System Release 7.17
ASTRO® 25
INTEGRATED VOICE AND DATA

Radio Features

NOVEMBER 2016

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Motorola Solutions Support Center

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- Before any software reload.
- To confirm troubleshooting results and analysis before removing and replacing a Field Replaceable Unit (FRU) and Field Replaceable Entity (FRE) to repair the system.

For...	Phone
United States Calls	**800-221-7144**
International Calls	**302-444-9800**

North America Parts Organization

For assistance in ordering replacement parts or identifying a part number, contact the Motorola Solutions Parts organization. Your first response when troubleshooting your system is to call the Motorola SSC.

For...	Phone
Phone Orders	**800-422-4210** (US and Canada Orders) For help identifying an item or part number, select choice 3 from the menu.
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Document History

Version	Description	Date
MN003349A01-A	Original release of the *Radio Features* manual.	November 2016

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About Radio Features

Radio features are the configured capabilities of subscriber units within the ASTRO® 25 Integrated Voice and Data System. Features include call types such as private, console, interconnect, emergency alert, talkgroup, multigroup, and agency group. Also covered are status messages, data services, and encryption. For requirements and considerations related to establishing a fleetmap, see the *Fleetmapping and Band Plan Management* manual.

What is Covered In This Manual

This manual contains the following chapters:

- Radio Features Description on page 23, provides a high-level description of radio features and the function they serve on your system.
- Radio Features – Technical Overview on page 47, describes the default records and software objects that support subscriber radio features.
- Radio Features – Configuration on page 59, details configuration procedures relating to radio features.
- Radio Features – Operation on page 87, details the tasks that you perform once the radio features are installed and operational on your system.
- Radio Features – Troubleshooting on page 95, describes troubleshooting of subscribers within the system, including voice quality, unit failure, voice connectivity, and data connectivity issues.

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	Provides standards and guidelines that should be followed when setting up a Motorola communications site. Also known as the R56 manual. This may be purchased on CD 9880384V83, by calling the North America Parts Organization at 800-422-4210 (or the international number: 302-444-9842)
Radio Control Manager manual and online help	Includes information and procedures on the use of the Radio Control Manager (RCM) application to monitor radio events, issue and monitor commands and make informational queries of system status.
Radio Control Manager Reports manual and online help	Provides a high-level description of the Radio Control Manager (RCM) Report features and the function it serves on your system.

Table continued…

Related Information	Purpose
User Configuration ManagerProvisioning Manager manual and online help	Covers the use of Provisioning ManagerCovers the use of User Configuration Manager (UCM) to configure system-level parameters, subscriber radios, subscriber radio users, talkgroups, security settings, and some ZoneWatch configuration objects.
Configuration Manager for Conventional Systems User Guide manual and online help.	Covers the use of the Configuration Manager application to configure conventional system parameters for consoles, channels and user objects.
MKM 7000 Console Alias Manager manual and online help	Provides information required to install, configure, and operate the optional MKM 7000 Console Alias Manager (CAM) solution for generating and managing aliases at the console site level.
PremierOne CAD User Guide (PremierOne solution)	Describes how to address ASTRO® radios, how to send text messages, send and receive queries, and how to use the person location feature from the perspective of a CAD dispatcher.
PremierOne Mobile User Guide (PremierOne solution)	Describes how to address ASTRO® radios, how to send text messages, send and receive queries, and how to use the person location feature from the perspective of a mobile user.
PremierOne Provisioning User Guide (PremierOne solution)	Describes how to configure ASTRO® radios, messaging, query, and the person location feature.
Smart Client User Guide (PremierOne solution)	Describes the Smart Client, an application used to provide text-messaging, address book, and optionally query functionality for ASTRO® 25 radios.
CPS Online Help	Contains the information on how to use the CPS software to program subscriber radios.
Motorola GGM 8000 Hardware User Guide	Contains basic information on the GGM 8000 gateway. Available on the Motorola Online website (http://businessonline.motorola.com). To access the manual, select **Resource Center → Product Information → Manuals → Network Infrastructure → Routers and Gateways**.
System Overview and Documentation	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. For an additional overview of the system, review the architecture and descriptive information in the manuals that apply to your system configuration.
Trunked Data Services Feature Guide	This manual describes the implementation and use of trunked data services on ASTRO® 25 IV&D systems. It covers the Trunked IV&D, including Classic Data and Enhanced Data, and the High Availability for Trunked IV&D (HA Data) feature.
For more details regarding subscriber radios, do one of the following • See Subscribers Radio Models on page 26. • Contact your Motorola representative • Visit the Motorola website at www.motorolasolutions.com	

Chapter 1

Radio Features Description

This chapter provides a high-level description of radio features and the function they serve on your system.

1.1 Subscribers General Information

Subscribers are the mobile or portable radios and desktop units with multiple frequency capability. They provide users with the ability to communicate in the system. Each one of these units is assigned a unique identification number and contains the logic circuitry necessary to operate with trunking and/or conventional channels.

- Subscribers accessing trunking channel resources can perform the following functions:
  - Generate and transmit requests for service in the form of data words that are then used to modulate the carrier frequency.
  - Interpret the data messages sent by the site controller.
  - Generate the frequency of the assigned voice channel.
  - Generate tones to advise the radio user about the status of the call request.
- Subscribers accessing conventional channel resources can perform the following functions:
  - Generate the frequency of the assigned voice channel.
  - Generate tones to advise the radio user about the status of the call request.
  - Receive a caller's PTT ID display.

1.1.1 Subscriber IDs

Each subscriber radio is assigned a unique ID which is used to identify the radio to the controller.

Subscriber IDs serve two purposes: identifying authorized subscribers, and associating radios with valid users. A radio is associated with a user through the subscriber ID or an alias. This association is performed in the User Configuration Manager (UCM)with the Provisioning Manager application.

Subscriber IDs serve two purposes: identifying authorized subscribers, and assigning radios to valid users. Using Provisioning Manager a radio is assigned to a user through the subscriber ID or an alias.

NOTICE: In case of systems equipped with MKM7000 Console Alias Manager software, aliases assigned in the UCMthe Provisioning Manager can be replaced with ones configured on the console. For details, see the *MKM 7000 Console Alias Manager* manual.

For security purposes, a subscriber ID helps identify who is responsible for a certain radio and helps determine if a radio is authorized on the system. The System Access Control record (SAC-record) maintains the list of IDs that are allowed to access the system. Radios are programmed with the CPS to operate on a system when the correct system key is used.

Subscribers can also be provisioned with an Authentication Key to prevent cloned radios from accessing the system.

NOTICE: The Subscriber Authentication feature works only in systems where the Authentication Center has been enabled. Radios must have the authentication feature enabled, and KVL keys provisioned.

The full ASTRO® 25 system individual ID range is from 1 to 16777215, with a maximum of 128,000 IDs available in a given system (including conventional units). Subscriber IDs in 3600 systems range from 700001 to 765534. As a result, after connecting a 3600 site to an ASTRO® 25 system, an ASTRO® 25 system radio with an ID number greater than 65534 (the leading “7” is omitted) cannot private call a 3600 radio. Also, since it does not fit in the SmartZone® ID range, its PTT-ID cannot appear on the 3600 radio's display.

MDC1200 channels and ACIM channels configured to be MDC1200 signaling-capable can be associated to a Conventional Channel Group configured for either the Standard or Non-Standard MDC ID Range. Channels configured for the Standard MDC ID Range do not support the Group and Wildcard MDC 1200 Addresses. These are IDs starting with E or containing F respectively and are not able to be used by the MCC 7500/7100 console for outbound signaling as it does not support Group or Wildcard Addressing. Channels configured for the Non-Standard MDC ID Range support Unit IDs starting with E or containing F. The MCC 7500/7100 console treats these IDs simply as additional Unit IDs on the MDC 1200 channels, effectively extending the number of Unit IDs that can be assigned to MDC subscriber radios and MCC consoles. Outbound signaling to Unit IDs on MDC 1200 channels part of a Non-Standard Channel Group is supported by the MCC 7500/7100 console.

1.1.2
Subscribers Supported Radio Features

Radio subscribers use the following radio features:

- Individual call services

  Individual calls are services that facilitate individual user to user communication.

  The following are individual type calls:

  - Private Calls
  - Interconnect Calls
- Group-based call services

  Group-based calls are services that facilitate group (one-to-many) communication.

  The following are examples of group-based calls:

  - Talkgroup Calls
  - Multigroup Calls
  - Agencygroup Calls
- Emergency services

  Emergency services are specialized, high-priority types of communication.

  The following are emergency type services:

  - Emergency Alarm
  - Emergency Call
- Data services

  Data services facilitate the exchange of data within an ASTRO® 25 system.

  They can be divided into:

  - Trunking data services
    + IV&D
    + Transit25
    + Enhanced Data Services
  - Conventional data services

    + ASTRO® 25 Conventional system with Integrated Data

- Supplementary Data Services
    - Call Alert
    - Status Request
    - Status Update
    - Message Update
    - Radio Check
    - Radio Enable/Disable
    - Remote Monitor
    - Continuous PTT Updating
- Radio security services

  Radio security services are the features that allow for secure communication within an ASTRO® 25 system.

  The following are subscriber security features:

    - Selective Radio Inhibit
    - Dynamic Regrouping
    - Encrypted Integrated Data
    - Subscriber Authentication
    - Over the Air Re-keying (OTAR)
    - End-to-End Encryption
- Other services
    - ASTRO® 25 system Portable Radio Scan Features
    - ISSI.1 Interoperability
    - PS LTE PTT Gateway Site
    - Talk Around Mode
    - Failsoft Mode
    - Outdoor Location
    - Messaging and Query
    - Increased Subsite Capability for IP Simulcast Trunking (32 subsite Capacity)
    - Site Selectable Alerts for Trunking
    - MDC 1200 Signaling

1.2

Subscribers Radio Models

The following tables contain features, encryption types and frequency bands for the mobile and portable subscriber radio and Consolette models available for use on ASTRO® 25 radio systems.

Table 1: Subscriber Models – Supported Features

Radio Model	Analog/ MDC1200/ ASTRO® 25 Conventional	3600 Trunking (analog and digital)	ASTRO® 25 FDMA Trunking	OTAR	IV&D	TDMA Trunking	Subscriber Authentication	Emergency at Invalid Sites
XTS1500 BN	✓	✓	✓	✗	✓	✗	✓	✓
XTS2500 BN	✓	✓	✓	✗ 1	✓	✗	✓	✓
XTS4000	✓	✓	✓	✓	✓	✗	✓	✗
XTS5000	✓	✓	✓	✓	✓	✗	✓	✓
XTL1500	✓	✓	✓	✗	✓	✗	✓	✓
XTL2500	✓	✓	✓	✗ 1	✓	✗	✓	✓
XTL5000**	✓	✓	✓	✓	✓	✗	✓	✓
ASTRO Spectra Plus	✓	✓	✓	✓	✓	✗	✗	✗
APX1000	✓	✓	✓	✗	✓	✓	✓	✓
APX1500	✓	✓	✓	✗	✓	✓	✓	✓
APX3000	✓	✓	✓	✓	✓	✓	✓	✓
APX4000	✓	✓	✓	✓	✓	✓	✓	✓
APX4500	✓	✓	✓	✓	✓	✓	✓	✓
APX6000	✓	✓	✓	✓	✓ 6	✓	✓	✓ 2
APX6000 XE	✓	✓	✓	✓	✓ 6	✓	✓	✓ 2
APX7000	✓	✓	✓	✓	✓ 6	✓	✓	✓ 2
APX7000 XE	✓	✓	✓	✓	✓ 6	✓	✓	✓ 2
APX6500	✓	✓	✓	✓	✓ 6	✓	✓	✓
APX7500[3]	✓	✓	✓	✓	✓ 6	✓	✓	✓
APX8000	✓	✓	✓	✓	✓	✓	✓	✓
XTS3000	✓	✓	✓ 4	✗ 5	✗	✗	✗	✗

Table continued…

Radio Model	Analog/ MDC1200/ ASTRO® 25 Conventional	3600 Trunking (analog and digital)	ASTRO® 25 FDMA Trunking	OTAR	IV&D	TDMA Trunking	Subscriber Authentication	Emergency at Invalid Sites
ASTRO Saber	✓	✓	✓ 4	✗ 5	✗	✗	✗	✗
ASTRO Spectra	✓	✓	✓ 4	✗ 5	✗	✗	✗	✗

[1] Tactical OTAR only.

[2] Portable APX subscribers in the DVRS mode can do an emergency alarm and emergency call but not when in an invalid site.

[3] Also available as a Consolette

[4] Only in 800 MHz.

[5] OTAR possible when radios based in a conventional system.

[6] APX radio models also support Enhanced Integrated Data feature.

NOTICE: The Phase 2 TDMA type of operation cannot be used together with the 900 MHz band.

Table 2: Types of Operation and Their Supported Encryption Types

Encryption Type	FDMA	TDMA
AES-256	✓	✓
DES-OFB	✓	✓
DES-XL	✓	✗
DVI-XL	✓	✗
DVP-XL*	✓	✗
ADP	✓	✓

* Even though this encryption type is supported on the APX7000/7500 subscriber models in all modes of operation, it is generally not used, as consoles do not support it.

Table 3: Subscriber Models – Supported Frequency Types

Subscriber Model	700 MHz	800 MHz	900 MHz	UHF	VHF
APX series	✓	✓	✓	✓	✓
XTL 2500/1500	✓	✓	✓ *	✓	✓
XTL (other models)	✓	✓	✗	✓	✓
XTS 2500/1500	✓	✓	✓ *	✓	✓
XTS (other models)	✓	✓	✗	✓	✓

Table continued…

Subscriber Model	700 MHz	800 MHz	900 MHz	UHF	VHF

* Only in:

- Analog Conventional
- MDC-1200 Conventional
- Analog Operation
- P25 Digital Conventional
- P25 FDMA Trunking

For more details regarding subscriber radios, contact your Motorola representative or visit the Motorola website at http://www.motorolasolutions.com.

1.3 Radio System Users

The radio system stores information about users, according to their individual location, and current group affiliation:

- **Radio users**: personnel using the trunked system are assigned a radio that is active in the system. A radio user is associated with a specific radio when the radio's ID is entered into the radio user's record in the UCMthe Provisioning Manager application. This relationship between a radio and a radio user allows you to change the radio a user is associated with at any particular time.A radio alias is name of a radio user assigned to the Radio ID.
- **Console users**: Personnel using the trunked system through an MCC 7500 console are assigned a radio user record in the database that is active in the system (no physical subscriber unit is involved). A console user is associated with a specific radio unit ID when the radio ID is entered into the console user's record in the UCM.
- Each console is assigned to a radio ID where each console user can have a radio alias associated with the radio ID. Personnel using the trunked system through a console are assigned a radio ID that is active in the system (no physical subscriber unit is involved). A console user is associated with a specific radio unit ID when the radio ID is entered into the console user's record in the Provisioning Manager.

1.4 ASTRO 25 Portable Radio Signaling Types

The following is a list of signaling types:

- ASTRO® 25 system FDMA trunking
- X2-TDMA Trunking
- P25 Phase 2 TDMA Trunking
- Analog Type II Trunking
- ASTRO® Type II Trunking
- ASTRO® P25 Conventional
- Analog Conventional
- MDC 1200 Conventional

1.5
Conventional Operation

Section Conventional Unit ID on page 50 contains general information on configuring conventional unit IDs. General information on configuring conventional channel groups is listed in section Conventional Channel Group on page 51 .

For information on configuring conventional sites and channels, see section Configuration for Conventional Sites and Channels on page 68 .

The list of subscriber models supporting conventional operation can be found in section Subscribers Radio Models on page 26 .

NOTICE: For more details regarding conventional operations, see the *Conventional Operations* manual.

1.6
ASTRO 25 Radio Features

This section provides the information on the following ASTRO® 25 system radio features:

- Call Services on page 29
- Data Services on page 33Enhanced Data Services on page 33
- Supplementary Data Services on page 35
- Radio Security Services on page 37
- Other Services on page 39

1.6.1
Call Services

Motorola trunked system supports several types of calls. They can be divided into:

- Individual Calls on page 29
- Group Calls on page 29

1.6.1.1
Individual Calls

There are two types of individual calls:

- Private calls (direct calls between two radios, or between a radio and a console operator)

  NOTICE: A special type of private call is the console call (direct call between a radio and a console operator).

- Interconnect calls (direct calls between a radio and a landline subscribera radio subscriber and a telephone user)

1.6.1.2
Group Calls

There are three types of group calls:

- Talkgroup calls (described in section Talkgroups on page 30)

  NOTICE: A special type of talkgroup call is the console call (console operator calling all talkgroup users).

- Multigroup calls (described in section Multigroups on page 31)

- Agencygroup calls (described in section Agencygroups on page 31)

Access types for all three types of call groups are described in section Talkgroup, Multigroup, and Agencygroup Access Types on page 31 .

NOTICE: Talkgroups, multigroups and agencygroups in a system supporting Dynamic Dual Mode (DDM) operation can be established as either FDMA-only, TDMA-only, or Dynamic. In systems that support DDM, trunked TDMA operation supports all of the call types that trunked FDMA operation supports in the TDMA mode. FDMA-only radios or radios at FDMA-only sites can interact with Dynamic Dual Mode (DDM) capable subscribers.

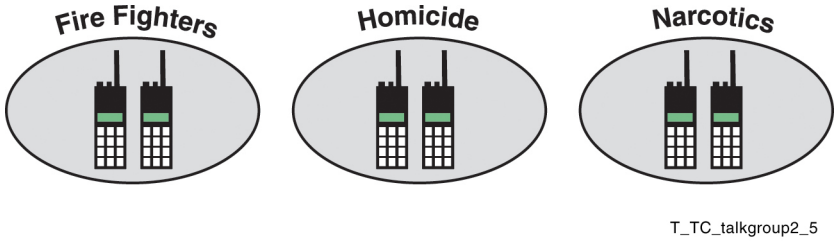
1.6.1.3
Talkgroups

A talkgroup is the basic unit of communication in a trunked system. In most organizations, radio users work in groups that are based on their functions and responsibilities. In a trunked radio system, these groups of radio users are assigned to communication talkgroups that reflect their function or responsibilities.

Programming of talkgroups in a radio is based on the communication needs of radio users. A radio is programmed with only one or with several talkgroups. Radio users selecting a particular talkgroup on their radios are assigned a voice channel when someone in the group requests talkgroup call services. Group privacy during conversations is provided since only one talkgroup is assigned to each voice channel.

Talkgroups are identified in the system by a unique six-digit ID. This ID ranges between 800001 and 865534, though only 16,000 of these IDs can be used at once.

Figure 1: Organization of Users in a Talkgroup (example)



NOTICE: For ASTRO® 25 system hardware that supports AMBE vocoding (for example base radios, consoles, and others) for Dynamic Dual Mode (FDMA/TDMA) operation, talkgroups multigroups and agencygroups are designated with one of the following access types: FDMA-only, TDMA-only, or Dynamic. For more details, see the *Call Processing/Mobility Management* manual. See the *User Configuration Manager* manual for creating a talkgroup with the Dynamic Dual Mode, FDMA-only, and TDMA-only Access Type parameter values.For details about creating a talkgroup with the Dynamic Dual Mode, FDMA-only, and TDMA-only Access Type parameter values, see the *Provisioning Manager* manual.

1.6.1.4
Conventional Talkgroups

A conventional talkgroup is a simple group of users on a single conventional talkgroup channel.

Using conventional talkgroups a console user is able to receive and transmit on the conventional talkgroups he is monitoring. Console dispatchers is monitoring talkgroups, not channels. A console user is not able to hear a conventional talkgroup he is not monitoring, but is able to see activity that would interfere with his conventional talkgroups and is able to tell if it was due to a subscriber, console or emergency call. Console user is also able to patch talkgroups between channels.

NOTICE:
See the *Conventional Operations* manual for more information on conventional talkgroups.

