System Release 7.17
ASTRO® 25
Integrated Voice and Data

Channel Partitioning

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Document History

Version	Description	Date
MN003241A01-A	Original release of the *Channel Partitioning* manual	November 2016

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About Channel Partitioning

This supplement provides installation and configuration information and describes the Channel Partitioning feature on the ASTRO® 25 master site. This manual is intended for field service managers and field service technicians.

What Is Covered In This Manual?

This manual describes configuration of radios, users, talkgroups, and multigroups as follows:

- Channel Partitioning Description on page 17, provides a high-level description of the Channel Partitioning feature.
- Channel Partitioning Technical Overview on page 19, provides an overview of the Channel Partitioning feature, including how it is used to access a system and scenarios that explain some implications of using the feature.
- Channel Partitioning Configuration and Optimization on page 23, describes the procedures used to configure Channel Partitioning in the Provisioning Manager and the UNC Wizard.
- Channel Partitioning Operation on page 29, provides information necessary for the operation of the Channel Partitioning feature in a system. Included topics are call processing, implications for Channel Partitioning and subscriber roaming, sub-band restriction, and call priority.
- Channel Partitioning Maintenance on page 39, describes maintenance-related information.
- Channel Partitioning Troubleshooting on page 41, describes how to use Channel Partitioning for troubleshooting purposes.

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

See the following documents for associated information about the radio system.

Related Information	Purpose
Standards and Guidelines for Communication Sites (6881089E50)	Provides standards and guidelines that should be followed when setting up a Motorola Solutions communications site. Also known as the R56 manual. This manual may be purchased on CD 9880384V83, by calling the North America Parts Organization at 800–422–4210 (or the International number: 302–444–9842).
System Documentation Overview	For an overview of the ASTRO® 25 system documentation, open the graphical user interface for the ASTRO® 25 system documentation set and select the **System Documentation Overview** link. A file opens that includes: • ASTRO® 25 system release documentation descriptions

Related Information	Purpose
	• ASTRO® 25 system diagrams For an additional overview of the system, open the manuals that apply to your system configuration. The first chapters of the manuals provide a non-technical overview, and the second chapters of the manuals provide a technical overview.

Chapter 1

Channel Partitioning Description

This chapter provides a high-level description of Channel Partitioning and the function it serves on your system.

1.1 Channel Partitioning Overview

Channel Partitioning is an ASTRO® 25 system feature that provides agencies, or a subset of agencies, with the exclusive use of specific RF channels. Channel Partitioning is accomplished by having the zone controller in the system steer calls to channel resources that are configured with the appropriate agency or user group designation. The use of this feature allows the segregation of one set of users from another in an attempt to improve the level of service available to one set of users. In other words, Channel Partitioning is used to prevent user group B's calls from busying user group A's calls.

Channel Partitioning controls which talkgroups or radio units are assigned to each RF channel resource in the system. This control is accomplished by *steering* each talkgroup or radio unit to an RF channel resource that is permitted for that talkgroup or radio unit, when service requests are granted. RF channel resources are configured with specific user groups during the User Configuration Server application (UCS) channel configuration process.

Channel Partitioning does not control site registration for the radio units. The radio unit and/or talkgroup must first be registered and/or affiliated to the site. Then Channel Partitioning is used to control which RF channel resource is assigned to the radio unit or the talkgroup.

This document covers Channel Partitioning for voice services while the system is in wide trunking and during failure scenarios. Channel Partitioning is disabled during site trunking or site failsoft.

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Chapter 2

Channel Partitioning Technical Overview

This chapter explains how the Channel Partitioning works in the context of your system.

2.1 Subscriber System Access and Channel Partitioning

No unique programming or specific configuration is required for a subscriber unit to operate in an ASTRO® 25 system with the Channel Partitioning feature. If a subscriber is programmed to access the ASTRO® 25 trunked system, it is able to work with Channel Partitioning.

2.1.1 Registration and Channel Partitioning

Channel Partitioning does not control site registration for the radio units. The radio unit and/or talkgroup must first be registered and/or affiliated to the site. Then Channel Partitioning controls which RF channel resource is assigned to the radio unit or the talkgroup.

Channel Partitioning controls which talkgroups or radio units are permitted to be assigned to each RF channel resource in the system. This control is accomplished by *steering* each talkgroup or radio unit to an RF channel resource that is permitted for that talkgroup or radio unit when service requests are granted. RF channel resources are configured with specific user groups during the User Configuration Server application (UCS) channel configuration process.

The user groups are configured in the Unified Network Configurator (UNC) Wizard and that configuration information is linked to a channel in the system through the User Group Alias.

NOTICE: Channel Partitioning does not require any configuration of the RF site controller, the simulcast site controller, the subscriber unit, or the console.

2.1.2 Roaming

If a subscriber involved in a unit-to-unit call roams to an RF site that does not have an operational channel to support the required user group, the call is terminated. If the subscriber makes a request for an interconnect call while at this RF site, the system rejects the request.

2.1.3 Subscriber Control Signaling

The algorithm of the zone controller for selecting a Control Channel at a site operates independently of the Channel Partitioning configuration.

NOTICE: If the user group channels have Control Channel capabilities, the user group channel capacity at a given site may be reduced.

2.1.4
Channel Partitioning Capacity

The Channel Partitioning capacity in a system depends on the number of user groups, radio groups, and talkgroups permitted on a system.

- You can create a maximum of 100 user groups within a single system.
- Any of the channels in an ASTRO® 25 trunked system can be partitioned.
- A channel can be associated to either all of the partitions (which is the default configuration), or up to a maximum of five user groups. This is configured in the ASTRO® 25 repeater site channel and the Multisite Subsystem channel on the UNC Wizard.
- Any of the talkgroups in the system can be partitioned, but a talkgroup can belong to only one partition (or user group). This is configured in the Talkgroup/Multigroup (TG/MG) capabilities profile on the Provisioning Manager (PM).
- Any of the radios in the system can be partitioned, but a radio user can belong to only one partition (or user group). This is configured in the Radio User capabilities profile on the PM.
- By default, all radio user capability profiles and TG/MG capability profiles are assigned to user group 1 (also known as DEFAULT). The channels in the system are defaulted to the **open** configuration, which allows all partitions.
- You are required to specify a user group when you create a profile. A list of available user groups is displayed in the right-hand pane of the PM main window.

2.2
Channel Partitioning Scenarios

This section describes some scenarios and implications of using the Channel Partitioning feature in an ASTRO® 25 system.

2.2.1
Wide Area Channel Partitioning Scenarios

When Channel Partitioning is used in a large system, such as a statewide shared system, consider certain implications. Resolving interoperability and mobility issues between statewide users, regional users, and citywide users must occur before configuring the system. Only the statewide users have the need or the resources for channels on a statewide basis. The regional users and citywide users could use each other's channels when they are roaming into each other's coverage and/or negotiate with the statewide agency for access to the statewide frequencies. All of these negotiations should be resolved before the Valid Site and Channel Partitioning configuration is started.

Different strategies that can be employed when configuring a system for control of statewide roamers are:

- Configure large user groups, then configure RF channel resources with these large user groups and use the Valid Site feature to control which of the members of the user group are allowed at the site.
- Allow the users to register to the sites but require the subscriber users to use talkgroups that belong to user groups configured to the RF channel resources at the site.

When creating roaming schemes with the Channel Partitioning feature and Valid Site feature, ensure the following:

- Each subscriber is programmed with one trunked unit ID.
- Subscribers are assigned to user groups.

- Talkgroups are assigned to user groups. Subscribers can be programmed with a number of talkgroups.
- Each talkgroup can belong to a different user group or they can all belong to the same user group.
- Private calls and interconnect calls are addressed to unit IDs so channel resources must be available for the subscriber at the sites that the subscriber can roam to.

Each Talkgroup ID programmed into a subscriber unit is most likely already a member of a user group. Each Talkgroup ID could also be a member of a different user group. This allows the subscriber user to select different user groups by changing the subscriber talkgroup selection.

2.2.2
Share Infrastructure but Not Some Channels

The Channel Partitioning feature provides the means for multiple agencies to pool their financial resources to share a larger system. With this feature, an agency has exclusive use of their allocated RF channel resources.

2.2.3
High Availability Service to Special Users

The Channel Partitioning feature provides exclusive use of designated channels for high priority groups. Channel Partitioning is an insurance policy that user group A calls is **never** blocked due to user group B's call activity.

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Chapter 3

Channel Partitioning Configuration and Optimization

This chapter contains optimization procedures and recommended settings relating to Channel Partitioning.

3.1 Configuring Channel Partitioning

Channel Partitioning allows the segregation of one set of users from another to improve the level of service observed by one set of users. The system is configured so that agencies, or a subset of agencies, have exclusive use of specific RF channels. Configuration management is the process you use to enter parameters for the infrastructure devices and subscribers to ensure that the system subscribers have access to the specific channel resources.

NOTICE: Channel Partitioning is a licensed option. A license is required to use the feature. For details, see the *License Manager* manual.

Prerequisites: The ASTRO® 25 system is set up.

When and where to use: Follow these steps to configure the Channel Partitioning feature in an ASTRO® 25 system.