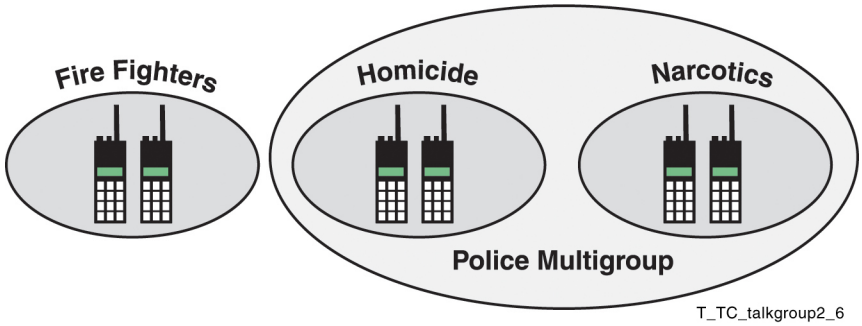
1.6.1.5

Multigroups

Several talkgroups are combined to form a multigroup (also called an announcement group). Multigroups are assigned a six-digit ID from the same pool of numbers as the talkgroups.

In this example, radio users in the narcotics and homicide talkgroups can hear calls placed to the police multigroup.

Figure 2: Organization of Talkgroups in Multigroups (example)

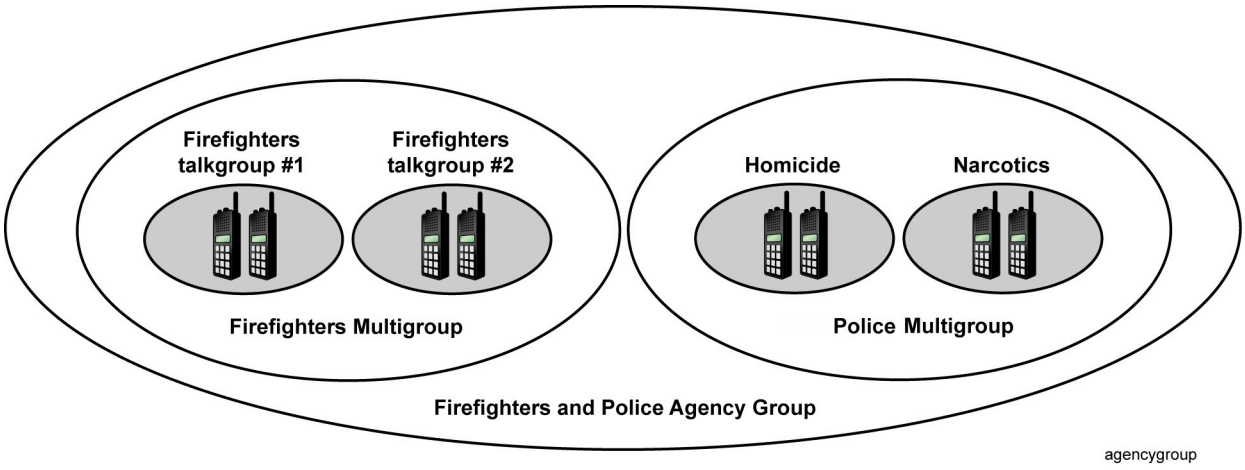


1.6.1.6

Agencygroups

Several multigroups are combined to form an agencygroup. Agencygroups are assigned a six-digit ID from the same pool of numbers as talkgroups or multigroups.

Figure 3: Organization of Multigroups in Agencygroups (example)



1.6.1.7

Talkgroup, Multigroup, and Agencygroup Access Types

Talkgroups, multigroups, and agencygroups can be configured as FDMA-only, TDMA-only, or Dynamic. When system elements (subscriber radios, base radios, consoles, and others) support AMBE vocoding of audio, talkgroups, multigroups, and agencygroups configured as TDMA-only or Dynamic can facilitate two voice calls (or slots) within a single 12.5 kHz voice channel. By designating talkgroups, multigroups and agencygroups as either FDMA-only or Dynamic, a capable system can

dynamically assign channel resources within the system to allow traditional subscriber radios (IMBE vocoding) to interact with TDMA-capable subscriber radios.

The AMBE+2 enhanced half-rate (EHR) audio vocoding method provides the basis for TDMA to be able to facilitate two voice calls within a single 12.5 kHz voice channel. It also improves in-audio quality, making its audio performance in Enhanced Half Rate mode (TDMA over the air) equivalent to the IMBE full rate (APCO Phase 1) vocoding.

The APX subscriber radios employ AMBE+2 enhanced full rate vocoding for FDMA calls and AMBE+2 enhanced half rate vocoding for TDMA calls. The AMBE+2 enhanced full rate (EFR) is fully interoperable and backwards-compatible with the IMBE full-rate vocoder used in FDMA (APCO Phase 1).

The system does not allow an FDMA-only radio to be dynamically regrouped to a TDMA-only talkgroup.

NOTICE: See the *User Configuration Manager* manual for information on creating a talkgroup with the Dynamic Dual Mode, FDMA-only, and TDMA-only Access Type parameter values.For details about creating a talkgroup with the Dynamic Dual Mode, FDMA-only, and TDMA-only Access Type parameter values, see the *Provisioning Manager* manual.

1.6.1.8
Alias Group Download

Alias Group Download provides radio system administrators with the ability to utilize the Provisioning Manager application to update the Push-To-Talk (PTT) ID alias information for APX radios utilizing group services. The updated radio PTT ID alias is sent to a voice talkgroup upon radio user pressing PTT.

The Alias Group Download feature eliminates the need to do a radio codeplug update to change the radio PTT ID alias, saving time, and eliminating errors caused by manually entering the alias information in two places.

However,if your system runs with no hangtime or transmission trunking, this feature is not available.

1.6.1.9
Talkgroup Select Assist

Geo Talkgroup Select Assist provides the ability to dynamically change a radio’s operating talkgroup based on its current location.

Outdoor location is used to track location of radios, either via a cadence or distance update. MotoMapper application can be used to draw borders on a map that results in a talkgroup change on radios in the “fence”. Upon entering or exiting a geo-fence, radio is issued a dynamic regroup command to change talkgroup. When a fence is drawn, any radio in the fence is dynamically regrouped to appropriate TG. Radio alerts user of change of talkgroup and loss of GPS

User is able to create, disable, enable and delete GeoFence boundaries. Boundaries may overlap and are assigned priorities. Radio’s talkgroup is controlled by the highest priority GeoFence in which the radio is located and is a target.

Boundaries of the GeoFence are displayed on the MotoMapping Client map. You are able to see which GeoFence Boundary is controlling a Subscriber’s talkgroup, and also radios not associated with the GeoFence in which they are located.

It is indicated on the radio that the radio has been regrouped to a new talkgroup and the current talkgroup selection has been changed.

It is achieved by updating radio’s position based location update. Radio sends GPS based on distance traveled.

1.6.2
Emergency Services

Emergency services are specialized, high-priority types of communication. They can be divided into:

Emergency Call on page 33

Emergency Alarm on page 33

NOTICE: For an ASTRO® 25 system interfacing with an ASTRO® 3.1 system conventional site (A3.1 coexistence), Emergency acknowledgment (ACK) and Call Alert ACK may source from any attached console system. This means that it may not be apparent which console may have acknowledged the request or which console may have sent a Call Alert.

NOTICE: The Emergency at Invalid Sites feature enables subscribers to register at sites they are normally not allowed to access (Site Access Denial). In order for the site to accept them, they need to either be sending an emergency alert or making an emergency call. When an SU enters the emergency mode at an invalid site, it sends a mobility message(s), to the infrastructure, indicating its emergency mode. The mobility message(s) are sent to the first “not valid” site with an acceptable RSSI.

Regardless of a subscriber emergency mode, this feature will not work when there is FDMA-TDMA incompatibility between the subscriber or its talkgroup, and the site.

For details, see the *Call Processing/Mobility Management* manual.

1.6.2.1
Emergency Call

An emergency call can be either a group call or an announcement call. Emergency call is a group call with the highest queuing priority. When the system is busy, emergency calls are set up immediately by ruthlessly preempting the lowest priority call in progress. The lowest priority call is dropped and the required resources immediately granted to the emergency call.

1.6.2.2
Emergency Alarm

Emergency alarm is a data-only signal that alerts a console operator to a subscriber with an emergency condition. Since these messages are sent on the control channel and do not require a voice resource, they are not queued or busied with an acceptable RSSI. Following the receipt of the registration message with the emergency bit set, the site will allow the radio to access the usually invalid site for the duration of the emergency event.

1.6.3
Data Services

This section describes the following features:

- Trunking Data ServicesEnhanced Data Services on page 33
- Conventional Data Services on page 34

1.6.3.1
Enhanced Data Services

Enhanced Data is a Motorola Solutions proprietary (not P25 standard) inbound-only packet data service optimized for applications that periodically send short messages from a subscriber or attached device to a host in the Customer Enterprise Network (CEN). Enhanced Data is only supported on ASTRO® 25 Trunked IV&D systems with GTR series site equipment and APX subscriber units. Datagrams carried via Enhanced Data must use UDP/IPv4 for network transport between the

subscriber or attached device and the CEN. The subscriber uses the Enhanced Data service when the following conditions are met:

- The radio has the Enhanced Data option.
- Radio is enabled for Enhanced Data in the Provisioning Manager application.
- The UDP Destination Port number in an inbound datagram matches one of the Enhanced Data Port numbers in the subscriber, configured through Customer Programming Software (CPS).
- The site includes a channel enabled for Reserved Access capability, which means that the channel supports Enhanced Data.
- Message size does not exceed the maximum packet size allowed for Enhanced Data. If the message is over the limit, it can be sent via classic, depending on a radio setting.

Neither TCP nor IPv6 are supported for datagram transport. Optionally, either Header Compression (UDP/IP) or IPSec encryption via the Encrypted Integrated Data (EID) feature can be used together with Enhanced Data. An Enhanced Data message can contain a maximum of 384 bytes of data, including user payload and all headers. Any data messages larger than this size are sent using Classic Data.

Enhanced Data introduces a new type of data channel to support short, periodic inbound data messages, such as Location (supported systems: GNSS, BeiDou, Glonass, Galileo). The Enhanced Data channel is a trunked resource at a Radio Frequency (RF) site and is allocated on first request from an Enhanced Data subscriber, then dynamically based on a periodic evaluation of the Enhanced Data load at the site. The Enhanced Data channel is based on the timing and signaling characteristics of the Phase 2 TDMA channel. However, both logical TDMA channels are used in tandem to provide Enhanced Data service. It is not possible to run Enhanced Data on one logical channel and voice on the other logical channel. Only inbound packet data messaging is supported. No outbound packet data messaging is supported on Enhanced Data channels. Context activation on a Classic Data channel is required before Enhanced Data messaging can be performed.

An inbound datagram is sent using a reservation scheme where the subscriber computes the number of TDMA time slots required to send the message and makes a request to the infrastructure for the slots. The infrastructure schedules the requested slots, and the scheduling is communicated to the subscriber via outbound signaling on the Enhanced Data channel. The subscriber then sends its message using the assigned scheduling, and each slot is acknowledged by the infrastructure over the air. Any slots of data that are not successfully acknowledged are retransmitted by the subscriber. Retries are performed until the infrastructure indicates the entire message has been successfully received or a predefined retry limit has been reached.

The Enhanced Data feature increases the safety of field users, by providing a practical outdoor tracking solution. The feature provides each active subscriber with an inbound data service for sending in periodic location and status updates. These short messages are used by dispatchers to track the radio users' status and location on Computer Aided Dispatch (CAD) consoles. Enhanced Data ensures a wide-area, mission-critical, portable and mobile coverage and offers a better utilization of the system resources. Enhanced Data is optimized for variable reporting rates and designed to support applications with message profiles similar to Location, such as PremierOne™ Responder Location.

The Enhanced Data feature can be used by Public Safety agencies, including police, fire, and EMS, as well as Transit agencies and city services, such as snow plow fleets.

1.6.3.2
Conventional Data Services

The ASTRO® 25 Conventional system with Integrated Data feature of the ASTRO® 25 communication system provides a wireless extension through the radio communication infrastructure between the data network and mobile data devices. Data travels between the fixed wireline network and the wireless clients on the Motorola ASTRO® 25 system communication network over conventional resources.

This feature supports unicast and group (broadcast) conventional data. Data can be encrypted or secure.

1.6.4
Supplementary Data Services

This section describes the following features:

1.6.4.1
Call Alert

Call Alert is a feature that allows an authorized caller to signal an audible and visual alert to a called radio as well as leave a notification of the call alert, if the radio was unattended at the time of the call.

The alert happens on the control channel and doesn't require a voice channel to be free. There is no voice communication involved in a Call Alert.

The Call Alert feature provides an authorized caller the ability to send an audible and visual alert signal to a subscriber radio. Call Alert is a Private Radio Network Management (PRNM) Suite function that allows an authorized caller to leave a notification in an unattended radio in order to indicate that a system user wishes to communicate with the user of the alerted radio. The initiator of a Call Alert may be a dispatcher or another subscriber unit user. Because it does not involve voice communication, the call alert is sent over the control channel and therefore use of this feature does not require a voice channel to be available. For details see Using Call Alert on page 90.

The Call Alert feature provides an authorized caller the ability to send an audible and visual alert signal to a subscriber radio. Call Alert is a function that allows an authorized caller to leave a notification in an unattended radio in order to indicate that a system user wishes to communicate with the user of the alerted radio. The initiator of a Call Alert may be a dispatcher or another subscriber unit user. Because it does not involve voice communication, the call alert is sent over the control channel and therefore use of this feature does not require a voice channel to be available. For details see Using Call Alert on page 90.

1.6.4.2
Status Request

A radio user can send a predefined radio status message over the air, without talking. This event quickly informs the user of the radio’s current operating condition without interrupting normal talkgroup communication. (A properly configured radio is required).

A console user can send a status request message over the air to the subscriber radio without talking. This event informs the console of the subscriber radio’s current operating condition without interrupting normal group communication. (A properly configured radio is required).

1.6.4.3
Status Update

The Status Update feature enables the status of a radio user (for example, en-route, on-scene, on-break, and others) to be automatically reported to the dispatcher console operator monitoring the channel when the radio user status changes. The status is persistent until the radio changes its status.

If a dispatch console goes offline and then back online again, which results in the state of the radio user being lost, the dispatcher can query the radios for their current status. This is useful to keep track of the status of various radio users to more effectively manage radio system users.

NOTICE: The Status Update signaling feature is supported in site conventional mode; however, if messages in a message set contain aliases for the numeric message or status values, then those alias references are not available in the Conventional Site Controller (cannot be referenced from the Zone Controller). In site conventional mode, the zone controller is unavailable, so the console only receives the Unit ID and numeric value for the Message or Status information. Aliasing of Unit IDs is not supported in Site Conventional Mode.

1.6.4.4
Message Update

Message Update is a signaling feature that enables subscriber radios to transmit predefined and/or numeric messages.

NOTICE:
Message Update is available only for 3600 systems (conventional and trunking)Message Update is available only for MDC 1200 conventional and 3600 trunking systems. For P25 9600 systems, see section Messaging and Query on page 44.

The Message Update signaling feature is supported in site conventional mode, however, if the messages in a message set contain aliases for the numeric message or status values, then those alias references are not available in the Conventional Site Controller (cannot be referenced from the Zone Controller). In site conventional mode, the zone controller is unavailable so the console only receives the Unit ID and numeric value for the Message or Status information. Aliasing of Unit IDs is not supported in Site Conventional Mode.

Use of supplementary data messages (non-voice communications from radio users to dispatchers) can reduce voice traffic on a conventional channel resource. Using data messages reduces loading on the channel to allow more users to effectively use the channel and to reduce interruptions for other radio users who do not need the information being sent to the dispatcher.

1.6.4.5
Radio Check

The Radio Check feature allows a system operator to "ping" a radio to see if it is turned on and within range of the system. There is no audible or visual alert to the radio operator other than a momentary flash of the radio "transmit" indicator.

1.6.4.6
Radio Enable/Disable

Radio Enable/Radio Disable is a signaling feature that allows the console operator to enable or disable a subscriber radio.

Lost or stolen subscriber radios must not be allowed to be used for unauthorized purposes. The radio enable/disable feature can prevent unauthorized people from listening to or interrupting communications using a lost or stolen radio by the console operator the render the radio inoperable (radio disable). Once the radio is recovered, the console operator can once again enable the radio and return it to normal operation.

1.6.4.7
Remote Monitor

Remote Monitor is a console feature that allows a console position to activate the transmit audio circuitry of the desired subscriber radio and key its transmitter. This allows a console operator to hear what is going on at the subscriber end to determine the safety and welfare of a radio user. For more information, see the “Using the Remote Monitor” section in the “Radio Features – Operation” chapter.

1.6.4.8
Continuous PTT Updating

This feature allows ASTRO® 25 system radios to receive and display the decimal ID of the transmitting radio in the talkgroup. The ID will display throughout the duration of the call. The Emergency ID display alternates between displaying emergency and flashing the unit ID. The operation is the same with control stations.

1.6.4.9
Location on PTT

All radios in the talkgroup can report their location during an emergency call initiated by one of the users of that talkgroup.

Intelligent Middleware enables displaying Location upon PTT for all group calls or emergency calls only (location displayed in mapping applications). There is support for Digital Vehicular Repeater System (DVRS) for trunking.

1.6.5
Radio Security Services

Unauthorized personnel can use lost or stolen radios with the proper encryption keys. To prevent misuse, never leave radios unattended and store them in a secure location when not in use. Plan for quick removal of the encryption keys in a situation when security is compromised. Use the subscriber lock feature to password-protect the radio.

In addition to keeping radios physically secure, Subscriber Lock feature (described in section Subscriber Lock on page 37), selective radio inhibit and dynamic regrouping commands (described in sections Selective Radio Inhibit on page 37 and Dynamic Regrouping on page 38) can increase radio security if a radio is lost or stolen.

Having applied the basic security guidelines, you can also use the following security features:

- Encrypted Integrated Data on page 38
- Subscriber Authentication on page 38
- Over the Air Re-keying on page 39
- End-to-End Encryption on page 39

1.6.5.1
Subscriber Lock

When not in use, the subscriber can be locked and password-protected so that only the authorized person can use it.

1.6.5.2
Selective Radio Inhibit

To inhibit radios that are lost or stolen, the selective radio inhibit command is used in the Radio Control Manager (RCM) application. It allows you to remotely remove select radio(s) from service.

Security groups, in the User Configuration Manager (UCM), manage which user logins have RCM access to which radios.Security groups established in the Provisioning Manager application manage which user logins have RCM access to which radios.

1.6.5.3
Dynamic Regrouping

Using the Radio Control Manager (RCM) application, you can dynamically regroup a radio. The Regroup command allows you to assign a talkgroup to a radio without adding the talkgroup to the radio's programming. The Regroup and Lock command can be used to isolate the radio from all other talkgroups that are programmed into the radio by locking the radio onto only the dynamically assign talkgroup.

Security groups, in the User Configuration Manager (UCM),, manage which User logins have RCM access to which radios.

NOTICE: The system does not allow an FDMA-only radio to be dynamically regrouped to a TDMA-only talkgroup.

1.6.5.4
Encrypted Integrated Data

The Encrypted Integrated Data (EID) feature provides data encryption services to ASTRO® 25 system Integrated Voice and Data (IV&D) IP Bearer services between the Customer Enterprise Network (CEN) and subscriber radios. This encryption service provides data encryption, decryption, and authentication between each EID-enabled subscriber radio and a new device in the CEN called a PDEG Encryption Unit (PDEG), by using the Internet Protocol Security (IPsec) protocol. The IPsec defines encryption, authentication, and key management routines for ensuring the privacy, integrity, and authenticity of data in the system. The encryption algorithm used is Advanced Encryption Standard (AES). The subscriber radio and PDEG data encryption keys can be centrally managed using a Key Management Facility (KMF) server in the CEN.

Using the EID feature, you can secure data sent using ASTRO® 25 system IP bearer service between the CEN and subscriber radio, including data sent between CEN applications and subscriber radio internal or external applications. Data remains encrypted between the IPsec tunnel endpoint within the subscriber radio and the IPsec tunnel endpoint within the PDEG located in the CEN.

For more information on the EID encryption, see the *Encrypted Integrated Data Feature Guide* manual.

1.6.5.5
Subscriber Authentication

The Subscriber Authentication feature has been designed to enhance subscriber access control. Its aim is to prevent cloned radios from accessing the ASTRO® 25 trunking system and causing problems such as theft of resources, theft of service, or disruption of operations.

Each subscriber unit is provided with a different authentication key. When it attempts to connect to a site, the following happens:

1. It receives a challenge message and is supposed to give the appropriate response, based on its authentication key.
2. The Authentication Center previously contacted the Zone Controller, where keys assigned to subscribers are stored and – based on this information – the Zone Controller generates a response that will be expected from the subscriber.
3. In order to learn what the appropriate response is, the site has to contact the Zone Controller. The Zone Controller forwards the expected response to the site, enabling it to compare the information received from the Zone Controller with the information received from the subscriber unit.

4 Depending on the result of this comparison, the subscriber unit is either accepted or rejected at the site.

NOTICE: The Subscriber Authentication feature works only in systems where the Authentication Center has been enabled. The radios need to be preconfigured using the KVL 4000 device, with the authentication key that is loaded into the Authentication Center.

For the list of subscriber models supporting the Subscriber Authentication feature, see section Subscribers Radio Models on page 26 .

For more information on this feature, see the *Radio Authentication* manual.

1.6.5.6
Over the Air Re-keying

For security purposes, it is possible to reload subscriber encryption keys without the need to physically connect the subscriber to the Key Variable Loader. The new keys are sent using radio transmission. This is referred to as Over the Air Re-keying (OTAR).

For the list of subscriber models supporting the OTAR feature, see section Subscribers Radio Models on page 26 .

1.6.5.7
End-to-End Encryption

End-to-End Encryption, or Secure Voice, is an overlay service that allows secure (digital or analog encryption) communication between MCC 7500 Dispatch Consoles and radio units in the field. Encryption/decryption services are provided by the system endpoints: console, logging interface, and field radio units, so communication remains secure between the source and the destination.

End-to-End Encryption, or Secure Voice, is an overlay service that allows secure communication between MCC 7500 Dispatch Consoles and radio units in the field. Encryption/decryption services are provided by the system endpoints: console, logging interface, and field radio units, so communication remains secure between the source and the destination.

1.6.6
Other Services

Other available services include:

- ASTRO 25 Portable Radio Scan Features on page 40
- ISSI.1 InteroperabilityISSI Inter-RF Subsystem Interface on page 40
- WAVE 7000 Site on page 41
- Talk Around Mode on page 42
- Simulcast Subsystem Failsoft Mode on page 42
- Outdoor Location on page 43
- Intelligent Middleware on page 44
- Messaging and Query on page 44
- Increased Subsite Capability for IP Simulcast Trunking (32 subsite Capacity) on page 45
- Site Selectable Alerts for Trunking on page 45

1.6.6.1

ASTRO 25 Portable Radio Scan Features

A subscriber can be set up to monitor activity on a configurable list of channels. The following are the available radio scan types:

Scan – both priority and non-priority scan

- Conventional scan
- Conventional Priority scan
- Trunking talkgroup scan
- Trunking Priority scan
- Mixed Conventional / Talkgroup scan
- Multi-System Trunking Scan
- Vote Scan
- Data Scan

NOTICE: For an agency call and a subscriber radio that is priority scanning, any agencygroup must be affiliated to a talkgroup which is part of the agencygroup hierarchy.

1.6.6.2

ISSI.1 InteroperabilityISSI Inter-RF Subsystem Interface

The ISSI.1 Network Gateway is a feature that provides wireline interoperability among different P25-compliant networks. The software application provided with this feature connects disparate trunked networks with the same or different System and Wide Area Communication Network (WACN) IDs. The hardware is based on the Sun Netra™ T5220 server, which consists of the Solaris operating system and Generic Application Server software, however, for an alternative solution to interoperability, see the*ISSI 8000 / CSSI 8000* manual.

Systems connected through the ISSI.1 Network Gateway need to be compliant with APCO Project 25 (P25). P25 is a standard for interoperable digital Land Mobile Radio (LMR). It has been adopted by a growing number of public safety organizations worldwide as the standard for interoperable communications. The P25 standard allows interoperability with P25 compliant systems from multiple vendors. P25 radios from multiple vendors can communicate digitally over P25 networks, and also operate in analog mode to operate with legacy equipment.

Project 25 standards include guidelines for interoperability between different P25 compliant RF systems. The Motorola ASTRO® 25 system provides two solutions:

- ISSI.1 (Inter Subsystem Interface) Network Gateway
- ISSI 8000 / CSSI 8000 (Inter-RF Subsystem Interface / Console Subsystem Interface)

ISSI.1

The ISSI.1 (Inter SubSystem Interface) Network Gateway feature which provided wireline interoperability between disparate APCO Project 25-compliant (P25) trunked networks which by implementing use of the same or different System and Wide Area Communication Network (WACN) IDs. The ISSI.1 Network Gateway was based on software running on a Sun Netra™ server with the Solaris operating system and Generic Application Server software. With ISSI.1, the ISSI.1 Network Gateway supported up to a maximum of 27 simultaneous trunked calls between systems and a maximum of 60 interoperability talkgroup pairs to allow agencies to roam and communicate across larger coverage areas, greatly enhancing overall coordination and effectiveness of multi-agency operations.

NOTICE: For more information, see the *ISSI.1 Network Gateway Feature Guide* manual.

ISSI 8000/CSSI 8000

The ISSI 8000/CSSI 8000 feature is the “next generation” of ISSI.1 and will support interoperability between disparate APCO Project 25-compliant (P25) systems and consoles to interface with an ASTRO® 25 system. The heart of this feature is the ISGW (Inter-Subsystem Gateway) software running on a Linux platform. A distinguishing characteristic of the ISSI 8000/CSSI 8000 solution is the fact that this feature allows foreign subscriber PTT IDs to be displayed at console operator positions in the ASTRO® 25 system With ISSI 8000, a mobile or portable subscriber radio user can place and receive voice calls across an ISSI network. These mobile or portable subscriber radios may be home radios operating in the home system, home radios operating in a foreign system, foreign radios operating in a home system, foreign radios operating in the foreign system.

NOTICE: For more information, see *ISSI 8000/CSSI 8000 Intersystem Gateway Feature Guide* manual.

Subscriber Radios - Automatic Roaming and Preferred System

Motorola mobile or portable subscriber radios capable of automatically roaming to other systems are configured to identify preference for a “Preferred System” to accommodate coverage situations where the coverage area of a home system and neighboring system overlap. The “Preferred System” operation for Motorola Solutions mobile or portable subscriber radios support fast, automatic roaming to support ISSI. When configured for a “Preferred System”, the Motorola Solutions mobile or portable subscriber radio prefers one system over another system when two or more systems are within an acceptable coverage range. Configured with the MultiSystem coverage type, automatic roaming to foreign systems is supported where control channel frequencies from foreign systems are programmed into the subscriber radio codeplug. To support affiliation to foreign talkgroups, subscriber radios can add foreign talkgroup/alias information to the subscriber personality, configured to support alias display for calls from foreign subscribers, and programmed to add foreign subscriber ID/alias to call list.

NOTICE: For more detailed information regarding mobile or portable subscriber radios, see your Motorola field representative.

Automatic Roaming is only supported in RF sites supported by G-series equipment (GCP8000 Site Controller, GCM 8000 Comparator, GTR 8000 Base Radio). QUANTAR-based RF sites do not support Automatic Roaming.

1.6.6.3
Dynamic Transcoding Feature

Dynamic transcoding allows talkgroup calls and unit-to-unit (private) calls to communicate between TDMA channels and FDMA channels at different sites. Dynamic transcoding allows Dynamic Dual Mode (DDM) channels to be granted in TDMA mode in the same call that includes an FDMA-only channel at another site, thus preserving channel bandwidth at the TDMA-capable site.

See the *Dynamic Transcoder User Guide* for details.

1.6.6.4
WAVE 7000 Site

The WAVE 7000 site consists of a redundant pair of WAVE 7000 servers, site switches, and site routers. The WAVE 7000 site provides wireline interoperability between an ASTRO® 25 system and a PS LTE system.

1.6.6.4.1
WAVE 7000 Site Modes of Operation

The WAVE 7000 site can provide communication between the ASTRO® 25 system and the PS LTE system as long as the following conditions are met:

- The The WAVE 7000 servers and the Site Relay Module are enabled
- Connectivity to the ASTRO® 25 system exists and is operational

A The WAVE 7000 site cannot provide communication between the ASTRO® 25 system and the PS LTE system sites, if one of the following happens:

- The link to Zone Controller is down
- One of the devices has been disabled

1.6.6.5
Talk Around Mode

In a Talk Around mode, a radio transmits (in simplex mode) to other radios that are in a line-of-sight coverage area. It is used when a trunked radio cannot find a trunked RF site which is operating in either Wide Area, Site Trunking or Site Failsoft mode.

This mode must be pre-configured in the radio, and must be manually selected by the operator.

1.6.6.6
Simulcast Subsystem Failsoft Mode

There are two types of Failsoft available depending on the type of site/subsystem:

- Site Failsoft is available for both ASTRO® 25 Repeater sites and Simulcast subsystems (Circuit-based and IP-based).
- Site Subsystem Failsoft is available for both Circuit-based and IP-based Simulcast subsystems.
- Local Failsoft is only available for IP Simulcast Subsites which are part of M1, M2, M3, L1, or L2 system configurations.Local Failsoft is only available for IP Simulcast Subsites which are part of M1, M2, M3, or L core system configurations. Local Failsoft is a configurable item on each base radio.

NOTICE: An ISR site enters an in-cabinet repeat mode for failsoft. A Simulcast or STRV type system enter sub-system wide failsoft with repeat happening through comparator voting.

Site Subsystem Failsoft

can be used when a major failure such as the loss of all Site Controllers at an ASTRO® 25 Repeater Site or a Simulcast Subsystem Prime Site occurs. When this type of major failure occurs, the subsystem can no longer maintain a control channel for use by the subscriber radios operating within the site/subsystem. When this happens, the subscriber radios try to locate another control channel at another repeater site or simulcast subsystem. If the subscriber radios cannot locate another control channel on which to operate and if the following conditions are met, the subscriber radios operate in Site Failsoft:

- One or more channels within the site/subsystem have been configured for Site Failsoft.
- The subscriber radios are configured for Failsoft operation.

With these conditions met, the subscriber radio enter a two-way conventional mode of operation on a given Failsoft channel. While in Failsoft, subscriber radio is limited to communicating only with other subscriber radio on the same Failsoft channel. The channel transmits a beep tone used for Failsoft to notify the radio user that the subscriber radio is operating on a Failsoft channel.

NOTICE: Failsoft call traffic is still being voted and simulcasted by the available channel resources.

The subscriber radios can be configured for the following modes of Failsoft operations:

- Failsoft by last known control channel – all talkgroups at a site/subsystem use the last known control channel transmit/receive frequency pair in a conventional mode

- Failsoft by Personality – subscriber radio uses a predefined channel transmit/receive frequency pair in a conventional mode for all talkgroups configured under a given personality in the subscriber radio.
- Failsoft by Talkgroup – subscriber radio uses a predefined channel transmit/receive frequency pair in a conventional mode for a specific talkgroup
- Failsoft Disabled – subscriber radio displays an “Out of Range” indication and no site-based RF communications are possible

Subscriber radios automatically exit Failsoft operation when a control channel is detected and the subscriber radio has synchronized with the site/subsystem.

Local Failsoft can be used when a critical failure occurs involving the IP Simulcast Prime Site, or the links between the IP Simulcast Primary Site and an IP Simulcast Subsite are not functioning. Critical failures can be caused by either of the following:

- The comparators at the Simulcast Prime Site are inoperable
- An IP Simulcast Subsite has lost its links to the comparators at the IP Simulcast Prime Site

Under this type of failure, and if one or more of the base radios at a subsite have been configured to transmit, a special Failsoft LC message, a subscriber enters Failsoft mode based on its programming.

Under this type of failure, and if one or more of the Multi-Site Base Radio (MsBR) at a subsite have been configured for Local Failsoft, the MsBR enters Local Failsoft mode based on its configuration. MsBRs configured for Local Failsoft transmit a special Failsoft message indicating Local Failsoft.

The timing of the Local Failsoft alarm tone is different than the Site Failsoft beep tone, so that the radio user is able to distinguish between Local Failsoft and Site (subsystem) Failsoft.

The base radio automatically exits Local Failsoft operation, after detecting that the link to the comparator has been reestablished, or when the Local Failsoft configuration has been disabled on the base radios. The subscriber radios automatically exit Failsoft operation when a control channel is detected and subscriber radio has synchronized with the control channel.

NOTICE: Any channels frequencies in use for Local Failsoft must be disabled at all other subsites, while Local Failsoft base radios are transmitting to avoid RF interference between the base radios at the different subsites. Use caution when configuring MsBRs for Local Failsoft. As the MsBR in Local Failsoft mode key locally on a simulcast frequency, destructive interference occurs on the same channel if other sub-sites of the simulcast sub-system transmit on the channel and are within the RF coverage range of the MsBR.

1.6.6.7

Outdoor Location

The ASTRO® 25 system Outdoor Location solution is a resource tracking solution that uses Global Navigation Satellite System (GNSS) satellites to provide operators with the ability to locate and track vehicles and personnel that operate outdoors. This can help reduce response time (dispatcher contacts a unit located closest to an emergency). Also, thanks to input sensors and available output options, various everyday tasks of a radio user can be simplified, and the dispatcher provided with immediate feedback on the current situation.

Available radio accessories include:

- GPS Remote Speaker Microphone
- Cellocator device
- Trimble Placer Gold Asset Protection Unit (APU)
- Trimble Placer Gold APU with Dead Reckoning Unit (DRU)

For detailed information on the Outdoor Location feature, refer to:

- *Intelligent Middleware Administrative Operation* manual.

- *Intelligent Middleware Installation and Configuration* manual in the Intelligent Middleware documentation set.

1.6.6.8
Intelligent Middleware

Intelligent Middleware is a suite of services with a common Application Programming Interface (API) to support network functions in ASTRO® 25 systems.

- The Intelligent Middleware Presence Service provides the ability for an application to publish and receive device and user presence data.
- The Intelligent Middleware Location Service provides the ability for third-party applications to monitor and archive the current location of Global Navigation Satellite System (GNSS)-based location reporting devices.

Intelligent Middleware is a subcomponent of many ASTRO® 25 system applications, including:

- ASTRO® 25 Outdoor Location Solution
- ASTRO® 25 Advanced Messaging Solution (AAMS)

The ASTRO® 25 Outdoor Location solution is a resource tracking solution that uses GNSS satellites to provide operators with the ability to locate and track vehicles and personnel that operate outdoors.

Available radio accessories include:

- GPS Remote Speaker Microphone
- Cellocator device
- Trimble Placer Gold Asset Protection Unit (APU)
- Trimble Placer Gold APU with Dead Reckoning Unit (DRU)

The ASTRO Advanced Messaging Solution (AAMS) solution enables text messaging to be sent to/from ASTRO subscribers.

MotoMapping is a mapping application that is used with the UNS Location Service, through which vehicle tracking and personnel location services are delivered in a graphical display.

For detailed information, refer to the following manuals in the Intelligent Middleware documentation set:

- *Intelligent Middleware Administrative Operation*
- *Intelligent Middleware Configuration Manager User Guide*
- *ASTRO 25 Outdoor Location Solution Feature Manual*
- *MotoMapping User Guide*

1.6.6.9
Messaging and Query

Messaging and Query is a feature that permits key notifications (for example, dispatch notifications, emergency messages, and query responses) to be sent to message capable radios such as APX, XTS, and XTL models.

NOTICE: This is an optional feature; available only if preconfigured in both infrastructure and the subscriber unit. This feature is available in P25 9600 trunking and conventional systems.

For more information, see the following manuals:

- *PremierOne CAD User Guide*
- *PremierOne Mobile User Guide*
- *PremierOne Provisioning User Guide*

1.6.6.10

Increased Subsite Capability for IP Simulcast Trunking (32 subsite Capacity)

This feature increased the number of trunking subsites in an ASTRO 25 system from the currently supported 15 IP simulcast trunking subsites, to 32 IP simulcast trunking subsites to improve Simulcast coverage without adding new frequencies.

A large number of subscribers are typically served by a Simulcast subsystem and a subsystem-wide control channel outage could cause them all to scatter at once to neighboring sites. This can be disruptive to the overall system and must be avoided even in the most basic deployment configurations.

This feature provides subscriber and base station functionality which will minimize the likelihood of widespread radio scatter during transport network failure and recovery. Upon the loss of packets from the prime site, the base station sends a proprietary control channel message to the subscribers. This message is used primarily to extend the period of time that a subscriber stays on the active site prior to searching for neighboring sites. If the subscriber finds a control channel at the site during this extended period, it will lock onto it and resume normal processing. If no control channel is found at the site during this period, the subscriber proceeds with its normal control channel search sequence which may include scanning for neighboring sites. Note also that this extended search period may be exited as a result of user initiated actions such as PTT, manual system selection, emergency call, emergency alarm, call alert, etc.

NOTICE: The subscribers need to be upgraded to the latest software release to support this feature.

1.6.6.11

Site Selectable Alerts for Trunking

This feature enables alerting all radios at a RF Site via an audible alert that is played periodically over a lengthy time period. The radios also display the CPS preconfigured alert alias with intelligent lighting which corresponds to the alert message.

Site Selectable Alert (SSA) is initiated by a specially provisioned (Supervisor) Subscriber unit registered to a site in the system. Supervisor subscriber unit signals the desired alert (15 possible alerts) to a target site or sites where the alert is to be broadcast. Targeted sites within the zone broadcast the alert to all subscribers registered to the targeted site regardless of affiliated talk group or selected supplementary service.

SSA occurs during idle time and mixes with voice when voice is present. Subscriber units monitoring the Control Channel receive the alert message and begin playing audible alert which corresponds to the alert message at preconfigured time intervals.

This feature is supported in the following trunking systems:

- ASTRO® 25 system FDMA Trunking
- P25 Phase 2 TDMA Trunking

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Chapter 2

Radio Features – Technical Overview

This chapter describes the default records and software objects that support subscriber radio features.

2.1 Default Records – UCMDefault Records

User Configuration Manager (UCM)Provisioning Manager contains default records that allow the system to operate when a configuration record does not exist in the database. Normally, system recognition of a subscriber radio attempting to access the system is achieved after a radio record is configured and established through the UCMthe Provisionig Manager application.

Default records allow you to do the following:

- Define privileges during system initialization.
- Define privileges for default access to the system.

For more information on default records, see:

- Default Access – UCM on page 47
- Default Record Assignments – UCM on page 48
- Using Default Radio User and Talkgroup Records – UCM on page 92
- the *User Configuration ManagerProvisioning Manager* manual

2.1.1 Default Access – UCM

Default access is a system condition (configured for a zone, using the UCM) that allows subscriber radios to access the communication system, using a default configuration record, when no configuration information is available from the User Configuration Server application (UCS).Default access is a system condition that allows subscriber radios to access the communication system using a default configuration when no configuration information is established in Provisioning Manager or available from the User Configuration Server application (UCS). Under default access, when a subscriber radio attempts to access the system, a default configuration record is automatically assigned to the subscriber radio. This default record provides the subscriber radio with a predefined set of call services and permissions. Two types of default access parameters are available:

- **Individual Default Access Permission** indicates whether a zone can automatically create a record in both the Radio and Radio User objects (located in the UCM), using default settings for new radios that contact the system (affiliations). The new Radio and Radio User records appear in the database as ZC$RADIO ID. If the parameter is set to **No**, then under normal operating conditions, a new radio cannot access the system until you manually enter a record in both the Radio and Radio User objects in the UCM. Any requests from new radios are rejected.
- **Individual Default Access Permission** indicates whether a zone can automatically create configuration records, for the UCS and Provisioning Manager using default configuration settings for new radios (with radio IDs home to the zone based on submitted home zone map configuration) that contact the system (affiliations). The new configuration records appear in the database as ZC $RADIO ID. If the parameter is set to **No**, then any system access request from a new radio (with radio IDs home to the zone based on submitted home zone map configuration) is rejected and a

new radio cannot access the system until a new radio configuration record is established manually using Provisioning Manager.