Process:

1. Prepare a fleetmap plan for your user groups, subscribers, talkgroups, multigroups, and agencygroups. See Fleetmapping on page 23.
2. Configure the user groups, subscribers, talkgroups, multigroups, and agencygroups with the Provisioning Manager and UNC Wizard. See Radio User Configuration on page 24.
3. Configure the channel resources (ASTRO® 25 repeater sites and Multisite subsystems only) with the UNC Wizard. See Configuring Resources on page 25.

3.2 Fleetmapping

A fleetmap is a chart that outlines the organization plan for your system of radio users, talkgroups, multigroups, agencygroups, user groups, and dispatch consoles. A fleetmap is created when your system is initially configured. Consult your existing fleetmap information before adding users to the system. Fleetmapping includes consideration of the following factors and system features:

- Functional organization of radios. For example, talkgroups may be created for distinct functions like police, fire, or emergency services, and other talkgroups or multigroups may be set aside to allow these groups to communicate with each other in a city-wide emergency. The fleetmap is your record of these organizational schemes.
- IDs and aliases of user groups, radio users, talkgroups, multigroups, and consoles.
- Assigned blocks of frequencies and how they are allocated to user groups defined within the fleetmap.
- The likelihood of adding users to existing talkgroups.

- The number of dispatch positions required and the likelihood of adding more.

3.2.1
User Group Configuration

User Groups are configured in the UNC Wizard and can only be viewed in the Provisioning Manager (PM).

NOTICE: The User Group object needs to be manually synchronized from the UNC to the PM to maintain data consistency. For details, see the *Unified Network Configurator* manual.

User Group IDs for an ASTRO® 25 system range between 1 and 100. User Group ID is the unique identifier for the user group object. If the user group is referenced by a Radio User Capability Profile or a Talkgroup Capability Profile, you cannot delete a user group. A warning dialog box appears if you delete a user group, indicating that the user group will be removed from all configured channels if the user group is deleted. When a user group object is deleted, the User Group Alias for this object is automatically removed from all channels.

When the system is first installed a default database record is populated with a user group object with User Group ID = 1. The alias for this User Group ID is **DEFAULT**. This User Group ID is used as the default User Group ID for the Radio User Capability Profile and the Talkgroup Capability Profile objects that are migrated to support Channel Partitioning.

IMPORTANT: All radio users, talkgroups, multigroups, and agencygroups in a system must be assigned to a user group.

3.3
Radio User Configuration

This section describes the settings which need to be defined to configure users in the system using the Provisioning Manager (PM).

3.3.1
UNC Wizard Overview of the User Group Object

The user group object defines the general capabilities of the user group. Each user group contains capability parameters that can be customized per configured profile.

Each talkgroup and each subscriber unit must be configured with a user group. The subscriber unit (unit ID) and all the talkgroups programmed into the subscriber unit could be members of the same user group but it is not a requirement. The subscriber unit (unit ID) and the talkgroups programmed into the subscriber can all be in different user groups. The maximum number of user groups is 100.

The user group object is created with the DEFAULT record.

3.3.2
Provisioning Manager Overview of the TG/MG Capabilities Profile

The TG/MG Capabilities Profile object defines the capabilities for a talkgroup or a multigroup, and the parameters for a user group. You can use the TG/MG Capabilities Profile record to define a set of parameters that are common to a specific talkgroup or multigroup. Each TG/MG Capabilities Profile contains capability parameters that can be customized per configured profile. Every talkgroup and multigroup are assigned a TG/MG Capabilities Profile.

3.3.3
Talkgroup, Multigroup, or Agencygroup Configuration for Channel Partitioning

Each talkgroup or multigroup must have certain Channel Partitioning settings defined in the Provisioning Manager (PM). The talkgroup is associated with a user group record, which defines the channels that subscribers must use when calling the talkgroup.

The table lists the user group settings that must be made for each Channel Partitioning capable talkgroup, multigroup, and agencygroup.

Table 1: Configuring Talkgroup/Multigroups/Agencygroup for Channel Partitioning

Application	Record	Tab	Field	Setting
PM	TG/MG Capabilities Profile	User Group	User Group Alias	Enter or select a valid User Group Alias that currently exists in the system

3.3.4
Provisioning Manager Overview for Channel Partitioning

The Radio Capabilities Profile is the mechanism that configures the general capabilities of a radio user. You can customize the capability parameters for a set of radio users by creating a profile.

3.3.5
Radio User Configuration for Channel Partitioning

Each radio user must have certain Channel Partitioning settings defined in the Provisioning Manager (PM). The radio user is associated with a user group record, which defines the channels that subscribers must use when calling the talkgroup.

The table lists the user group settings that must be made for each Channel Partitioning capable radio user.