- **Talkgroup Default Access Permission** indicates whether a zone can create a new talkgroup record in the talkgroup object (located in the UCM), using default settings, when a radio request is received on a talkgroup not currently in the talkgroup database. The new talkgroup records appear in the database as ZC$TALKGROUP ID. If the parameter is set to **No**, then under normal operating conditions, you cannot create a default talkgroup record. Any requests for a new talkgroup are rejected.
- **Talkgroup Default Access Permission** indicates whether a zone can create a new talkgroup record in the Provisioning Manager/UCS database using default settings when a radio request is received on a talkgroup not currently in the talkgroup database. The new talkgroup records appear in the database as ZC$TALKGROUP ID. If the parameter is set to **No**, any requests for a new talkgroup are rejected under normal operating conditions and therefore you cannot create a default talkgroup record.

2.1.2
Default Record Assignments – UCM

In the UCMthe Provisioning Manager, objects are associated with one or more default records.

NOTICE: Profile objects also use default records.

Table 4: Objects with Default Records

Object	Default Records
Console TG/MG Capabilities Profile	TEMPLATE
Talkgroup/Multigroup Capabilities ProfileTG/MG Capabilities Profile	SZ$DEF, TEMPLATE
Talkgroup/Multigroup Site Access ProfileTG/MG Site Access Profile	SZ$DEF,TEMPLATE
Status Set	STATUS-SET-1
Radio User Capabilities ProfileRadio Capabilities Profile	SZ$DEF,TEMPLATE
Radio User Site Access ProfileRadio Site Access Profile	SZ$DEF,TEMPLATE
Radio User Interconnect ProfileRadio Interconnect Profile	SZ$DEF,TEMPLATE
Talkgroup	SZ$DEF,
Radio	SZ$DEF
Radio User	SZ$DEF
Foreign Group Site Access Profile	TEMPLATE
Foreign Group Capabilities Profile	TEMPLATE

NOTICE: Default access allows all radio users and talkgroups to access the system with a predefined set of permissions. Individual control of default access for a radio user or a talkgroup is not possible. This operating mode is not recommended under normal operating conditions.

2.1.2.1

Default Radio Access Permissions and Default TG Access Permissions

Default Radio Access Permissions and Default TG Access Permissions configuration is used as a default record by the zone controller, after the subscriber database has been loaded. The default record defines guest privileges and default information for all radios, users, and talkgroups attempting to access the system. It happens when default access is enabled and there are no user-entered records. New radios or talkgroups created by the zone controller are clones of the corresponding default access permission records. Changes made to default access permission records are always sent to the zone controller.

The default access permission record can be customized to control radios services until their UCS server application record is available. Once the UCS server application records are available, the feature can be controlled for each individual user.

It is recommended that the Default Access option is disabled if the number of Individual Radio IDs in the system is at or near System capacity. The Individual Radio ID records created using the default access permission record must not be deleted before user updates to these records are sent back to the Zone Controller.

NOTICE: When the zone controller receives user-entered records or profiles, they are used instead of the default access permission records.

2.1.2.2

TEMPLATE Default Record

Use the TEMPLATE records as default profiles, or modify them to create new profiles. The system is delivered with TEMPLATE records for the following profile objects:

- TG/MG Capabilities Profile
- TG/MG Site Access Profile
- Radio User Capabilities Profile
- Radio User Site Access Profile
- Radio User Interconnect Profile
- Radio Capabilities Profile
- Radio Site Access Profile
- Radio Interconnect Profile
- Foreign Group Site Access Profile
- Foreign Group Capabilities Profile

2.1.2.3

STATUS-SET-1 Default Record

This record is the default for the Status Set object. It is used by the SZ$DEF, and TEMPLATE records. Use this record as a template to create new records.

2.2

Identification Numbers

ID numbers are one of the key configuration elements that must be entered into the system. Based on the ID numbers that are entered, the system determines the following:

- Whether or not the individual radio or group is allowed to register at a site
- Which call services the individual radio or group can use

- What system features the individual radio or group can use
- Which zone is responsible for controlling the call (for group calls)

For more information, see:

- Programming ID Numbers on page 50
- Conventional Unit ID on page 50
- Conventional Channel Group on page 51
- Radio Identification on page 51
- the *User Configuration ManagerProvisioning Manager* manual

2.2.1
Programming ID Numbers

Individual and group IDs information from the system fleetmap is programmed into the following areas of the system:

- Individual and talkgroup IDs are entered in the User Configuration Managerthe Provisioning Manageror, if console site-level alias management is implemented, in the optional MKM 7000 Console Alias Manager.
- If a talkgroup resource is created in multiple console positions, each instance of the resource must be identified with a unique record in the User Configuration Manager (through the Radio object).
- Each radio is programmed with the system ID, its unique individual ID, and as many talkgroup IDs as needed (using the applicable programming software).

NOTICE: MCC 7500 consoles are each provisioned with one individual ID.

2.2.2
Conventional Unit ID

Conventional unit IDs are configured in the User Configuration Manager.Conventional unit IDs are configured in the Provisioning Manager where the Conventional Unit ID contains information about the conventional units within the system. Additionally, you can use the (optional) Console Alias Manager to perform some configuration actions.

In the User Configuration Manager, the Conventional Unit ID field contains information about the conventional units within the system.

The conventional unit ID can be assigned to a conventional subscriber or a dispatch console. The Application to Conventional Unit Mapping object in the User Configuration Manager (UCM) software maps a Console Application to a Conventional Unit. Each console application is assigned a conventional unit ID to use when communicating in the system. This ID is used by the conventional system to uniquely identify the physical console within a Conventional Channel Group.

The conventional unit ID can be assigned to a conventional subscriber or a dispatch console. In the Provisioning Manager Conventional Units are classified as Conventional Voice Unit and Conventional Data Unit. Console Applications maps to these units

NOTICE: The conventional unit ID can be found in two fields: **Conventional Unit ID** and **Conventional Hex Unit ID**. In most cases, only the **Conventional Unit ID** field is editable and lets you enter the decimal Unit ID. However, if a conventional unit is assigned to a conventional channel group with MDC signaling (**MDC signaling** field set to **Yes**), and the **Limited ID Space** field is set to **No**, the **Conventional Hex Unit ID** field becomes editable. If it does, the conventional unit ID must be entered as hexadecimal value, ranging from 1 to DEEE.

NOTICE: Conventional unit ID can be entered as decimal or hexadecimal number. In most cases, only the decimal entry is editable. However, if a conventional unit is assigned to a conventional channel group with MDC signaling (**MDC signaling** field set to **Yes**), and the **Limited ID Space** field is set to **No**, the hexadecimal entry becomes editable.

NOTICE: Conventional unit ID is entered in hexadecimal number; for channels configured to use standard MDC1200 ranges it is 1–DEEE range, for channels configured to use non-standard ranges it is 1–FFFF range.

In the (optional) Console Alias Manager, to configure the conventional unit ID, you can use the Unit ID field. Detailed configuration information is included in the *MKM 7000 Console Alias Manager* manual.

2.2.3
Conventional Channel Group

Conventional Channels in a zone are logically grouped into conventional channel groups and ranges, which is convenient in a shared system where agencies/organizations want to use the same ID space. In shared systems without conventional channel groups, the conventional unit ID range would need to be partitioned among the agencies/organizations sharing the system. The entire individual ID range can be allocated within each Conventional Channel Group, which means that there can be duplicate IDs within the system.

- For every Conventional Channel Group, the console is allocated an individual ID, which is unique within its associated Conventional Channel Group.
- Analog channels are automatically assigned a channel group ID of zero (zero cannot be assigned to any other group type), and an NM user cannot change this setting.
- The dedicated group for data-capable channels and units is 2001, though non data-capable channels can also use this group number.

For more details, see the *MKM 7000 Console Alias Manager* manual (if the MKM 7000 CAM is implemented in your system), and, depending on the system version:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

2.2.4
Radio Identification

The Radio object is used to create records that contain attributes related to the physical radio unit, such as its unique identity, serial number, RF band, and interconnect capability. A radio record is required for each radio that is accessing the system.

The Radio menu under the Subscriber tab in Provisioning Manager contains IVD Radio and HPD Radio parameters that contain attributes related to the physical radio unit, such as its unique identity, serial number, RF band, and interconnect capability. Radio record configuration data is required for each radio that is accessing the system.

A unique radio serial number, radio ID, and an authentication key identify a specific radio and radio user in the system. A user alias can be associated with multiple Unit IDs (for example, an officer with multiple radios assigned). In this case the same user alias appears multiple times, each with a different Unit ID.

A console operator position also requires a unique radio identification number and is associated with a talkgroup to access audio resources.

Identifying console resources in the same way as radios allows the system to properly identify the source for requests for service and to forward information to the correct destinations.

Individual identification numbers used by the system range from 1 to 16,777,215. The IDs are distributed as follows:

- ID 0 is reserved by the system and cannot be assigned to a radio or console resource.
- 1 - 16777211 are available for assignment to radios and console resources.
- 16777212 is assigned to the RCM as a system wide ID.
- 16777213 is reserved by the system for internal use.
- 16777214 is reserved by the system for internal use.
- 16777215 is reserved for future use.
- -1 is assigned to the SZ$DEF record.

Some of the radios are data-ready subscriber radios capable of requesting data messaging services across Packet Data Channel (PDCH) resources. Subscriber radios interfacing with mobile data devices are capable of providing data to mobile data applications. These data-ready subscriber radios and mobile data devices are configured and identified with an IP address, as well as other parameters, to support data calls for data communication services. Use the radio object and radio user object in the UCM to establish the IP addresses and other necessary parameters to support data capable subscriber radios.Use the Provisioning Manager to establish the necessary parameters to support data capable subscriber radios.

2.3 Radio User – UCMRadio User

The Radio User object contains records that identify specific users on the system and their capabilities. A radio user record includes specific priority levels and access rights for interconnect. To configure a radio user, you must know how they access the system and what capabilities they require for this access. The Radio User object has one default record: SZ$DEF.

You can associate or create a relationship between a radio user and a specific radio. You associate the user with a radio by entering the radio's ID into the radio user's record. You can change which radio a user is associated with at any particular time.

The IVD Radio and HPD Radio objects under the Subscriber category in the Provisioning Manager contain the records primarily used to identify specific radios on the system their users and capabilities.

See the *Provisioning Manager* manual for information about configuration of IVD Radio and HPD Radio objects.

2.3.1 Radio User Configuration Updates – UCMRadio User Configuration Updates

During system operation, updates are sometimes needed to an existing user configuration information. Changes to a radio user configuration are entered in the User Configuration Manager (UCM)the Provisioning Manager with the most recent configuration data. These changes can be entered at the user request and distributed to all affected devices in the system. Once entered, the changes are copied to the Unified Network Configurator (UNC) application in each zone during the database replication process. Each UNC application then distributes the complete database to its zone controller. The zone controller uses this information to populate its Group Home Location Register (GHLR) and Individual Home Location Register (IHLR).

2.4 Radio Groups – UCMRadio Groups

The system has three types of groups: talkgroup, multigroup, and agencygroup.

- The talkgroup object consists of information that identifies a group of radios that communicate and interact together on the system. A talkgroup is designed around a functional group of an organization. For example, a special squad inside the state police or a state's Department of Natural Resources (DNR) could each be a talkgroup.
- The multigroup object is used to create records that identify a group of talkgroups that are the target of multigroup announcements. These records include the same parameters as the talkgroup record plus two parameters specific to the multigroup record. A multigroup lets you combine a number of talkgroups for communication, such as grouping the state police with the DNR in a multigroup to allow communication between the two organizations.
- The agencygroup object is used to create records that identify a group of multigroups that can communicate with each other on the system. An agencygroup is one level above the multigroup.

For more information, see:

- Group Calls on page 29
- Defining Radio Group IDs – UCMDefining Radio Group IDs on page 53
- Talkgroup/Multigroup Profiles on page 75
- Creating a Talkgroup, Multigroup, or Agencygroup on page 77
- Deleting a Talkgroup, Multigroup, or Agencygroup on page 88
- Disabling a Talkgroup, Multigroup, or Agencygroup on page 90
- The *User Configuration ManagerProvisioning Manager* manual

When planning to add a group, consider the possible impact on system resources. Large talkgroups, multigroups, or agencygroups require resources at all sites with affiliated members and may cause busies, especially if all members are in the same site. In general though, only one channel is needed when all members of a talkgroup are in one site. Consider the system's channel availability. The infrastructure must be in place to support the traffic of added groups.

See the *Conventional Operations* manual for conventional talkgroups.

2.4.1
Defining Radio Group IDs – UCMDefining Radio Group IDs

Talkgroup IDs consist of an eight-digit decimal number beginning with 80000001. Talkgroups, multigroups, and agencygroups are created from the same pool of eight-digit decimal numbers.

The following numbers are reserved:

- 80000000 and 80065535 are reserved for system use.

  NOTICE: APCO Project 25 reserves this number, but a Motorola ASTRO® 25 system does not support system-wide calls.

- 80065537 is reserved for the SZ$DEF default record.
- 80000508– 80000511 are reserved for system operations.

You can create a total of 16,384 talkgroups, multigroups, and agencygroups on a system, using this set of decimal numbers. The assignable ID numbers can be anywhere in the range from 80000001 to 80065534.

SmartZone® 3600 systems support a maximum of 4000 talkgroups/multigroups/agencygroups with IDs within the range of 800001 to 804094. Any talkgroup, multigroup, or agencygroup communication that must include 3600 and ASTRO® 25 system radios must have an ID in the 800001 to 804094 range.

2.5

Profile Objects – UCMProvisioning Manager Profiles

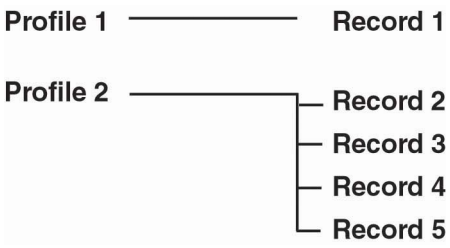
A profile is a master list of common attributes or capabilities used by radio users, talkgroups, multigroups, or agencygroups. Creating a profile allows you to enter information one time and reference it from many individual records. You do not have to enter the information separately into each record. Create a different profile for each type of function and group of users in your system (up to 500 profiles).

Using a profile helps to ensure data accuracy. It also reduces the amount of data that has to flow through the network between the UCMthe Provisioning Manager and the zone controller.

Profile information includes data that relates to radios, radio users, talkgroups, multigroups, and agencygroups that perform the same function. For example, all radio users associated with the fire department require the same resources, so use a profile to create a master file for their records.

A record can have a one-to-one relationship with a profile, or many records can be mapped to the same profile.

Figure 4: Relationship between Records and Profiles



IMPORTANT: When you configure a talkgroup, multigroup, agencygroup, or a radio user record, you must assign a profile to each record.

For more information, see:

- Radio User Object – UCMRadio Profile Parameters on page 54
- Talkgroup Object – UCMTalkgroup Object on page 55
- Parameters for Objects and Profiles – UCMParameters for Objects and Profiles on page 57
- Creating a Radio Object Record, a Broadcast Data Agency, or a Radio UserCreating a Radio Record or Broadcast Data Agency on page 81
- Object Creation Access Permissions on page 83
- the *User Configuration ManagerProvisioning Manager* manual

2.5.1

Radio User Object – UCMRadio Profile Parameters

The Radio User object is mapped to the following profiles:The Radio profile parameters are established using the following Provisioning Manager profiles:

- Radio User Capabilities ProfileRadio Capabilities Profile (see section UCM Overview of the Radio User Capabilities Profile ObjectRadio Capabilities Profile on page 55)
- Radio User Site Access ProfileRadio Site Access Profile (see section Radio User Site Access Profile – UCMRadio Site Access Profile on page 55)
- Radio User Interconnect ProfileRadio Interconnect Profile (see section Radio User Interconnect Profile – UCMRadio Interconnect Profile on page 55)

2.5.1.1

UCM Overview of the Radio User Capabilities Profile ObjectRadio Capabilities Profile

The Radio User Capabilities Profile object defines the general capabilities of the radio user. Each Radio User Capabilities Profile contains capability parameters that can be customized per configured profile. Every radio user is assigned a Radio User Capabilities Profile. You can use a Radio User Capabilities Profile object to define a set of parameters that are common to a specific group of radio users.

The Radio User Capabilities Profile object is created with the following default records:

- SZ$DEF
- TEMPLATE

The SZ$DEF default record displays a negative integer in the Profile ID field. This is outside the normal Profile ID field range, which is 1 to 2,000.

The Radio Capabilities Profile object defines the general capabilities of the radio user where each parameters can be customized for each configured profile. You can use a Radio User Capabilities ProfileRadio Capabilities Profile object to define a set of parameters that are common to a specific group of radio users. See the *Provisioning Manager* manual for details.

2.5.1.2

Radio User Site Access Profile – UCMRadio Site Access Profile

The Radio User Site Access Profile object defines which sites the radio user has access permission for in the system and consists of privilege information associated with particular sites in the system. Every radio user is assigned a Radio User Site Access profile. You can use a Radio User Site Access profile record to define the set of parameters that are common to a specific group of radio users.

The Radio Site Access Profile defines which sites the radio user has access permission for in the system and consists of privilege information associated with particular sites in the system. Every radio user is assigned a Radio Site Access profile.You can use a Radio User Site Access profile record to define the set of parameters that are common to a specific group of radio users. See the *Provisioning Manager* manual for details.

2.5.1.3

Radio User Interconnect Profile – UCMRadio Interconnect Profile

The interconnect feature enables landline-to-radio calls and radio-to-landline calls for radio users whose user records grant them permission to make and/or receive the interconnect calls. The Radio User Interconnect Profile object defines the interconnect call capabilities for a radio user. Every radio user is assigned a Radio User Interconnect Profile. You can use the Radio User Interconnect Profile record to define the set of parameters that are common to a specific group of radio users.

The interconnect feature enables landline-to-radio calls and radio-to-landline calls for radio users whose user records grant them permission to make and/or receive the interconnect calls. The Radio Interconnect Profile object defines the interconnect call capabilities for a radio user. Every radio user is assigned a Radio Interconnect Profile. You can use the Radio Interconnect Profile record to define the set of parameters that are common to a specific group of radio users.

The Radio Interconnect Profile object is created with the TEMPLATE default record.

2.5.2

Talkgroup Object – UCMTalkgroup Object

Console TG/MG Capabilities Profile – UCMConsole TG/MG Capabilities Profile on page 56

TG/MG Capabilities Profile – UCMTG/MG Capabilities Profile on page 56

TG/MG Site Access Profile – UCMTG/MG Site Access Profile on page 57

NOTICE: The Multigroup and Agencygroup objects are mapped to the same profiles as the Talkgroup object. See sections Multigroup – UCM ParametersMultigroup Parameters on page 57 and Agencygroup – UCM ParametersAgencygroup Parameters on page 57 for their respective parameters.

2.5.2.1

UCM Overview of the Talkgroup ObjectTalkgroup Object – Overview

The Talkgroup object consists of the information that identifies a group of radios that communicate and interact with each other in the system. This group can also be a small subset of a multigroup. The Talkgroup object has one default record SZ$DEF.

Talkgroup IDs are 8-digit decimal numbers, beginning with 80,000,001. Talkgroups, multigroups, and agencygroups are created from the same pool of 8-digit decimal numbers. The following numbers are reserved:

Table 5: Reserved Talkgroup IDs

Reserved ID	This ID is reserved for...
80,065,535	Addressing all groups in a zone-wide call
80,065,536	The SZ$DEF default record
80,000,508-80,000,511	System functions
80,000,000	System functions

You can create a total of 16,000 talkgroups and multigroups in the system using this set of decimal numbers. They can be anywhere in the range from 80,000,001 to 80,065,534.

CAUTION: Do not exceed the maximum allowed number of configured talkgroups. This can cause degraded system operation or anomalous events.

CAUTION: System administrators should be certain that talkgroups are only used with sites that are capable of supporting the FDMA or TDMA mode required for that talkgroup. There are no business rules in place, for example, to prevent an operator from configuring a TDMA-only talkgroup to operate on a site with channels that are only capable of FDMA operation. The same caution applies to the configuration of FDMA-only individual radios at TDMA-only sites.

2.5.2.2

Console TG/MG Capabilities Profile – UCMConsole TG/MG Capabilities Profile

A Console Talkgroup/Multigroup (TG/MG) Capabilities Profile is available for setting TG/MG resource capabilities. These profiles allow or limit the accessibility of these resources to specific console features. A Console Talkgroup/Multigroup (TG/MG) Capabilities Profile is also available for setting the Agencygroup capabilities.

2.5.2.3

TG/MG Capabilities Profile – UCMTG/MG Capabilities Profile

The Talkgroup/Multigroup (TG/MG) Capabilities Profile object defines the capabilities for a talkgroup, multigroup, or an agencygroup. Use the TG/MG Capabilities Profile record to define a set of parameters that are common to a specific talkgroup, multigroup, or agencygroup.

Refer to section TG/MG Capabilities Profile – UCM ParametersTG/MG Capabilities Profile Parameters on page 58 for detailed information on the parameters for the TG/MG Capabilities Profile.

NOTICE: See the *User Configuration ManagerProvisioning Manager* manual for creating a talkgroup with the Dynamic Dual Mode, FDMA-only, and TDMA-only Access Type parameter values.

2.5.2.4
TG/MG Site Access Profile – UCMTG/MG Site Access Profile

The TG/MG Site Access Profile object defines which sites the talkgroup, multigroup, or an agencygroup has access permission for in the system. Every talkgroup, multigroup, or agencygroup is assigned a Site Access Profile. Use the TG/MG Site Access Profile record to define a set of sites that are common to a specific talkgroup, multigroup, or agencygroup.

2.5.3
Parameters for Objects and Profiles – UCMParameters for Objects and Profiles

This section provides parameters for objects and profiles.

2.5.3.1
Multigroup – UCM ParametersMultigroup Parameters

The multigroup parameters are as follows:

- **Interrupt or Wait Mode**

  Interrupt mode requires that all radios in the designated talkgroups participate in the call whether the radios are monitoring the Control Channel or participating in a talkgroup call as receiving radios. A message sent through the voice channel, as part of the ASTRO® 25 system embedded signaling, causes the receiving radios to return to the Control Channel to receive the multigroup's voice channel assignment. The only radios unable to participate in a multigroup call are the currently transmitting ones.

  Wait mode allows talkgroup calls in progress to end before a multigroup call begins, the multigroup waits for all talkgroup members to be available.

- **Talkgroup in Multigroup**

  This parameter is used to enter the list of talkgroups associated with the specified Multigroup ID.

  IMPORTANT: All talkgroups that are assigned to the multigroup must have the same home zone as the multigroup.

2.5.3.2
Agencygroup – UCM ParametersAgencygroup Parameters

The agencygroup parameters are as follows:

- **Interrupt or Wait Mode**

  Interrupt mode requires that all radios in the designated multigroups and their talkgroups participate in the call, whether the radios are monitoring the Control Channel, or participating in a multigroup and/or talkgroup call as receiving radios. A message sent through the voice channel, as part of the ASTRO® 25 system embedded signaling, causes the receiving radios to return to the Control Channel to receive the agencygroup’s voice channel assignment. The only radios unable to participate in an agencygroup call are the currently transmitting ones.

  Wait mode allows talkgroup and multigroup calls in progress to end before an agencygroup call begins. The agencygroup waits for all multigroup members to be available.

- **Multigroups in Agencygroup**

This parameter is used to enter the list of multigroup associated with the specified agencygroup ID.

IMPORTANT: All multigroups that are assigned to the agencygroup must have the same home zone as the agencygroup.

2.5.3.3

TG/MG Capabilities Profile – UCM ParametersTG/MG Capabilities Profile Parameters

The TG/MG Capabilities profile parameters are as follows:

- **PTT–ID or Transmission mode operation**

  Selecting **PTT–ID** indicates that the system assigns one repeater to the call for the duration of the conversation within the parameters of the Message Trunk Timer. Selecting **Transmission** indicates that the system assigns one repeater for the duration of a single transmission by one radio.

- **Calls Without Console Allowed**

  Selecting **Yes** allows the system to process talkgroup calls without a console being involved, if resource failures prevent the console from accessing the system. Selecting **No** requires any affiliated consoles to be part of the call. If a console is affiliated to a talkgroup and resource failures are preventing consoles from participating in the call, then the call is not allowed.

- **Audio Interrupt Mode: Never, Always, or On Priority**

  Selecting **Never** prevents all audio interrupt requests. Selecting **Always** lets the system automatically grant audio interrupt requests on the same talkgroup. **On Priority** determines if the current call is interruptable, based on the subscriber ID priority. For the interrupt request to be granted, the interrupting radio user must have the same or higher priority level than the radio user who is currently transmitting.

Each TG/MG Capabilities Profile contains capability parameters that are customized per configured profile. Every talkgroup and multigroup is assigned a TG/MG Capabilities Profile.

Chapter 3

Radio Features – Configuration

This chapter details configuration procedures relating to radio features.

3.1 UCM – Configuration for Secure Talkgroup/Multigroup CallsConfiguration for Secure Talkgroup/Multigroup Calls

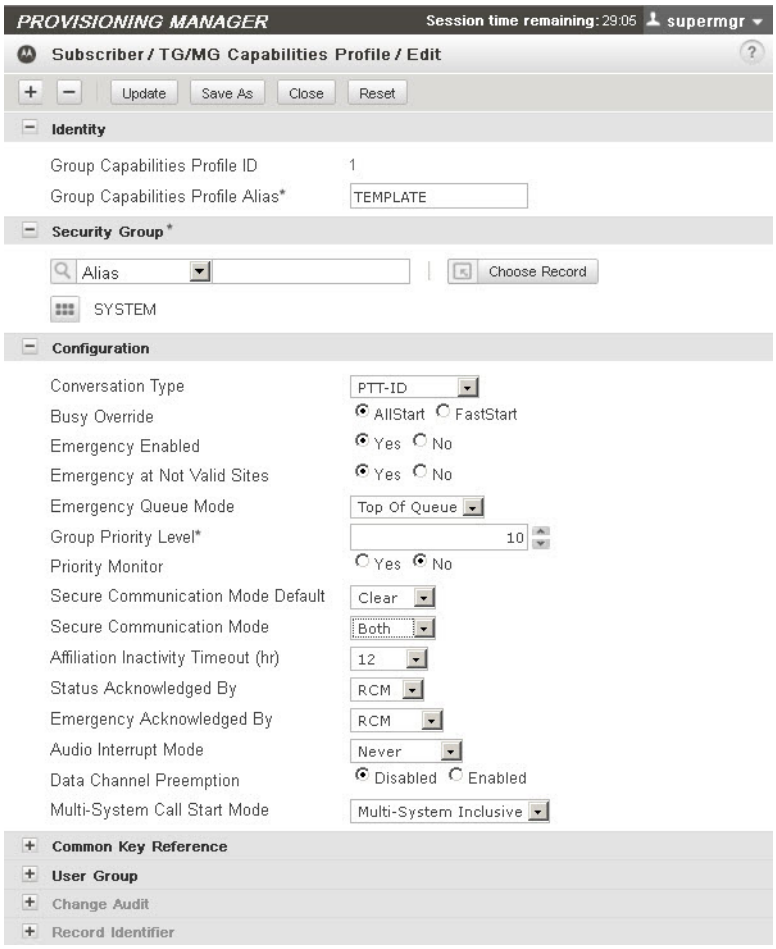
Radio users identify those who operate subscriber radios for system communication.You can establish and assign radio users to a radio under the subscriber object class in the Provisioning Manager

Each secure-capable talkgroup or multigroup must have certain secure settings defined in the Provisioning Manager. The talkgroup is associated with a TG/MG Capabilities Profile record, which defines the secure communication mode (clear, secure, or both) and the Common Key Reference (CKR) number that subscribers must use when making a secure call to the talkgroup.

Table 6: Configuring Talkgroup/Multigroups for Secure Voice Capability

Record	Field	Setting
Talkgroup	Talkgroup Enabled	Yes
Multigroup	Multigroup Enabled	Yes
Agencygroup	Agencygroup Enabled	Yes
TG/MG Capabilities Profile	Secure Communication Mode	Secure or Both
	Secure Common Key Reference Number	Common Key Reference (CKR) number is used for secure talkgroup calls. This setting should correspond with CKR settings made in the Key Management Facility (KMF). Subscribers must also be provisioned with this CKR.

Figure 5: Secure Settings – TG/MG Capabilities Profile Record



The Secure Communication Mode field has three choices: clear, secure, or both. The following takes place, based on the selection:

- Talkgroups and announcement groups programmed for clear only are not allowed to initiate a call in secure mode or upgrade to secure while the call is in progress. The zone controller sends a deny Outbound Signaling Packet (OSP) to the requesting subscriber.
- Talkgroups and announcement groups programmed for secure only are not allowed to initiate a call in clear mode or downgrade to clear while the call is in progress. The zone controller sends a deny OSP to the requesting subscriber.
- Talkgroups and announcement groups programmed for "Both" are allowed to upgrade and downgrade.

The system processes the dynamic regrouping as a talkgroup call. Dynamic regrouping, which is initiated from the RCM, takes individual subscribers that normally do not communicate with each other, and groups them into a talkgroup reserved for specific events. The operation is transparent to the radio user. The subscriber responds to the regrouping command, joins the dynamic talkgroup specified in the OSP, and notifies the user, through a tone and its display. The communication from that point forward takes place with the dynamic talkgroup and not the talkgroup indicated by the selector position.

Talkgroups designated for dynamic regrouping in the system fleetmap must also be assigned a CKR if it is intended that they have secure capability. The talkgroups and their corresponding CKRs are programmed in the UCMthe Provisioning Manager. Subscribers have no knowledge of the talkgroup ID or CKR assignment until the regrouping OSP is received through their Control Channel.

Once active, dynamic regrouping talkgroups follow the same rules for channel grants busies, and denials as all other talkgroups in the system.

IMPORTANT: A console cannot be dynamically regrouped and must be preconfigured through the Console Database Manager (CDM) for all talkgroups that utilize dynamic regrouping.

See “TG/MG Capabilities Profile” in the *Provisioning Manager* manual for details on the TG/MG Capabilities Profile parameters.

Table 7: Parameters for the TG/MG Capabilities Profile – Capabilities Parameters Tab

Field	Default	Range	Description
Capabilities Parameters			
Conversation Type	PTT-ID	PTT-ID or Transmission	**PTT-ID** indicates that the system assigns a traffic channel for the duration of the entire conversation as follows: after a subscriber dekeys, the voice channel stays active (hang time); during this period the subscribers stay idle on the voice channel. Any subscriber, responding during this hang time, first keys up on the Control Channel to send a message with its PTT-ID, indicating that it wants to send audio now for this call. Then, the system sends a grant message directing the subscriber back to the same voice channel acting as the new source. **Transmission** indicates that the system assigns a traffic channel for the duration of a single transmission by one subscriber. When the subscriber dekeys, the traffic channel is deallocated and all subscribers involved in the call return to the Control Channel. Any subsequent traffic channel requests are sent in on the Control Channel by the requesting radio.
Busy Override	AllStart	AllStart or FASTStart	**AllStart** requires that all affiliated talkgroup members, consoles, LOMIs (Logging Operator Module Interfaces)AIS (Archiving Interface Server), critical sites, and other required resources are available for a requested call before the call can begin. If some of the affiliated resources are not available, the system returns a busy signal to the initiating radio. When the required resources become available, the call is granted. **FASTStart** enables automatic busy override by a talkgroup. This call request method processes the request with any affiliated talkgroup members, consoles, LOMIs (Logging Operator Module Interfaces)AIS (Archiving Interface Server), and critical sites that are available. As channels become available at sites with other affiliated talkgroup members, they are added to the call in progress.

Table continued…

Field	Default	Range	Description
Emergency Enabled	Yes	Yes or No	**Yes** enables radio users in the talkgroup to initiate emergency calls or alarms. **No** disables this capability. Emergency calls are processed under normal priority level control.
Emergency at 'Not Valid' Sites	Yes	Yes or No	**Yes** enables emergency calls to be placed at non-valid sites for the talkgroup as determined by the selection of valid sites in the TG/MG Site Access Profile. **No** disables this capability.
Emergency Queue Mode	Top of Queue	Ruthless or Top of Queue	**Ruthless** enables an emergency call to terminate the call with the lowest priority at all sites involved. This occurs when there are no available channel resources at the sites requested by the call. **Top of Queue** specifies that emergency calls have the highest priority and receive the next available repeater. This only applies at the initiating site. All other sites are ruthlessly preempted. Console emergency calls are always ruthlessly preempted.
Group Priority Level	10	2 to 10. 2 is highest, 10 is lowest.	Select a priority level to determine how the system responds to talkgroup call requests if all resources are not immediately available and the call must be busied. Talkgroup calls use the lower-number (better) priority of either the requesting individual or the requested talkgroup. **IMPORTANT:** The priority value of 1 is reserved by the system for emergency calls.
Priority Monitor	No	Yes or No	**Yes** allows a radio user with Priority Monitor capability to monitor a talkgroup call. Information regarding activity on this talkgroup is sent out on voice channels assigned to other talkgroup calls. Radios monitoring talkgroup calls can detect this information and use it to scan over to more important talkgroup conversations on other channels. In order to access this functionality, the radio must: • Be programmed for Priority Monitor scan • Have a configured scan list. • Be in scan mode. **No** disables this capability.

Table continued...

Field	Default	Range	Description
			You should only enable Priority Monitor on a small subset of the total talkgroups in the system, due to the limited bandwidth of the embedded voice channel signaling. This increases the speed with which a radio is notified of a priority message. Radios monitoring Private Call or Interconnect calls are not interrupted by Priority Monitor talkgroup activity.
Secure Communication Mode	Both	Clear, Secure, or Both	**Clear** allows a radio user to transmit clear (non-secure) talkgroup calls only. **Secure** allows the radio user to transmit secure (encrypted) talkgroup calls only. **Both** allows the radio user to transmit both clear and secure talkgroup calls.
Secure Communication Mode Default	Clear	Clear or Secure	**Clear** specifies that the initial Transmit Mode Select Switch (TMSS) setting on the consoles is set to **Clear** for all talkgroups/multigroups associated with this talkgroup/multigroup profile. **Secure** specifies that the initial TMSS setting on the consoles is set to **Secure** for all talkgroups/multigroups associated with this talkgroup/multigroup profile. **NOTICE:** This parameter is only editable when Secure Communication Mode is set to **Both**. This is a read-only parameter and is set to the same value as the Secure Communication Mode if the Secure Communication Mode is not set to **Both**. The default mode for this parameter when the Secure Communication Mode parameter is set to **Both**, is **Digital Clear**.
Secure Common Key Reference Number	1	1 to 4095	Enter the common key reference number.
Affiliation Inactivity Timeout (Hours)	12 hours	4 to 73 hours (73 = infinite and is never polled)	Select the time when an inactive radio or console Channel Control window affiliated to the current talkgroup or multigroup is polled to determine if it is no longer on the system. Infinite means that it is never polled.
Route Trunked Status Events to Console	Yes	Yes or No	(Read only) Enables the console to receive status event notices. This field is set in the system configuration tab using the UNC.

Table continued…

Field	Default	Range	Description
Status Acknowledged By	RCM	Zone Controller, RCM, or CADI	**Zone Controller** selects the zone controller for acknowledging status. **RCM** selects RCM software for acknowledging status. **CADI** selects the CADI software for acknowledging status. **NOTICE:** If the Route Trunked Status Events to Console field in the system configuration is set to **No** then this field is disabled.
Emergency Acknowledged By	RCM	RCM, Console, or CADI	**RCM** selects RCM software for acknowledging emergencies. **Console** selects the console for acknowledging emergencies. **CADI** selects the CADI software for acknowledging emergencies. **NOTICE:** This parameter is Read Only/Disabled only when the **Route Trunked Status Events to Console** parameter is set to **No**. If the Emergency Acknowledged By field in the system configuration is set to RCM, CADI or Console then this field is disabled.
Audio Interrupt Mode	Never	Never or Always	**Never** prevents all audio interrupt requests. **Always** allows the system to automatically grant audio interrupt requests on the same talkgroup. **On Priority** allows the system to use Subscriber ID priority in order to interrupt other radios.
Data Channel Preemption	Disabled	Enabled or Disabled	**Enabled** allows users in preempt-capable talkgroups or multigroups to preempt data calls. Enabling preemption at the talkgroup or multigroup level does not affect operations, unless the system data channel preemption is enabled first. Preempt capability for the particular talkgroup or multigroup is enabled at the system level first. If this field is enabled, the system can use the data channel for voice calls and voice has priority over a data call. **Disabled** restricts voice call requests from preempting data calls.

3.2

UCM – Configuration for Secure Private CallsConfiguration for Secure Private Calls

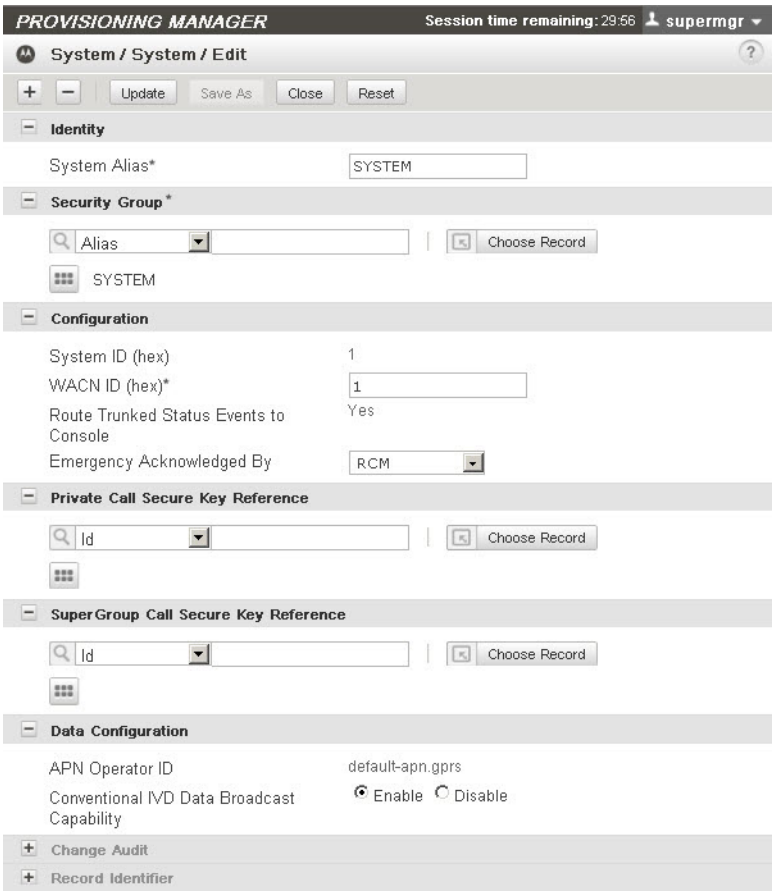
To enable secure private calls, both the System record and each IVD/HPD Radio record must be configured appropriately in the Provisioning Manager. In the System record, the Common Key

Reference (CKR) number is defined for all private calls made in the system. In IVD/HPD Radio record, the secure communication mode must be set to either Secure or Both.

Table 8: Configuring Private Call for Secure Voice Capability

Record	Field	Setting
Radio Capabilities Profile	Private Call (PC) Enabled	Yes
HPD/IVD Radio	Secure Communication Mode	Secure or Both
System	Private Call Secure Key Reference	Common Key Reference (CKR) number is used for all secure private calls in the system. This setting should correspond with CKR settings made in the Key Management Facility (KMF). Subscribers must also be provisioned with this CKR.