Table 2: Configuring Radio Users for Channel Partitioning

Application	Record	Tab	Field	Setting
PM	Radio Capabilities Profile	User Group	User Group Alias	Enter or select a valid User Group Alias that currently exists in the system

3.4
Configuring Resources

This section describes the settings which need to be defined to configure users in the system, using the UNC Wizard.

3.4.1
Channel Configuration for Channel Partitioning

Each ASTRO® 25 repeater site channel and Multisite Subsystem channel must have certain Channel Partitioning settings defined in the UNC Wizard. Those RF channels are associated with a user group record, to define the channels that subscribers must use when making calls.

NOTICE: If a channel is not configured for use by a user group, then the channel is seen by the system as an *unrestricted* channel so that it can be used by all user groups.

The table lists the user group settings that must be made for each Channel Partitioning capable channel.

Table 3: RF Channel Configuration for Channel Partitioning

Application	Wizard	Field	Setting
UNC Wizard	Channel User Groups	User Group ID	Select the user groups that are permitted on this RF channel using the drop-down list buttons in the **Channel User Groups** section. Click **Submit** and the selected user groups are valid for the specified channel.
	Channel	Allow All User Groups?	The default for this field is **Yes**, which allows any user group to be steered to this channel. Selecting **No** makes this channel exclusive to a list of 1 to 5 user groups.

If no user groups are shown on the **Channel User Groups** wizard, all user groups are permitted on this RF channel.

If one or more user groups are shown on the **Channel User Groups** wizard, only these user groups are permitted on this RF channel.

IMPORTANT: There can only be a maximum of five user groups assigned per channel.

3.5
Sub-band Restriction and Channel Partitioning

It is possible to use Channel Partitioning to support the steering of subscriber units with limited frequency range, or sub-band restrictions. Sub-band restriction must function while in site trunking.

Because Sub-band restriction has been or can be used as a limited method of doing Channel Partitioning, it is important to note that the Channel Partitioning feature is not meant to replace or inhibit the use of the sub-band restricted feature. Sub-band restriction continues to operate and is configured in the same manner as prior releases. However, a call request must now satisfy **both** the sub-band restriction rules and the Channel Partitioning rules. The service talkgroup steering feature is also retained in its entirety and, again, must satisfy both the service steering rules which currently exist and the Channel Partitioning rules.

3.6

Subscriber Programming and Channel Partitioning

If a radio is programmed to access an ASTRO® 25 trunked system, it is able to work with the Channel Partitioning feature.

Each Subscriber Unit (unit ID) can be a member of *one* user group. If a subscriber user has been assigned to a wrong user group, this error negatively impacts individual services (private call and interconnect) during roaming.

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Chapter 4

Channel Partitioning Operation

This chapter details tasks to perform once the Channel Partitioning is installed and operational on your system.

4.1 Call Processing and Channel Partitioning

Careful planning during the fleetmapping stage of system design enhances accomplishment of call processing tasks in systems that include the Channel Partitioning feature.

The following sections describe the impact Channel Partitioning has on various calls.

4.1.1 Talkgroup Calls

Each Talkgroup ID programmed into a subscriber unit is already a member of a user group. Each Talkgroup ID could also be a member of a different user group. This ability allows the subscriber user to select different user groups by changing the subscriber talkgroup selection.

4.1.2 Emergency Calls

Emergency calls are supported with Channel Partitioning. If an emergency call request is made and all the user group-permitted RF channel resources are busy, the system converts the busy using either the top of the queue or the ruthless preemption procedure. Only the RF channel resources configured for the user group member making the emergency request can be used to convert the busy. An RF channel resource with an *open* configuration can also be used to convert this busy.

Emergency calls are allowed if a radio unit can register or affiliate at a site even if no RF channel resources are configured to support this radio unit at this site. The user group configuration is overridden and an RF channel resource is assigned for the emergency call. The emergency call request can be granted on any of the channels at the site. If the RF channel resources are busy at the site when this type of emergency call request is made, busy conversion uses top of queue or ruthless preemption and considers all the in-service RF channel resources at the site.

4.1.3 Private Calls

Private calls that include the console are processed as follows:

- Private calls to and from a console and a subscriber are steered to a channel which permits the user group of the subscriber in the call.
- For console-initiated private calls, the system rejects a unit-to-unit call request involving a radio and a console position when the RF site at which the radio is located has no RF channels which permit the required user group.

Private calls when the target and the initiator are in the same site are processed as follows:

- When both the originating and target units are registered on the same site, the call request is steered to an RF channel resource that is compatible with the user group of the originating unit. For

example, if the originator belongs to user group A, and the target belongs to user group B, the call request is steered to an RF channel resource that supports user group A.