Figure 6: Secure Settings – System Record



Zone controller examines the requestor's individual record to determine whether the individual record is strapped secure or selectable. Then it either grants or denies an encrypted private call request, based upon the requestor's individual record.

The zone controller denies the following requests:

- Secure mode PTT to a clear only target. The zone controller indicates to the requestor that the call is "Clear Only".

- A private call request between a clear only unit and a secure only unit.

See “System” in the *Provisioning Manager* manual for details on the system parameters.

3.3

UCM – Configuration for Secure Conventional ChannelsConfiguration for Secure Conventional Channels

The console or console operator can assign a conventional channel to a common key reference (CKR) number which supports encryption and decryption for secure communication. CKRs are mapped to a conventional channel unit ID with the Network Manager software. Using the conventional channel unit ID, conventional channels can be put into Conventional Channel Groups to facilitate secure conventional communication when the Conventional Channel is associated with a Security Group.

NOTICE: For field defaults, values, ranges, and descriptions, see the*User Configuration Manager* (UCM)the *Provisioning Manager* and the *Configuration Manager* manuals.

See the *Provisioning Manager* manual for details.

Table 9: Common Settings for Secure Conventional Channels.

Record	Tab	Field	Setting
Common Key Reference	Basic	CKR Index	Common Key Reference (CKR) number used by the console.
		CKR Alias	Unique, descriptive name for a CKR number.
		Security Group	Security Group number.
Conventional Channel Group **NOTICE:** Data-capable conventional channels and units are assigned to group 2001 and cannot be assigned to other Conventional Channel Groups.	Basic	Conventional Channel Group ID	Conventional Channel Group ID number for conventional channels sharing common characteristics.
		Conventional Channel Group Alias	Unique, descriptive name for the Conventional Channel Group ID number.
		Security Group	Security Group number.
Conventional Unit	Basic	Conventional Unit ID/ Conventional Hex Unit ID	Refers to a specific console within the Conventional Channel Group.
		Conventional Channel Group ID	Conventional Channel Group number to which the channel is assigned.
		Conventional Unit Alias	Unique, descriptive name for the Conventional Channel Group ID number.
		Security Group	Security Group number.

Table continued…

Record	Tab	Field	Setting
		CKR Index	Common Key Reference (CKR) number used by the console.
Application to Conventional Unit Mapping	Basic	Conventional Channel Group ID	Conventional Channel Group number to which the channel is assigned.
		Conventional Unit ID/ Conventional Hex Unit ID	Refers to a specific console within the Conventional Channel Group.
		Zone ID	Zone number.
		Application Platform ID	Number identifier for a console configured in the zone.
		Application ID	Number identifier for a console application.
		Security Group	Security Group number.

3.4

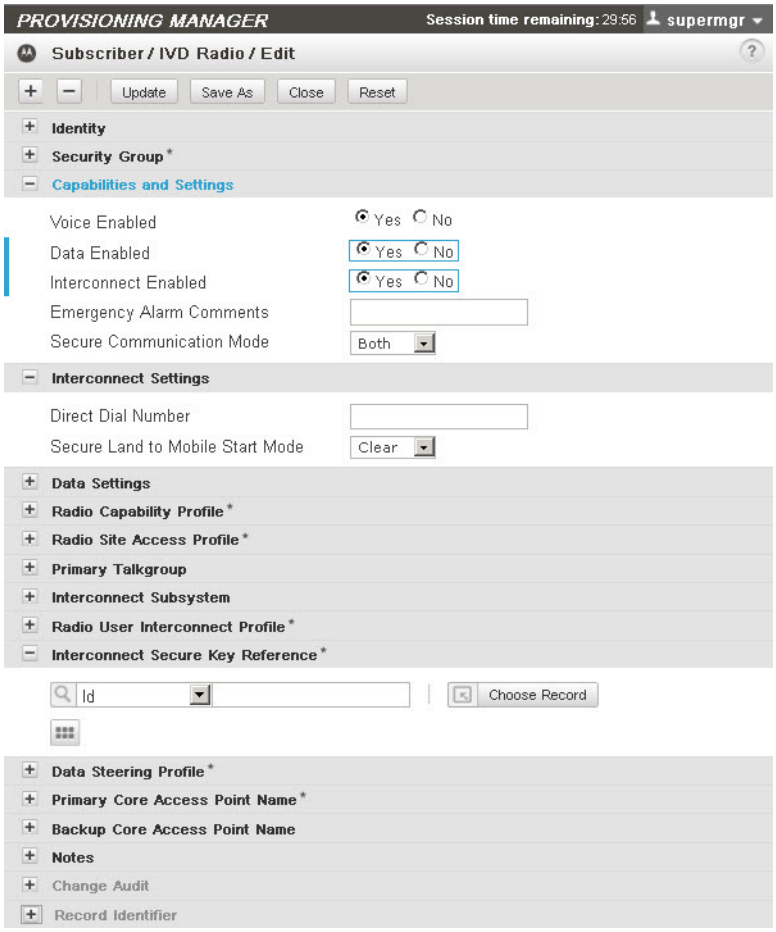
UCM – Configuration for Secure Interconnect CallsConfiguration for Secure Interconnect Calls

For secure-capable telephone interconnect services, each IVD/HPD Radio record must be properly configured in the Provisioning Manager. Each radio user must be defined with the appropriate secure communication mode (Secure or Both), the Common Key Reference (CKR) for telephone interconnect calls must be defined, and the default mode for all land-initiated interconnect calls must be set.

Table 10: Configuring Telephone Interconnect for Secure Voice Capability

Record	Field	Setting
Radio UserIVD Radio	Interconnect Enabled	Yes
	Secure Communication Mode	Secure or Both
	Secure Common Key Reference for Interconnect	Common Key Reference (CKR) number is used for secure interconnect calls. This setting should correspond to CKR settings made in the Key Management Facility (KMF). Subscribers must be provisioned with this CKR.
	Secure Land to Mobile Start Mode	Set to Secure if all land-initiated calls should default to secure mode when started.

Figure 7: Secure Settings



The Secure Land to Mobile Start Mode field has two values: **Secure** and **Clear**. Set to **Secure**, to transmit secure for interconnect audio directed to a subscriber. Set to **Clear**, to transmit clear for interconnect audio directed to the subscriber.

The ASTRO® 25 system supports secure upgrades for telephone interconnect calls but only from the subscriber side. Regardless whether the call is initiated by the subscriber or the landline, if the call starts in clear mode, the subscriber has the capability to request a change to secure mode. Once secure resources are assigned, the call remains as secure until either the subscriber or the landline terminates it.

See the *Provisioning Manager* manual for details regarding security settings for radio and its users.

3.5 Configuration for Conventional Sites and Channels

For information on conventional site configuration, see Conventional Site Configuration on page 68. For information on conventional channel configuration, see Conventional Channel Configuration on page 69 .

3.5.1 Conventional Site Configuration

A Conventional site is a single-solution, RF communication site designed to optimize the channel capacity requirements. A Conventional site may be colocated with an already-configured site.

The Conventional Site object contains conventional subsystem information for CCGW. Use the parent Conventional Site to configure CCGW at a conventional subsystem.

The CCGW and CCGW-HD objects represent the Conventional Channel Gateway which controls the Conventional site channels. Only one CCGW can be associated with a Conventional site

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.2
Conventional Channel Configuration

The following conventional channel types are supported:

- Analog Conventional Channel
- Digital Conventional Channel
- Conventional Talkgroup Channel
- Conventional Mixed Mode Channel
- MDC 1200 Conventional Channel
- ACIM Conventional Channel

IMPORTANT: It is advised that you follow the given sequence of the procedures while creating your records.

3.5.2.1
Analog Conventional Channel Configuration

The channel record sets the parameters for the channel operations at the site. The channel record represents the actual operational parameters of the base radio.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems: see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.2.2
Digital Conventional Channel Configuration

The channel record sets the parameters for the channel operations at the site. The channel record represents the actual operational parameters of the base radio.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems: see the *Provisioning Manager* manual and online help.
- For K1/K2K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.2.3
Conventional Talkgroup Channel Configuration

The channel record sets the parameters for the channel operations at the site. The channel record represents the actual operational parameters of the base radio.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L1/L2L core systems: see the *Provisioning Manager* manual and online help.

3.5.2.4
Conventional Mixed Mode Channel Configuration

The Conventional Mixed Mode Channel is a combination of Analog and Digital channels. The channel record sets the parameters for the channel operations at the site. The channel record represents the actual operational parameters of the base radio. The CCGW can control as many as 4 channels.

IMPORTANT: The Conventional Mixed Mode Channel is only available for the **Combination (GGM 8000)** sites. See the *GGM 8000 System Gateway* manual, for more information on GGM 8000.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.2.5
MDC 1200 Conventional Channel Configuration

The channel record sets the parameters for the channel operations at the site. The channel record represents the actual operational parameters of the base radio.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.2.6
ACIM Conventional Channel Configuration

The ACIM channel is used to enable the exchange of control information with a Motorola Consolette. The channel is configurable as an ACIM channel with an option for MDC-1200 operation.

IMPORTANT: ACIM conventional channels are disallowed in certain groups.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.5.3
Consolette – Configuration

The APX Consolette is offered in two configurations:

- **L999AA**, with a full featured front panel containing an O5 control head, a numeric keypad, an auxiliary display for Clock and VU Meter functionality.
- **L998AA**, with a limited front panel containing only the auxiliary display for Clock and VU Meter functionality.

Both of these configurations provide TRC, ACIM, and E&M remote control operation.

Additionally, there is an orderable option, **GA00469AA** – Extended Dispatch Functionality, that enables advanced functionality through the ACIM interface on ASTRO® P25 and MDC Conventional channels.

A list of advanced functionalities supported by the Consolette can be found in the ACIM Channel Features section of the *Conventional Operations* manual.

For more information, refer to the *APX Consolette Detail Service Manual* (68009482001).

3.6

Radio and Radio User Configuration

Radio and radio user configuration information for call processing support identifies individuals and talkgroups that use the system and identifies the services the system must provide to those individuals or talkgroups.

Radio and radio user configuration information for call processing support identifies individuals and talkgroups that use the system and identifies the services the system must provide to those individuals or talkgroups. Configuration information is established in the following places:

- **Provisioning Manager** – Within Provisioning Manager records are built for radios, radio users, talkgroups, multi-groups and agency-groups with parameters that affect the operations of all radios in the system, including site access denial.
- **MKM 7000 Console Alias Manager application** - Some of radio and radio user configuration (console alias) information is also entered using the MKM 7000 Console Alias Manager application if this feature is implemented in your system. For more details, see the *MKM 7000 Console Alias Manager* manual and online help.
- **Subscriber Radio Programming** – Subscriber radios are programmed using their specific programming software.

Configuration information is entered in three places:

- User Configuration Server application (UCS) through the User Configuration Manager (UCM) application. Within this application, records are built for radios, radio users, talkgroups, multigroups and agencygroups. Parameters that affect the operations of all radios in the system, including site access denial, are also entered in the UCM application.
- Some of the information can also be entered using the MKM 7000 Console Alias Manager application, if this feature is implemented in your system. For more details, see the *MKM 7000 Console Alias Manager* manual and online help.
- Radios through their specific programming software.

Radio and radio user configuration information is divided into four parts:

- Home Zone assignment for individual and talkgroup IDs
- Identification numbers and aliases for individuals and talkgroups
- Call services and system features allowed for an individual or talkgroup
- Valid site settings for each individual and talkgroup

Radio and radio user configuration information is referenced by the system each time a radio attempts to register to a site and/or affiliate with a talkgroup.

IMPORTANT: Configuration information must be consistent when programming the UCS serverProvisioning Manager application, radios, and consoles.

3.6.1
User Configuration

The User Configuration Manager (UCM) and the Unified Network Configurator (UNC) are the PRNM Suite management applications used to enter and maintain system-level configuration information for users.

Each user record is assigned various configuration parameters that allow it to be identified and operate throughout the system. The configuration parameters determine the system services available to each user.

The Provisioning Manager and Unified Network Configurator (UNC) applications establish configuration information for users. Each user record is assigned various configuration parameters that allow it to be identified and operate throughout the system. The configuration parameters determine the system services available to each user.

3.6.1.1
Configuring Users in Provisioning Manager

This process outlines the overall steps needed to add users to the system.

Process:

1. Organize configuration information.
2. Use the Radio object (in the UCM) to enter and maintain radio and infrastructure records.
3. Use the Radio User object (in the UCM) to enter and maintain information about the user of a radio.
4. Use the IVD/HPD Radio objects (in the Provisioning Manager) to enter and maintain the following:
   - radio and infrastructure records
   - information about the user of a radio

3.6.1.2
Trunking Radio Features – Configuration Order

Configuration information is entered during the initial phase of system operation and updated as the users and capabilities of the system change.

Motorola recommends using the following sequence when initially entering database information for subscriber objects in the UCM.

The following sequence is recommended when initially entering subscriber data in subscriber records in Provisioning Manager:

Table 11: Trunking Radio Features – Configuration Order

	Configuration	Predecessor
1	Home Zone Mapping	None
2	Frequency Band Plan	None
3	Sub-band Range Mapping	None
4	Talkgroup/Multigroup (TG/MG) Capabilities Profile	None
5	TG/MG Site Access Profile	None

Table continued…

	Configuration	Predecessor
6	Status Set	None
7	Radio User Capabilities ProfileRadio Capabilities Profile	Status Set
8	Radio User Site Access ProfileRadio Site Access Profile	None
9	Radio User Interconnect ProfileRadio Interconnect Profile	None
10	Talkgroup	Home Zone Mapping, Talkgroup/Multigroup (TG/MG) Capabilities Profile, and TG/MG Site Access Profile
11	Multigroup	Home Zone Mapping, Talkgroup/Multigroup (TG/MG) Capabilities Profile, TG/MG Site Access Profile, and Talkgroup
12	Agencygroup	Home Zone Mapping, Talkgroup/Multigroup (TG/MG) Capabilities Profile, TG/MG Site Access Profile, Talkgroup, and Multigroup
13	RadioIVD/HPD Radio	Home Zone Mapping, Status Set, Radio Capabilities Profile, Radio Site Access Profile, Radio Interconnect Profile, Talkgroup, and Radio
14	Broadcast Data Agency	Data System, Radio, Zone, Packet Data Gateway, Packet Data Router
15	Radio User	Home Zone Mapping, Status Set, Radio User Capabilities Profile, Radio User Site Access Profile, Radio User Interconnect Profile, Talkgroup, and Radio
16	Storm Plan	Home Zone Mapping, Status Set, Radio User Capabilities Profile, Radio User Site Access Profile, Radio User Interconnect Profile, Talkgroup, and Radio UserHome Zone Mapping, Status Set, Radio Capabilities Profile, Radio Site Access Profile, Radio Interconnect Profile, and Talkgroup.
17	Storm Plan Command	Home Zone Mapping, Status Set, Radio User Capabilities Profile, Radio User Site Access Profile, Radio User Interconnect Profile, Talkgroup, Radio User, and Storm Plan

NOTICE: If SmartZone® (3600) sites are present in the system, you must also configure Modulation Mapping. It is configured right after Home Zone Mapping in all the above-mentioned cases. You can find the information on how to configure Modulation Mapping in the *User Configuration ManagerProvisioning Manager* manual.

3.6.1.3
Conventional Radio Features – Configuration Order

Motorola recommends using the sequence listed below when initially entering database information for subscriber objects in the UCMthe Provisioning Manager.

Table 12: Conventional Radio Features – Configuration Order

	Configuration	Predecessor
1	Conventional Broadcast Data Agency	None
2	Conventional UnitConventional Voice Unit	Conventional Home Zone Mapping, KMFs, CKRs (if aiming for secure Conventional Unit), Sites/Channels (if manual subscriber registration is needed)
3	Conventional Voice and Data Unit	Conventional Home Zone Mapping, KMFs, CKRs (if aiming for secure Conventional Unit), Sites/Channels (if manual subscriber registration is needed)

3.6.2
Radios Configuration

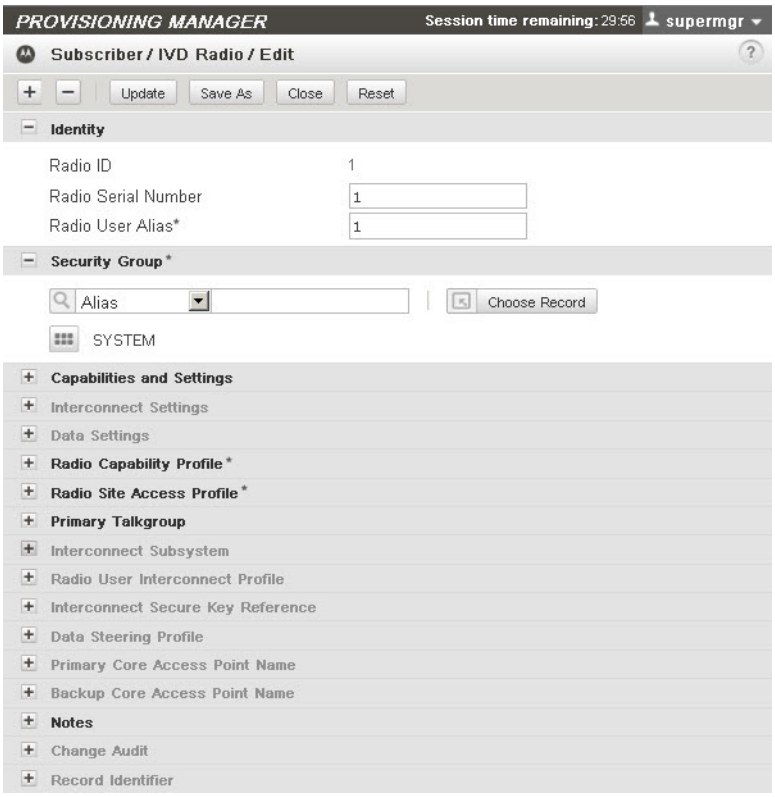
The radio object in the UCM containsThe IVD/ HPD Radio objects in the Provisioning Manager contain attributes related to the physical radio unit, such as its unique identity and serial number. It has one default record: SZ$DEFDefault Radio Access Permissions.

3.6.2.1
Radio ID Ranges

When selecting the starting and ending radio ID range (from 1 to 16777211), remember that users may have to type these IDs when sending unit-to-unit calls or Call Alert Pages. Use the lower end of the range to save user keystrokes. The same IDs also display on the radios if the ID Display feature is being used, and on the consoles if the console alias feature is not used.

IMPORTANT: The full ASTRO® 25 system individual ID range is from 1 to 16,777,215, with a maximum of 128,000 IDs available in a given system (including conventional units). Subscriber IDs in SmartZone® systems range from 700001 to 765534. As a result, after connecting a SmartZone® site to an ASTRO® 25 system, an ASTRO® 25 system radio with an ID number greater than 65534 (the leading “7” is omitted) cannot private call a SmartZone® radio. Also, since it does not fit in the SmartZone® ID range, its PTT-ID cannot appear on the SmartZone® radio's display.

Figure 8: Radio ID Ranges



IMPORTANT: You must create a radio record by entering the parameters in the Radio Configuration window before you create the radio's associated radio user.

3.6.2.2
Radio Users in the System

A radio user is established in Provisioning Manager by setting up a Radio ID and Radio Alias for the user. Once the radio ID is established it can be configured with various capabilities.

The radio user record contains information that identifies system users and their capabilities. See “How to Create a Radio User – Basic Tab” for information about adding radio user records to the system.

NOTICE: The radio serial number and ID number information are needed for this procedure.

3.6.3
Talkgroup/Multigroup Profiles

This section covers creating the following profiles:The following profiles are established using the Provisioning Manager:

- Console Talkgroup/Multigroup Capabilities profile
- Talkgroup/Multigroup Capabilities profile
- Talkgroup/Multigroup Site Access profile

NOTICE: For creating profiles, refer to the *Provisioning Manager* manual.