- The controller rejects requests for private calls from partitioned radios if none of the voice channels configured with the initiator or target user group are available due to failure.
- If an initiating subscriber's channel is unrestricted and the target subscriber's channel is partitioned, call processing issues a reject, if no channel resources are in service at the target location.
- If neither the target nor the initiating subscriber ID belongs to a user group in their respective sites, or if there is a configured channel but it is out of service, call processing rejects the call request.

Private calls when the target and the initiator are in different sites are processed as follows:

- The zone controller uses the channel of the user group of the radio at the site. For example, if the originator belongs to user group A and is at the site A which permits user group A, and the target belongs to user group B and is at the site B which permits user group B, the following occurs:
  1. The zone controller selects a channel at the site A which permits user group A (the user group for the originator at the site A).
  2. The zone controller selects a channel at the site B which permits user group B (the user group for the target at the site B).
- The zone controller rejects a call request from a subscriber whose user group channels are not in service at its site due to failures.

4.1.4 Console Calls

Console patch is allowed between groups (including MSEL) that are members of different user groups. A supergroup is created and all the selected groups are placed into this supergroup. For as long as this patch is active, all the groups placed into this supergroup use all the user groups of all the patched/ MSEL talkgroups that have members affiliated at the local zone.

The table lists the details of console patch to subscribers calls.

Table 4: Console to Subscriber Calls

The Destination Site Has a Configured Partition	Destination Site Has at Least One Channel in Service	All In Service Channels Permitting The User Group Assigned to Emergency Calls	Console to Subscriber Private Call	Console to Subscriber Emergency Call	Results
Yes	Yes	N/A	Yes	No	Call processing steers the call to a channel which permits the user group of the radio user in the call.
No	Yes	N/A	Yes	No	Call processing rejects the private call request because no RF channels at the site are configured to allow the required user group.
Yes	No	N/A	Yes	No	Call processing rejects the private call request

Table continued...

The Destination Site Has a Configured Partition	Destination Site Has at Least One Channel in Service	All In Service Channels Permitting The User Group Assigned to Emergency Calls	Console to Subscriber Private Call	Console to Subscriber Emergency Call	Results
					because at least one channel at the site is configured to permit the user group, but all channels which permit the user group are out of service (non-operational).
Yes	Yes	Yes	No	Yes	Call processing busies the emergency request because a channel cannot be obtained in the partition by way of preemption. Console-initiated emergency calls require all affiliated sites to participate in the call.

4.1.5
Multigroup Calls

Multigroups are permitted to have member talkgroups that belong to different user groups.

Suppose Multigroup X and Talkgroup V support user group 1, while Talkgroup T supports user group 2. Both Talkgroups V and T are members of Multigroup X. If a Multigroup call is made, all member talkgroups are steered to a channel that is configured with at least one of any of the user groups of all talkgroup members of the Multigroup that have subscribers affiliated at the local zone. In this example, if there are members at the zone affiliated to talkgroups X, T, or V (but not S), when a multigroup call X is made, channels configured with user groups 1 or 2 are valid. If a subscriber is affiliated to talkgroup S at the local zone, then channels with user group 3 can also be used to listen to the multigroup call X.

If Talkgroup T initiates a call request, the call is assigned to a channel that supports user group 2. Multigroup X can listen to Talkgroup T at the local site on a user group 2 RF channel resource.

The table lists the details of the multigroup calls chart.

Table 5: Multigroup Calls Chart

Group	User Group
Multigroup X (AGX)	1
Talkgroup T (member of AGX)	2
Talkgroup S (member of AGX)	3
Talkgroup V (member of AGX)	1

For more information regarding Multigroup Calls and Agency Group calls, see the *Call Processing and Mobility Management* manual.

4.1.6
Agency Group Calls

Agency group works in a similar way to Multigroup for channel partitioning. Agency group is composed of a set of Multigroups (which themselves are composed of talkgroups). This relationship is strictly hierarchical and thus a Multigroup cannot contain an Agency group.

The table lists the details of the agency group calls chart.

Table 6: Agency Group Calls Chart

Group	User Group
Agency Group Z	1
Multigroup X (member of Agency Group Z)	2
Multigroup Y (member of Agency Group Z)	3
Talkgroup A (member of Multigroup X)	4
Talkgroup B (member of Multigroup X)	5
Talkgroup C (member of Multigroup Y)	6
Talkgroup D (member of Multigroup Group Y)	7

In the table, assuming all the agency groups, multigroups, and talkgroups are present in the zone, channels configured with user groups 1, 2, 3, 4, 5, 6, or 7 are all valid to service an agency group call on agency group Z.

NOTICE: Agency group affiliated radios do NOT listen to member multigroup or talkgroup calls at all, regardless of the user groups.

4.1.7
Interconnect Calls

Channel Partitioning does not affect the time when the interconnect resource allocation occurs, but does affect how the zone controller selects the resources at the RF site. Interconnect shared service is a configuration variable which affects the entire site, not just a single partition. For example, if you configure the site 1 for an interconnect shared service value of three channels, then the entire site can have a maximum of three interconnect calls occurring simultaneously. If a user group A is making three interconnect calls, and a radio from user group B makes an interconnect call request, the call request is busied. Interconnect shared service operates independent of the Channel Partitioning feature.

For more information regarding interconnect calls, see the *Enhanced Telephone Interconnect* manual.

4.1.7.1
Shared Service Algorithm

The Shared Service algorithm continues to be applied at the site level. Channel Partitioning does not affect it. The Shared Service algorithm adjusts the number of available channels for interconnect, based on the level of call loading. The Shared Service algorithm works independently from Channel Partitioning, and does not adjust to interconnect channel availability to specific user groups. Busy user groups can influence the availability of interconnect channels to less busy user groups. For example, consider a site that consists of two user groups, one of which is busy and the other of which is hardly used. High call activity on channels from the busier user group can cause the Shared Service algorithm to reduce the number of channels available for interconnect throughout the site. It also influences the

number of interconnect channels available to the less busy user group. If this situation becomes a problem for a particular site, the system operator is advised to disable Shared Service at that site.

4.1.8
Data Calls

When an RF channel resource is assigned as a data channel and a user group member needs that RF channel resource (because that channel is the only RF channel the user group is permitted to use), and if the channel is not protected, then the data channel must be given up to the voice call request. For details concerning protected data channels, see the *Trunked Data Services* manual.

4.1.9
Call Request

The zone controller rejects the call request due to Channel Partitioning if a non-emergency call request is made at a site to which one of the following applies:

- No channel is configured to permit that required user group to operate at the site.
- No open channels are available.
- The only active channel available configured with the caller's user group is the Control Channel.

4.1.10
Call Setup

When a valid subscriber unit requests service, the system assigns RF channel resources according to user group configurations. After a call request is received, the system checks for an idle RF channel resource that is configured for exclusive use. For example, using the Channel Resource Chart in the following table, RF channels 5 and 6 are configured for exclusive use by user group 1 (UG1). If a member of user group 1 initiates a call request, the system tries to assign RF channel resources 5 and 6 first. If RF channel resources 5 and 6 are already busy, the system next checks the availability of shared RF channel resources. UG1 shares RF channel resources 3 and 4. If RF channel resources 3 and 4 are busy and channel resources 5 and 6 are still busy, the system then checks the availability of the RF channel resources that have an **Open** configuration. The system then checks the RF channel resource 2 for availability. If the RF channel resource 2 is busy, the system busies the call request and starts a busy queue.

The table provides an example of a Channel Resource Chart (where CC represents the Control Channel and TC represents the traffic channel).

Table 7: Channel Resource Chart Example

RF Channel Resource	Channel Capability	Current Assignment	User Group (UG)
1	CC, TC	CC	Open
2	CC, TC	TC	Open
3	TC	TC	1, 3, 4, 7, 30
4	TC	TC	1, 3, 4, 7, 30
5	TC	TC	1
6	TC	TC	1
7	TC	TC	3

Table continued…

RF Channel Resource	Channel Capability	Current Assignment	User Group (UG)
8	TC	TC	4
9	TC	TC	3, 4
10	TC	TC	7

4.1.11 Call Maintenance

The ASTRO® 25 busy conversion priority rules still apply with one difference. The busy conversion process only considers the availability of the RF channel resources that are configured with each particular user group member in the queue. For example, using the Channel Resource Chart in Table 7: Channel Resource Chart Example on page 33, if UG1 was waiting in the queue, RF channels 3, 4, 5 or 6 could be used for the busy conversion. If UG30 was waiting in a queue, only RF channels 3 or 4 could be used for the busy conversion. If UG1 was closer to the top of the queue than UG30 and RF channel resource 4 became available, the system would assign channel 4 to UG1 even though UG1 had more possible RF resource channels.

NOTICE: Shared RF channel resources do not have user group priority. All user groups have equal priority on the RF channel resources they share.

A new user group to a channel does not trigger a busy conversion. However, once busy conversion is triggered, if the newly added user group matches the user group of a busied call, then that channel is considered for assignment to this call (it was ignored earlier, since it did not contain the call's user group).

Removing a user group from a channel does not end a call in progress. However, once the call is ended, the deleted user group is no longer able to access the channel.

4.1.12 Site Trunking

The system supports Channel Partitioning only when the ZC assigns the channels. Channel Partitioning is not supported when a site is operating in the site trunking or the failsoft mode.