3.6.4
Status Set Profile

The Status Set profile adds up to 16 preconfigured statuses, so that radio users can signal their current status to the Radio Configuration Manager (RCM) by pressing one of the status buttons on the radio. When a radio user sends a status, it is displayed in the RCM Status Events monitor pane where the RCM user can respond to it. This status is transmitted on the Control Channel to save voice channel resources.

IMPORTANT: A status set cannot be deleted or renamed once it is added to the system.

NOTICE: The RCM does not display P25 conventional and MDC1200 conventional statuses.

The Status Set profile record consists of two tabs: Basic and Configuration.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.6.5
Message Set Profile

Status Set Profile on page 76The Message Set profile adds up to 16 pre-configured messages so that radio users can signal their current state to the Radio Configuration Manager (RCM) by pressing one of the message buttons on the radio. When a radio user sends a message, it is displayed in the RCM Status Events monitor pane where the RCM user can respond to it. This message is transmitted on the control channel to save voice channel resources. Both, the MCC 7500 and the RCM can display the Message Set.

The Message Set Profile record consists of two tabs: Basic and Configuration.

IMPORTANT: A Message Set cannot be deleted once it has been assigned to a Conventional Unit. The default MESSAGE_SET-1 cannot be deleted.

NOTICE: The RCM does not display P25 conventional and MDC1200 conventional messages.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.6.6
Creating a Radio User Capabilities ProfileCreating Radio User Profiles

The Radio User Capabilities Profile record defines the common capabilities of the radio user and consists of privilege information associated with particular radio users in the system. This record consists of two tabs, Basic and Configuration.

NOTICE: For detailed configuration procedures, refer to the *User Configuration Manager* manual and online help.

The following Radio Profiles are established using the Provisioning Manager:

- **Radio Capabilities Profile** – this record defines a list of sites that the radio user can access in the system and contains information about the site at which the radio is valid.
- **Radio Site Access Profile** – this record defines a list of sites that the radio user can access in the system and contains information about the site at which the radio is valid.
- **Radio Interconnect Profile** – the Radio Interconnect Profile record defines the telephone interconnect capabilities of the radio user.

NOTICE: For creating radio profiles, refer to the *Provisioning Manager* manual.

3.6.7
Submitting the Home Zone Map

There can be several maps defined in the system, however, only one of them can be active at a time. Home Zone Map Submission is a process of sending an active map to all initialized devices in the system.

NOTICE: Submitting the home zone map does not activate the map. You need to activate the map manually. For details, refer to the *Unified Network Configurator* manual. The active map cannot be modified. If changes to the home zone map are required, the new map needs to be submitted.

NOTICE: You cannot modify the active map. If changes to the home zone map are required, the new map needs to be submitted.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.8
Creating a Talkgroup, Multigroup, or Agencygroup

The talkgroup object consists of the information identifying a group of radios that communicate and interact together on the system. This group can also be a part of a multigroup. The highest level is called the agencygroup and is composed of a set of multigroups.

- There can be up to 255 talkgroups in a multigroup.
- There can be up to 16 multigroups in an agencygroup.
- There can be up to 16 agencygroups on the system.

The talkgroup or multigroup object has one default record: SZ$DEF.

3.6.8.1
Defining Talkgroup IDs

Talkgroup IDs are 8-digit decimal numbers beginning with 80000000. Talkgroups and multigroups are created from the same pool of 8-digit decimal numbers. You can create a total of 16,384 talkgroups and multigroups on a system using this set of decimal numbers. They can be anywhere in the range from 80000001 to 80065534.

The following numbers are reserved:

- 80000000 is reserved for system use.
- 80065535 is reserved for addressing all groups in a zone-wide call.

  NOTICE: APCO Project 25 reserves this number, but a Motorola system does not support system-wide calls.
- 80065537 is reserved for the SZ$DEF default record.

The system has three types of groups: talkgroup, multigroup, and agencygroup. A talkgroup is usually designed around a functional group or an organization. For example, a special squad inside the state police or a state's Department of Natural Resources (DNR) could each be a talkgroup. A multigroup lets you combine a number of talkgroups for communication, such as grouping the state police with the DNR in a multigroup to allow communication between the two organizations. Above that is an agencygroup which is composed of a set of multigroups.

When planning to add a group, you must consider the effects it has on system resources. Large talkgroups, multigroups, and agencygroups require resources at all sites with affiliated members and could cause busies, especially if all members are in the same site. Usually only one channel is needed when all members of a talkgroup are in one site. Consider the system's channel availability. The infrastructure must be in place to support the traffic of added groups.

3.6.8.2
Talkgroup Ranges

When adding a talkgroup, consider the normal roaming area of the talkgroup members. Assign the talkgroup's home zone as the zone where the majority of the members spend most of their time. All talkgroups in a multigroup must share the same home zone as the multigroup.

IMPORTANT:
The system ensures that Sub-Band Restricted (SBR) Talkgroups are not added to non-SBR Multigroups.

The system ensures that SBR Multigrups are not added to non-SBR Agencygroups.

Talkgroup IDs are assigned by your organization, (number 800 is added to the ID as a prefix to flag it as a talkgroup ID to the system). Some talkgroup IDs are reserved for use by the system's infrastructure.

Table 13: Talkgroup ID Ranges Assignable by your Organization

ID	Assignable
80000001 - 80065534	Yes

Only 16,384 Talkgroup IDs can be assigned, but they can be anywhere in the range from 80000001 to 80065534.

Table 14: Reserved Talkgroup ID Ranges

ID	Reserved by Motorola	Reserved by APCO (Association of Public-Safety Communication Officials)
80065537	Default record (SZ$DEF)	Not Applicable
80065536	Initialization record	Not Applicable
80065535	All Groups	All Groups
80000001 - 80065534	Valid talkgroup ID	Valid talkgroup ID
0	Null	Null

3.6.8.3
Creating a Talkgroup

When creating a talkgroup keep in mind that:

- For a talkgroup configured as FDMA-only, calls are processed by the system in the FDMA mode

- For a talkgroup configured as TDMA-only, calls are processed by the system in the TDMA mode. RF subsystems with members affiliated to such groups must be TDMA-capable RF subsystems.
- All talkgroups that are part of TDMA multigroup must be configured as TDMA-only talkgroups or DDM talkgroups.
- Radios that are affiliated to TDMA-only talkgroups are capable of receiving FDMA Multigroup calls. Although the manager allows such configuration, it is not recommended.
- All talkgroups that are part of any multigroup associated with TDMA agencygroup must be configured as TDMA-only talkgroups or DDM talkgroups.

Table 15: Tasks Involved in Adding a Talkgroup

System Element	Tasks to be Performed
User Configuration Manager	Create a new record in the Talkgroup object in the User Configuration Manager (UCM).
Provisioning Manager	Create a new record in the Talkgroup object in the Provisioning Manager.
Console	None
Customer Programming Software (CPS)	Use the CPS to program the talkgroups in the subscribers.

The Talkgroup record consists of information that identifies a group of radios that communicate and interact together on the system. This record consists of two tabs: Basic and Configuration.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.
See the *Conventional Operations* manual for more information on creating conventional talkgroups.

3.6.8.4

Creating a Multigroup

Adding a multigroup is the same as adding a talkgroup, but you also have to associate one or more talkgroups with the multigroup. A multigroup is made up of several talkgroups whose members occasionally need to communicate as a group.

When creating a new multigroup, keep in mind:

- A multigroup call requires a channel at each site with an affiliated multigroup member, resulting in a potentially large impact on system resources.
- The home zone of the multigroup must be the same as the home zone of all the talkgroups included in the multigroup.
- UCMProvisioning Manager supports up to 254 talkgroups in one multigroup.
- A talkgroup can belong to only one multigroup.
- For a multigroup configured as FDMA-only multigroup, calls are processed by the system in the FDMA mode.
- For a multigroup configured as TDMA-only, calls are processed by the system in the TDMA mode. RF subsystems with members affiliated to such groups must be TDMA-capable RF subsystems.
- All talkgroups that are part of TDMA multigroup must be configured either as TDMA-only talkgroups or as DDM talkgroups.
- Radios that are affiliated to TDMA-only talkgroups are capable of receiving FDMA Multigroup calls. Although the manager allows for such a configuration, it is not recommended.

- All talkgroups that are part of any multigroup associated with TDMA agencygroup must be configured as TDMA-only talkgroups or DDM talkgroups.
- All multigroups that are grouped in TDMA-only agencygroup must be configured as TDMA-only multigroups or DDM multigroups.

Table 16: Tasks Involved in Adding a Multigroup

System Element	Tasks to be Performed
User Configuration ManagerProvisioning Manager	Create a new record in the Multigroup object.
Console	None
Customer Programming Software (CPS)	Programs the multigroup in the radio and assigns it to a position in the selector. CPS uses "announcement group" to refer to a multigroup.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

You configure the multigroup in the User Configuration Manager (UCM)the Provisioning Manager. The Multigroup record consists of two tabs: Basic and Configuration.

3.6.8.5 Creating an Agencygroup

Adding an agencygroup is the same as adding a multigroup, but you also have to associate one or more multigroups with the agencygroup. An agencygroup is made up of several multigroups whose members occasionally need to communicate as a group. The groups relationship is strictly hierarchical and thus a multigroup cannot contain an agencygroup.

When creating a new agencygroup, keep in mind:

- UCMProvisioning Manager supports up to 16 multigroups in one agencygroup.
- All talkgroups that are part of any multigroup associated with TDMA agencygroup must be configured as TDMA-only talkgroups or DDM talkgroups.
- All multigroups that are grouped in TDMA-only agencygroup must be configured as TDMA-only multigroups or DDM multigroups.
- All agencygroups can have the highest interrupt priority for calls except for Emergency Calls, if so configured.
- All agencygroups can support Emergency Calls and alarms, if so configured.
- All agencygroups support the same encryption as talkgroups.
- Home Zone Mapping must be configured and submitted before multigroups are added to the agencygroup.
- Agencygroups are distributed to Zone Controller and consoles, and are treated as multigroups.

Table 17: Tasks Involved in Adding an Agencygroup

System Element	Tasks to be Performed
User Configuration ManagerProvisioning Manager	Create a new record in the Agencygroup object.
Console	Agencygroup looks like a typical Multigroup to the Console.

Table continued...

System Element	Tasks to be Performed
Customer Programming Software (CPS)	Programs an Agencygroup to be the highest priority talkgroup in the scan list.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

You configure the agencygroup in the User Configuration Manager (UCM)Provisioning Manager. The Agencygroup record consists of two tabs: Basic and Configuration.

3.6.9
Creating a Radio Object Record, a Broadcast Data Agency, or a Radio UserCreating a Radio Record or Broadcast Data Agency

The Radio object contains attributes related to the physical radio unit, such as its unique identity and serial number. The Radio UserThe Radio object contains records that identify specific users on the system and their capabilities.A radio userA radio record includes specific priority levels and access rights for interconnect. To configure a radio user, you must know how they are going to access the system and what capabilities they require for this access.

3.6.9.1
Creating a Radio Object Record

The Radio Object record contains attributes related to the physical radio unit, such as its unique identity, capabilities, and programmed parameters.

Table 18: Tasks Involved in Adding a Radio

System Element	Tasks to Perform
UCMProvisioning Manager	Create a new Radio recordIVD/HPD Radio record
Console	None
CPS	Program the radio with specific features

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.9.2
Creating a Broadcast Data Agency

Before configuring the Broadcast Data Agency, it is necessary to ensure that GGSN and APN are configured in the UNC and synchronized to the UCMthe Provisioning Manager, and a respective radio (HPD or IV&D Radio) exists in the Radio object (see “Creating a Radio”). Broadcast Data feature is configured in the UNC and you can only see whether it is enabled or disabled in the Settings tab of the Data System object in the UCMthe Provisioning Manager.

To create a broadcast agency, do the following:

- Assign an APN to a Broadcast Agency
- Assign a Radio to a Broadcast Agency
- Assign the appropriate broadcast IP address for each zone that is to have broadcast data enabled. The broadcast IP address must be unique for each APN

Broadcast Agency radio assignments can be reassigned as needed.

A radio record that is assigned to a broadcast agency cannot be deleted. Remove the radio's assignment to that broadcast agency, or if it is the only radio record assigned to the agency, first delete the Broadcast Agency record and then the radio record.

IMPORTANT: For data messaging services, it is critical that IP addresses specified in Radio UsersIVD/HPD Radio objects and Broadcast Data Agencies do not conflict within a CEN (Customer Enterprise Network). IP address conflicts may result in loss of data messaging service for the conflicting subscribers.

Once the broadcast agency is created, enter the serial number of the radio to assign the radio to that agency and save the record. You can assign other radios to the agency after this step is complete.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.9.3
Creating a Conventional Broadcast Data Agency

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L1/L2 systems, see the *Provisioning Manager* manual and online help.
- For K1/K2 systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.6.9.4
Creating a Conventional Unit

Conventional Unit Object containsConventional Voice Unit and Conventional Voice and Data Unit contain information about the conventional units within the system.

A conventional unit ID can be assigned to a conventional subscriber or a dispatch console.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.9.5
Creating an Application to Conventional Unit Mapping

The Application to Conventional Unit Mapping object associates a console application to a conventional unit. Each console application is assigned a conventional unit ID to use when communicating in the system. This ID is used by the conventional system to uniquely identify the physical console within a Conventional Channel Group.

NOTICE: Only units that are not data capable can be associated.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.9.6
Creating a Radio User

Table 19: Tasks Involved in Adding a Radio User

System Element	Task to be Performed
UCMProvisioning Manager	Add the radio user.

Table continued…

System Element	Task to be Performed
	The Radio User record containsThe IVD/HPD Radio records contain the information that identifies system users and their capabilities.
Console	Add individual ID and alias to the MKM 7000 Console Alias Manager database (if this feature is implemented in your system) using the Web interface. For details, see the *MKM 7000 Console Alias Manager* manual and online help.
CPS	Program the radio with specific features.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.10
Object Creation Access Permissions

Object access rights control the types of objects users can create within their security group. To create an object within a security group, the user inserts access rights for that security group.

Table 20: Object Creation Permissions in the UCM

Permission to Create...	Lets the User Create...
Subscriber Objects	New radios, radio users, talkgroups, multigroups, storm plans, and status sets.
Infrastructure Objects	Sites, repeaters, channels, and others.
Users	Other user accounts.
Security Groups	New security groups. This requires the security partitioning option.

Object access rights control the types of objects users can create within their security group. To create an object within a security group, the user inserts access rights for that security group. For example, a user with the access rights to create subscriber objects can establish radio IDs, radio aliases, talkgroups, multigroups, storm plans, etc. A user with the access rights to create Infrastructure objects can establish sites, repeaters, channels, etc. A user with access rights to create user accounts can establish other user accounts. Finally, users with the access rights to create security groups (requires the security partitioning option) can establish new security groups and other parameters associated with security groups.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.6.11
Subscriber Configuration

Subscriber configuration is achieved through Customer Programming Software (CPS). A PC running CPS is directly connected to the subscriber's universal connection port and the codeplug is loaded.

The configuration settings in CPS are categorized into different types, such as Radio-Wide settings, Controls, Display and Menu settings, Phone settings, and Secure settings.

For details on how to configure CPS settings, see the *CPS* online help.

3.6.12

Frequency Bandwidth and Modulation Settings

In order to achieve optimal voice and/or data performance between a Subscriber and a Base Radio, the bandwidth and modulation settings of the Subscriber personality should be aligned with those of the Base Radio. The following tables show the Base Radio and Subscriber settings that are compatible:

NOTICE: QUANTAR® Wide mode is only applicable to 3600 trunked simulcast channels.

NOTICE:
Option 1 is 25 kHz Analog or Widepulse simulcast.

Option 2 is 20 kHz (851-854 MHz) NPSPAC simulcast.

Table 21: QUANTAR Station Wide Mode

Device – Parameter	Option 1	Option 2
QUANTAR® – Receive Channel bandwidth	Wide 25-30	NPSPAC 25
QUANTAR® – ASTRO® 25 system Tx Filter	Wide Pulse *	Wide Pulse
QUANTAR® – Transmit Rated Deviation (for Analog Only)	5.0 kHz	4.0 kHz
SU (Receive) – Digital Modulator Type	Wide	Wide
SU – Transmit Deviation (for Analog Only)	5 kHz	4 kHz
SU – Channel Bandwidth	25 kHz	20 kHz

* When RSS configures the QUANTAR® for simulcast operation (Simulcast ENABLED), the ASTRO® 25 system Tx filter is set to WIDE PULSE. However, the ASTRO® 25 system Tx filter can be changed to NARROW PULSE to operate in a 12.5 kHz channel or it can be changed (if necessary) to match the subscriber Rx filter. In either case, the QUANTAR® Tx and Subscriber Rx filters must match. Once the QUANTAR® station is configured for Simulcast (Simulcast ENABLED) with the ASTRO® 25 system Tx Filter set to WIDE PULSE, if the simulcast setting for the QUANTAR® station is changed to DISABLED, the ASTRO® 25 system Tx Filter setting will change to NARROW PULSE. However, the ASTRO® 25 system Tx Filter setting can be reconfigured to match the user's channel bandwidth and subscriber Rx filter setting.

NOTICE:
Option 1 is 25 kHz Analog with narrow pulse simulcast.

Option 2 is 20 kHz (851-854 MHz) NPSPAC narrow pulse simulcast.

Option 3 is 12.5 kHz Analog with P25 and 7.7 kHz receive IF bandwidth.

Option 4 is 12.5 kHz Analog with P25 and 6.2 kHz receive IF bandwidth.

Table 22: QUANTAR Station Narrow Mode

Device – Parameter	Option 1	Option 2	Option 3	Option 4
QUANTAR® – Receive Channel bandwidth	Wide 25-30	NPSPAC 25	Narrow 12.5-15	Narrow 12.5
QUANTAR® – ASTRO® 25 system Tx Filter	Narrow Pulse	Narrow Pulse	Narrow Pulse	Narrow Pulse
QUANTAR® – Transmit Rated Deviation (for Analog Only)	5.0 kHz	4.0 kHz	2.5 kHz	2.5 kHz

Table continued…

Device – Parameter	Option 1	Option 2	Option 3	Option 4
SU (Receive) – Digital Modulator Type	C4FM	C4FM	C4FM	C4FM
SU – Transmit Deviation (for Analog Only)	5 kHz	4 kHz	2.5 kHz	2.5 kHz
SU – Channel Bandwidth	25 kHz	20 kHz	12.5 kHz	12.5 kHz

NOTICE: When it is required to receive both C4FM and CQPSK on the same frequency (for example in two different locations), select CQPSK. Some degradation will take place when receiving C4FM.

NOTICE:
Option 1 is 12.5 kHz P25 constant envelope modulation.

Option 2 is 12.5 kHz P25 linear modulation (used for simulcast).

Table 23: GTR 8000 Base Radio Narrow Mode

Device – Parameter	Option 1	Option 2
GTR 8000 Base Radio– Receive Channel bandwidth	Narrow 12.5	Narrow 12.5
GTR 8000 Base Radio – Tx Modulation Type	C4FM	LSM *
SU (Receive) – Digital Modulator Type	C4FM	CQPSK *
SU – Transmit Deviation (for Analog Only)	2.5 kHz	2.5 kHz
SU – Channel Bandwidth	12.5 kHz	12.5 kHz
* In case of Phase2-TDMA trunking (H-DQPSK modulation), this CSS field is ignored		

3.7
Programming the MCC 7500 Console

The radio capabilities of a console position are set with the Console User, Console TG/MG Capabilities Profile, and Console User Capabilities Profile objects.

NOTICE: Configuring the Gold Elite or the MCC 7500 console to use conventional channels at an ASTRO® 25 system, release 3.1 site is no different than configuring conventional channels at any other type of site employing conventional channels. For more details on conventional operations, see the *Conventional Operations* manual.