4.2 Channel Partitioning Implications

This section describes the implications of Channel Partitioning on the users and resources in an ASTRO® 25 system.

4.2.1 Valid Site with User Groups but No RF Channel Resources

If a channel fails and a second RF channel resource is not available for the user groups configured to a failed channel, or a channel is out of service for maintenance, the system must issue a reject. The site has no RF channel resources for these call requests. The subscriber user is **not** granted services, and the subscriber unit does **not** automatically begin looking for other sites.

4.2.2
Valid Site but No User Group

If a valid site configuration allows a radio unit to register and/or affiliate at a site and no RF channel resources have been configured to support that radio unit or talkgroup, the user stays at the site and has all service requests (except the emergency group call request) rejected because no RF channel resources are available. The user is **not** forced to scan to another site.

4.2.3
User Groups but No Valid Site

The second scenario is when a user group is configured with one or more of the RF channel resources at the site but some or all members of the user group are not *valid* at this site. The invalid users never stay at the site. They are denied access so they immediately scan for other sites. This result could be due to an oversight in the configuration process. It could also be an intentional configuration. This configuration scheme allows the operator of the system to configure some channels with the same user groups throughout the system but selectively deny site access to some user group members at specific sites. If this result is not the intent, then to resolve the discrepancy, do one of the following:

- In the UNC Wizard: Under **RF Site Level Configuration**, select the **Channel User Groups** wizard and remove the user group at this site, since it is not required.

4.2.4
Operation with Default Records

The Provisioning Manager contains default records that serve as shortcuts for quickly creating new records. Default records allow you to define privileges:

- During system initialization.
- For default access to the system.

During system re-initialization, if the system allows wide area calls before the HLR has updated records, the system assigns calls with the assumption that the RF channel resources have an Open configuration. Once the HLR has records, user group configurations are followed.

For the case of default access (that is, Home Location Register of requesting that unit not found, new subscriber unit operates on the system before it is entered through the User Configuration Server), the unit in question is permitted to operate, based on the permissions in the default user access template. If no services are permitted, the unit in question is denied access.

If services are permitted to this radio unit, this radio unit becomes a member of the user group that has been entered as part of the default user access template. All units that gain access to the system in this manner are members of the same user group.

If this radio unit is permitted to make group calls, group call records are created, based on the default group access template. All group call records created in this manner use the user group that has been entered as part of the default group access template.

If default access is permitted on the system, RF channel resources must be configured so that the default user group is supported.

4.3
Subscriber Roaming Implications

Each subscriber unit (unit ID) can be a member of only *one* user group. If a subscriber user has been assigned to a user group that does not have access to system-wide channel resources, the subscriber's ability to roam is severely limited.

If subscribers using Channel Partitioning are going to be moving across site and zone boundaries they need to belong to a user group that is configured to access channels at all the sites and zones in the system.

4.4 Sub-band Restriction

Because sub-band restriction has been or can be used as a limited method of doing Channel Partitioning, it is important to note that the Channel Partitioning feature is not meant to replace or inhibit the use of the sub-band restricted feature. Sub-band restriction continues to operate and is configured in the same manner as in prior releases.

The Sub-band Restricted Operation feature can only steer call requests to RF channel resources in a specific frequency band, not to specific RF channel resources within that frequency band.

4.4.1 Control Channels

The Channel Partitioning feature introduces no additional system requirements related to the Control Channel operation. A new reject reason is introduced on the Control Channel, but it uses an existing set of packets. The Channel Partitioning feature does not affect the priority and message structure of these existing packets. The zone controller's algorithm for selecting a Control Channel at a site operates independent of the Channel Partitioning configuration.

NOTICE: A user group's channel capacity at a given site may be reduced if the user group channels are also given Control Channel capabilities. Motorola Solutions recommends configuring the Control Channels as open channels.

4.4.2 Voice Channels

The Channel Partitioning feature is implemented for the trunking voice only. Channel Partitioning does not support Conventional or Data Only channels.

4.4.3 Data Channels

The Channel Partitioning feature does not affect data service operations. Data channel requests follow allocation rules which are based on channel capabilities, excluding the user group list, and data shared service configuration for each site. The problem with allowing data shared service is that a single RF channel may be used for multiple data calls which span over several user groups.

To ensure that channel resources are always available for voice calls, the concept of protected data channels is used. The zone controller is provisioned with the number of both Classic Data and Enhanced Data channels to protect from preemption at each site (protected limit).

The zone controller preempts a data channel for a group voice call only after the protected limit for that type of data channel, specified at the site by the Unified Network Configurator (UNC), is reached. The zone controller always preempts data channels, including protected data channels, for emergency voice calls. New individual voice calls do not preempt assigned data channels that are considered protected.