3.7.1
Creating a Console User

A Console User is a user that is able to log on to and use applications in the console subsystem. A Console User has associated capabilities that allow or limit the console features to which they have access.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.7.2
Creating a Console User Capabilities Profile

A Console User Capabilities Profile allows or limits the console features accessible by a console user.

NOTICE: Depending on the system version, for detailed configuration procedures, refer to:

- For M1/M2/M3 and L core systems, see the *Provisioning Manager* manual and online help.
- For K core systems, see the *Configuration Manager for Conventional Systems User Guide* manual and online help.

3.7.3
Creating a Console Private Call Resource in the UCMthe Provisioning Manager

The Console Private Call Resource is a resource that a Console Dispatcher uses to send and receive Private Calls. This record consists of two tabs, Basic and Configuration.

Table 24: Tasks Involved in Adding a Console Private Call Resource

System Element	Tasks to Perform
User Configuration ManagerProvisioning Manager	Create a new record in the Console Private Call Resource object in the User Configuration Manager (UCM)Provisioning Manager.

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

3.7.4
Configuring Call Alert – MCC 7500

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

Chapter 4

Radio Features – Operation

This chapter details the tasks that you perform once the radio features are installed and operational on your system.

4.1 Record-Related Operations

This section provides information about operations performed on records.

4.1.1 Modifying an Existing Record – UCM

There are no specific procedures for record modification. In order to make the required updates, open a record, make the changes, and them save them.

NOTICE: For detailed procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

4.1.2 Using an Existing Record to Create a New Record – UCM

Use the Save As command to create a new record from an existing record. This method of creating records is a preferred shortcut to quickly create many records. This saves time when creating similar groups.

NOTICE: Use “Creating a Talkgroup, Multigroup, or Agencygroup” as a guideline for making the changes.

NOTICE: For detailed procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

4.1.3 Multi-creating Records

The Provisioning Manager enables you to create many records at once.

For details see “Creating Multiple Records at Once“ in the *Provisioning Manager* manual.

4.1.4 Multi-editing Records

The Provisioning Manager enables you to edit many records at once.

For details see “Editing Multiple Records at Once“ in the *Provisioning Manager* manual.

4.1.5 Deleting Records

The “Deleting a Record in Provisioning Manager” procedure in the *Provisioning Manager* manual provides an overview on how to delete a record in Provisioning Manager. See the following sections for specific radio-related information:

4.1.5.1

Deleting a Radio UserDeleting a Radio

Consider the following before deleting a radio user:

- If you delete a radio from the system, also delete its user unless you are assigning a new radio to the same user.
- After you delete a radio user, you may assign the deleted radio user's ID number to a new radio user.
- After you delete a radio user from the UCMthe Provisioning Manager, the user's radio does not work in the system until it is assigned in another radio user's record (unless the system is in default mode).
- When you delete a radio user, it does not delete the radio from the system. However, if you delete a radio from the system, the radio is deleted from the radio user's record.

After you delete a radio user from the Provisioning Manager, the user's radio does not work in the system until it is assigned in another radio user's record (unless the system is in default mode).

Table 25: Tasks for Deleting a Radio UserRadio

System Element	Tasks to Perform
User Configuration Manager (UCM)Provisioning Manager	Delete the radio user record in the Radio User objectthe IVD/HPD Radio object. See the “Deleting a Radio” section in the*User Configuration Manager (UCM)Provisioning Manager* manual.
Console	Delete the radio user alias from the MKM 7000 Console Alias Manager database (if this feature is implemented in your system), using the Web interface. For details, see the *MKM 7000 Console Alias Manager* manual and online help.
Customer Programming Software (CPS)	Delete the radio user information from the appropriate templates and turn off default access permission in the radio.

4.1.5.2

Deleting a Talkgroup, Multigroup, or Agencygroup

Consider the following before deleting a talkgroup, a multigroup, or an agencygroup:

- After a talkgroup is deleted, its ID number may be assigned to a new talkgroup.
- When a talkgroup is deleted from the system, it is automatically deleted from any multigroup or agencygroup it is assigned to.
- When a multigroup is deleted from the system, it is automatically deleted from any agencygroup it is assigned to.
- If a multigroup/agencygroup is deleted only at the UCMthe Provisioning Manager, radio users can select the multigroup/agencygroup but are not able to communicate on that multigroup/

agencygroup. This affects emergency calls. Reprogram the radios to remove the multigroup/ agencygroup.

Table 26: Tasks for Deleting a Talkgroup, a Multigroup or an Agencygroup

System Element	Tasks to Perform
CPS	Delete the talkgroup, multigroup, or the agencygroup from the radios before you delete it from the User Configuration Managerthe Provisioning Manager. Delete the talkgroup, multigroup, or agencygroup from every CPS template in which it is included, then download the templates to the radios to delete the talkgroup, multigroup, or agencygroup from the radios.
User Configuration ManagerProvisioning Manager	Delete the talkgroup, multigroup, or agencygroup. See “Deleting a Talkgroup, a Multigroup, or an Agencygroup”.
Console	None

NOTICE:
See the *Conventional Operations* manual for more information on conventional talkgroups.

4.1.6
Disabling Records

Disable certain records without removing them permanently from the system. See sections:

- Disabling a Radio or a Radio User on page 89
- Disabling a Talkgroup, Multigroup, or Agencygroup on page 90

4.1.6.1
Disabling a Radio or a Radio User

Delete radios and radio usersIVD/HPD radios from the system or disable them temporarily. Unless radios are damaged beyond repair, it is recommended to disable rather than delete them, in order to simplify adding them back into the system. Use the UCMthe Provisioning Manager to disable the radio user attached to the radio that you wish to temporarily disable. Because there is one radio user per radio, that action disables access to the system for both the radio user and the radio.

NOTICE: If you disable a radio user, also disable that user's radio, unless you assign the radio to another radio user.

Table 27: Tasks for Disabling a Radio or Radio User

System Element	Tasks to Perform
User Configuration ManagerProvisioning Manager	Disable a radio user in the Radio User object.Disable a radio, for example set Voice Enable to **No**
Console	Disable a console (radio) user in the Console User object.
CPS	None.

NOTICE: For detailed procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

4.1.6.2

Disabling a Talkgroup, Multigroup, or Agencygroup

You can disable certain records without removing them permanently from the system. You disable a talkgroup, multigroup, or agencygroup in the UCMthe Provisioning Manager.

You might disable a talkgroup, multigroup, or agencygroup when there are changes to user needs, in response to system performance issues, or because of a decrease in the number of radio users on the system. When you disable a talkgroup, multigroup, or agencygroup, radio users can no longer use it to communicate until it is re-enabled. Radio users can continue to communicate on the system by selecting another talkgroup that is programmed into their radios.

Table 28: Tasks Involved in Disabling a Talkgroup, Multigroup, or Agencygroup

System Element	Task to Be Performed
User Configuration Manag-erProvisioning Manager	Select **No** on the Talkgroup Enabled or Multigroup Enabled radio buttons for the Talkgroup or the Multigroup objects.
Console	None
CPS	None

NOTICE: For detailed configuration procedures, refer to the *User Configuration ManagerProvisioning Manager* manual and online help.

NOTICE:
For disabling a conventional talkgroup use **Conventional Talkgroup Enable**, see the *Provisioning Manager* manual.

4.1.7

Replacing a Radio

NOTICE: After you delete a radio ID from the system, you can then reuse the ID. You must create a new record for this radio.

Table 29: Tasks for Replacing a Radio

System Element	Tasks to Perform
UCMProvisioning Manager	Modify the records in the IVD/HPD Radiothe Radio and Radio User objects to reflect the serial number of the new radio.
Console	None.
CPS	Program the new radio with the same features and capabilities as the old radio.

4.1.8

Using Call Alert

Call Alert is a Private Radio Network Management (PRNM) Suite functionality that allows an authorized caller to leave a notification in an unattended radio in order to indicate that a system user wishes to communicate with the user of the alerted radio. The initiator may be a dispatcher or another subscriber unit user. There is no voice communication involved in Call Alert. This paging feature provides benefits in the following situations:

- If a user is temporarily away from the radio, a Call Alert page can be sent to the radio. The radio continues to emit call-received tones (four tones every 15 seconds) until acknowledged manually by the target radio user

- If a user operates in a noisy environment, a Call Alert can be sent to the radio. When the user leaves the high-noise area, the tones inform that the user has missed a call while in the high-noise environment.
- If there is a need to verify that the user is active on the system. A successful Call Alert emits four beeps at the initiating radio, informing the caller that the target radio is active on the system and has received the page.

The Call Alert feature encompasses the ability to encode and send a Call Alert page, or to decode an incoming page.

Call Alerts can be initiated from and received by consoles and subscribers.

The console sends the Call Alert to its local zone controller, where it is processed. Also, in the case where the destination is in a different zone. The zone controller of the destination zone sends the Call Alert to the site where the subscriber is located.

For information on configuring Call Alert, see “Configuring Call Alert – MCC 7500”.

4.1.8.1
Processing a Call Alert

Process:

1. A Call Alert destined for a radio is initiated by a user at a dispatch console position. An alternative scenario is that the Call Alert is initiated by a radio user.
2. The Call Alert is sent from the console to the local zone controller.
3. The zone controller subsystem determines the destination zone and destination site for the Call Alert based on the current location of the radio.
4. The zone controller subsystem sends the Call Alert to the destination site and sends a response back to the console indicating that the Call Alert has been sent to the site.
5. The site controller at the destination site receives the Call Alert from the zone controller and sends the Call Alert to the Control Channel (also to voice channels and data channels if In-Call User Alert is enabled) for transmission over the air. The channel transmits the Call Alert to the radio using APCO standard messaging.
6. Upon receipt of the Call Alert, the radio alerts the user both visually and audibly of the receipt of the Call Alert. The visual and audible notifications persist until the user responds to the Alert. Pressing any key or button (except for the light key/dim button and the volume knob) or switching to a different channel is a response to the Call Alert that stops visual and audible alerting.
7. When the user responds to the Call Alert, the radio sends an acknowledgment on the Control Channel to the site.
8. The site controller receives the Call Alert acknowledgment from the Control Channel and forwards it to the zone controller.
9. The zone controller subsystem sends the Call Alert acknowledgment to the originating console.
10. The console then displays the success/failure of the Call Alert to the console dispatcher.

4.1.9
Using Call Alert in Site Trunking

Site Trunking is a mode of operation when the link to the zone controller fails and the site controller operates the site as if it were an independent single site system. When operating in the Site Trunking mode, the site has the same Call Alert functionality as in the Wide Trunking mode, but call alerts are processed within one site.

4.2
Using the Inbound Event Display

Inbound Event Display (IED) is a feature that supports call-based console technology in which operators can manage received message and status events in a quiet mode. Quiet mode means that all volumes are turned down or set to zero.

IED is an operator organizational tool that functions as a floating window that appears on top of the radio dispatch main screen. The IED alerts the operator of new events with a single audible tone. The operator selects and acknowledges that the user has received the radio message or status. When multiple statuses arrive in the queue, the IED default is to put those events on hold. The operator handles events based on highest priority, and deletes an event when the call is completed.

Conventional radio message and status events are sent to the Radio Control Manager (RCM) by default, however, using IED to send these events to the console ensures that a live operator has received the status or message.

The System object in the UCM application allows Radio Trunked Status events to be routed to the consoles, using the Route (Trunked) Status Events to Console parameter. Radio Status events is the only type of events that can be displayed on the IED. For MCC 7500 consoles, IED is enabled on a per console basis, using the UCMthe Provisioning Manager (through the Console Application Platform object).

NOTICE: Route Trunked Status Events to Console field also has to be configured. This can be done in the Unified Network Configurator, the UCMthe Provisioning Manager provides only read-only information on the value of this parameter.

The MCC 7500 consoles can display trunked and conventional Radio Status events, conventional Radio Message events, and trunked and conventional Emergency Alarm events on their IED.

For details on configuring the Inbound Event Display on an MCC 7500 console, see the *MCC 7500 Elite Admin User's GuideMCC 7500/7100 Elite Admin User's Guide* and the *User Configuration ManagerProvisioning Manager* manuals.

4.3
Using Default Radio User and Talkgroup Records – UCM

The SZ$DEF default record is used by the Zone Controller when the individual and talkgroup access permissions are set to yes. It is customized to control services to the radios until their UCS server application record is available. Once the UCS server application records are available, the features are controlled for each individual user.

See Default Radio Access Permissions and Default TG Access Permissions on page 49 for configuration of Default Radio and Group Access Permissions

4.3.1
Radio User and Talkgroup Record Download from the UCMthe Provisioning Manager

After the User Configuration Server (UCS) application database is downloaded and the channel capabilities are verified, the Unified Network Configurator (UNC) begins sending subscriber and talkgroup records to the zone controller. The time required for this download varies, depending on the number of subscribers and talkgroups in the system.

NOTICE: Any radio, radio user, and talkgroup records added to the UCS server application database during the initialization period remain in the database until the initialization is complete. Once the initialization is complete, the controller replaces the default records with the permanent records as it receives them from the User Configuration Manager (UCM)the Provisioning Manager through the UNC.

4.4
Data Operation

For information on the use of subscriber radios for data communication, refer to the *Trunked Data Services Feature Guide* manual, which covers both Enhanced Data Services and IV&D data features.

4.5
Using the Remote Monitor

Remote Monitor is a console feature that allows a console position to activate the transmit audio circuitry of the desired radio and key its transmitter. This allows a console operator to hear what is going on at the subscriber end to determine the safety and welfare of a radio user.

Some radios can be programmed so that when a Remote Monitor message is received, the radio's microphone is not turned on, but the radio is keyed. This is called Radio Trace. Radio Trace can be used to help determine the location of a lost or stolen radio by providing an RF signal from the radio that can be used to track its location.

The Remote Monitor feature can operate in two modes: silent or non-silent. In the silent mode, there is no indication to the radio user that the Remote Monitor mode is in operation (that is, LEDs do not light, the display does not change, and the speaker does not unmute for the duration of the Remote Monitor transmission). When the radio is being monitored in the non-silent mode, the radio has visual and audio indicators functioning as in normal operation.

Another important option of this feature is the determination of the duration of the Remote Monitor transmission. When a Remote Monitor is initiated, an acknowledgment is always expected from the receiving unit. If, after a specified period of time, an acknowledgment is not received, the console position attempts to re-send the Remote Monitor request. Retries are initiated until a total of five attempts have been made to reach the target unit. The acknowledgment wait period is configurable per conventional channel. During an attempt to accomplish a Remote Monitor, an "attempting" status message is returned. Upon the reception of an acknowledgment from a receiving unit, the status message indicating that the radio is now being monitored is returned. If an acknowledgment is not received, the error message is returned.

A console position can initiate only one signaling function (for example, Call Alert, Radio Check, or Remote Monitor) on a resource at a time. If a second signaling function is attempted while the first one is in progress (either sending another signaling function or waiting for the acknowledgment for a signaling function just sent), then an error message is returned. If a resource is in use when the Remote Monitor feature is initiated, then the function waits up to 60 seconds to contact that resource. If the resource is still in use after this time, the function is ended and an error message is returned.

The retries of the Remote Monitor request in progress can be aborted. When Remote Monitor processing is ended due to a console operator request, a status message is provided. When a console operator attempts to abort a Remote Monitor request that is not in progress, the error message is returned, indicating that the Remote Monitor request cannot be aborted.

Once the radio has acknowledged the Remote Monitor request, the console operator cannot stop the Remote Monitor function. If a console position becomes disabled while sending a Remote Monitor request or waiting for the acknowledgment for a Remote Monitor request just sent, then Remote Monitor processing is ended. If a console operator attempts to send or abort a Remote Monitor request on a disabled console position, then an error message is returned.

Refer to the "Creating a Console TG/MG Capabilities Profile" section for information on how to configure the Remote Monitor feature.

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Chapter 5

Radio Features – Troubleshooting

This chapter describes troubleshooting of subscribers within the system, including voice quality, unit failure, voice connectivity, and data connectivity issues. For more detailed information, refer to the *Call Processing and Mobility Management* or the *Fault Management Reference Guide* manuals.

5.1 Considerations for Radio Use

When operating a radio, consider the following:

- Hold the radio in a vertical position in front of your face with the microphone (and other parts of the radio including the antenna) at least 1 to 2 inches (2.5 cm to 5 cm) away from the lips. Keeping the radio at a proper distance is important since RF exposures decrease with (increasing) distance from the antenna.
- For body-worn operation, always place the radio in a Motorola-approved clip, holder, holster, case, or body harness, if available for the product. (All Motorola-approved accessory, antenna, and device combinations comply with Federal Communications Commission (FCC) occupational/controlled environment RF exposure limits. Exposure information on various accessory, antenna, and device combinations are found under the Display Exhibit section of http://www.fcc.gov/oet/fccid. Search for the FCC ID number, which is obtained from the label of your radio). Use of non-Motorola-approved accessories may result in exposure levels which exceed the FCC's occupational/controlled environment RF exposure limits.
- If you are not using a body-worn accessory and are not using the radio in the intended use position in front of the face, then ensure that the antenna and the radio are kept 2.5 cm (1 inch) from the body when transmitting. Keeping the radio at a proper distance is important since RF exposures decrease with (increasing) distance from the antenna.
- The feature to expand the number of adjacent sites for a subscriber radio is only available to Expanded Adjacent Site Broadcast-capable subscriber radios. It is not applicable to radios operating on the 3600 sites attached to SmartX Site Converters.

5.2 Subscriber Radio Voice Connectivity

Voice connectivity for a subscriber radio user communicating with other subscriber radio users may be impacted for a number of different reasons, including the following:

- Improper programming at the radio or the UCMthe Provisioning Manager database
- Failed subscriber unit
- Failed RF infrastructure component, such as a base station
- Incorrect key usage
- Lack of keys in subscriber radios
- Improper user manipulation of key sets

NOTICE: If an Sub-Band Restricted (SBR) radio is currently active in a talkgroup call and roams into an RF site that has a non-SBR channel assigned to that talkgroup call, then the SBR radio does not receive the audio since it cannot operate on a non-SBR channel. Following the end of the current transmission, the system transmission trunks the call to enable the call to be set up on an SBR channel upon the next transmission request. For the multigroup scan scenario, any radio that is currently in the multigroup scan mode is excluded from a talkgroup call if the talkgroup is associated with the multigroup and there are other talkgroup-affiliated radios registered at the same RF site. In this case, the radio that is in multigroup scan mode does not receive audio for this call.

5.3 Digital Audio Quality

Poor audio quality can be caused by a number of factors in an ASTRO® 25 system. Some factors are the same as those found in an analog system. Others are related with the technology used to handle digital signals and convert them to and from analog signals.

Among the causes of poor digital audio quality are:

- Users speaking too close to the microphone
- Users not enunciating clearly
- Poor line characterization
- Poor optimization
- Degradation of an audio circuit, such as excessive thermal noise due to a failing component
- Intermittent failure of a device, module, or a link
- Total failure of a device, module, or a link

5.4 Subscriber Radio Wireless Data Network Connectivity

A user is disconnected from the wireless data network due to the following reasons:

- Improper programming
- Failed subscriber unit
- Failed RF infrastructure component, such as a base station
- Incorrect configuration of the PDG database

5.5 Subscriber Unit Failure

The failure of a subscriber unit results in that unit being unable to communicate. The failure does not affect other radio users in the talkgroup, site, or zone.

5.6 SmartZone Radio Call Failure

If you are experiencing problems communicating with a talkgroup, you can check the UCMthe Provisioning Manager/UNC configuration for the radio and the SmartX device/site. Alternatively, you can consult the list of possible problems provided below.

SmartZone® (3600) site alarms are sent to the SmartX site converter, which then passes them onto the User Configuration Managerthe Provisioning Manager. The ASTRO® 25 system event browser receives the following alarms from the SmartZone® network:

- Site Controller Malfunction
- Channel Malfunction
- 3600 Link Down Due to Zone Controller Link Down
- Site Equipment Comm Failure Due to Zone Controller Link Down
- Malfunction State Due to Loss of T1/E1 Sync
- T1/E1 Misconfiguration
- Link to SmartX Site Converter Down

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