For details concerning protected data channels, see the *Trunked Data Services* manual.

4.5

Call Priority

Call Control is the function provided by the zone controller subsystem. At the heart of the zone controller subsystem is the zone controller product which provides, among other functions, RF channel resource management, and allocation.

The system allocates RF channels for voice requests within a partition, based on the following partitioning rules:

- The highest preference is allocated to an idle channel in which the requesting user group is the sole member.
- Medium preference is allocated to an idle channel in which the requesting user group is one in a discrete list of user groups (channel is not **unrestricted**).
- The lowest preference is allocated to an idle channel which is designated as *unrestricted*.

A non-emergency call can preempt channels assigned to scan, if the system parameter *Preempt Scan* is set to *True*, and that the channel is configured with the user group of the call.

The system allocates RF channels for emergency requests outside a partition, based on the following partitioning rules:

- The highest preference is allocated to an idle shared channel.
- Lowest preference is allocated to an idle exclusive channel.

NOTICE: For more information regarding Multigroup Calls and Agency Group calls, see the *Call Processing and Mobility Management* manual.

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Chapter 5

Channel Partitioning Maintenance

This chapter provides maintenance information regarding Channel Partitioning.

5.1 Channel Partitioning Maintenance Considerations

Consider the following when changing Channel Partitioning:

- Changes to the fleetmap in general and Channel Partitioning in particular may influence the subscriber service.
- The Network Management subsystem accepts administrator configuration of user group data.

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Chapter 6

Channel Partitioning Troubleshooting

This chapter provides fault management and troubleshooting information relating to Channel Partitioning.

6.1 Channel Partitioning as a Troubleshooting Tool

Channel Partitioning can be used as a troubleshooting aid in tracking down and resolving channel-specific problems. Troubleshooting can be done by using channel partitioning capability to steer specific groups or radio units to a specific RF channel resource, while restricting all other groups and radio units from the same RF channel resource. With Channel Partitioning, it is possible for the troubleshooter to be granted the same specific RF channel resource on every channel grant. The restriction of other users from this channel also allows the maintenance organization to quickly accomplish their troubleshooting without waiting for other users that might otherwise be assigned to the channel being tested.

IMPORTANT: Because calls can be busied even when RF channels at a site are idle (if those idle channels are not in the user group configuration of the subscriber initiating the call), Channel Partitioning reduces the overall efficiency of the trunked system. Channel Partitioning can improve the level of service for the users of some talkgroups and radio units, but it can also severely reduce the level of service for other users. This result is because users are not allowed on RF channel resources if they are not permitted to use them, even if the RF channels resources are idle.

6.2 Call Processing Problems and Channel Partitioning

The following call processing problems may arise in a system with Channel Partitioning:

- **Valid Site with User Groups but No RF Channel Resources** – in order to resolve this issue, do one of the following:
  - In the UNC Wizard: Under **RF Site Level Configuration**, select the **Channel** wizard and configure RF channel resources with an Open configuration. This action allows any user group to use this RF channel resource and remove the user group at this site, since it is not required.
  - In the UNC Wizard: Under **RF Site Level Configuration**, select the **Channel User Groups** wizard and configure at least two RF channel resources with every user group allowed at the site, including the default user group.
- **Valid Site but No User Group** – in order to resolve this problem, do one of the following:
  - In the Provisioning Manager: Select **Radio Site Access Profile**. On the **Include or Exclude Valid Sites** tab, change the Valid Site programming and deny site access to the user who is not supposed to be on this site. This action requires the user to automatically scan for another site.
  - In the UNC Wizard: Under **RF Site Level Configuration**, select the **Channel User Groups** wizard to add the proper user groups to at least one RF channel resource at the site. If the system allows users to operate on the system using default records, the default user group must be added to at least one RF channel resource.
  - In the UNC Wizard: Under **RF Site Level Configuration**, select the **Channel** wizard to configure at least one RF channel resource at the site with an Open configuration.

NOTICE: In this scenario, it is up to the user to either select a different talkgroup or force a site switch to another site where the user could be a member of a user group at that site.

6.3 Considerations with Channel Partitioning

There system does not prevent a user from assigning the same user group to incompatible talkgroups and channels (such as an FDMA-only talkgroup with a TDMA only channel). For example, if an FDMA only talkgroup is placed in a partition with only TDMA only channels, the system does not provide service for the talkgroup. Therefore, when planning the system, be sure that Channel Partitioning allows for the proper FDMA and TDMA mode usage by individual radio user, talkgroup, and channel.

6.4 Fault Management and Channel Partitioning

The Channel Partitioning feature has no specific fault management operations.