System Release 7.17
ASTRO® 25
INTEGRATED VOICE AND DATA

Performance Management

NOVEMBER 2016

MN003340A01-A

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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 Solutions 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.
	302-444-9842 (International Orders) Includes help for identifying an item or part number and for translation as needed.
Fax Orders	**800-622-6210** (US and Canada Orders)

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Document History

Version	Description	Date
MN003340A01-A	Original release of the *Performance Management* manual.	November 2016

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Contents

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About Performance Management

By proactive monitoring of your system performance, you can identify potential problems before they occur as well as adjust system resources to provide optimum performance.

What is Covered In This Manual

This booklet contains the following chapters:

- Performance Management Description on page 15 presents an overview of the benefits and tasks involved in monitoring system performance.
- Performance Management Theory of Operations on page 17 describes system performance issues and the applications used to monitor system performance.

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 Solutions communications site. Also known as *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).
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.
Affiliation Display	Includes information and procedures on the use of the Affiliation Display software application to monitor the location and talkgroup affiliations of subscribers as they move within the coverage zone of ASTRO® 25 systems.
Dynamic Reports	Covers the use of the Dynamic Reports software application to display usage trends and patterns of activity for effective performance monitoring and reporting in ASTRO® 25 systems.
Historical Reports	Covers the use of the Historical Reports application to generate reports that show system-wide and zone-level historical data for ASTRO® 25 systems.

Table continued…

Related Information	Purpose
InfoVista User Guide	Covers the use of the optional InfoVista application to analyze the performance of the transport network in ASTRO® 25 systems.
Unified Event Manager	Covers the use of Unified Event Manager (UEM) that provides reliable fault management services for devices in ASTRO® 25 systems.
ZoneWatch	Covers the use of the ZoneWatch software application to monitor call processing resource assignments at sites in ASTRO® 25 systems.

Chapter 1

Performance Management Description

This chapter provides a high-level description of Performance Management and the functions it serves on your system.

1.1 Performance Management Introduction

This section presents an overview of the benefits and tasks involved in monitoring system performance.

By proactive monitoring performance of your system , you can identify potential problems before they occur as well as adjust system resources to provide optimum performance.

To effectively monitor system performance, monitor the following areas of system operations on a regular basis:

- The historical usage trends and activity patterns of radio users and system resources at a system, zone, and site level.
- The current usage trends and activity patterns of radio users and system resources within a zone.
- The details of radio call activity occurring within a zone.
- The characteristics of radio user and talkgroup mobility within a zone.
- The current usage of system applications and servers.

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Chapter 2

Performance Management Theory of Operations

This chapter explains how Performance Management works in the context of your system.

2.1 What is System Performance?

System performance, as defined here, is the system's ability to handle call requests, as measured by how often radio users experience busies when attempting to make calls. System performance is more easily optimized when you have a clear understanding of how the system works and how well the system performs under normal conditions. When you know how your system is supposed to perform and how well it actually performs under typical operating conditions, you are then prepared quickly to observe and correct deviations from normal performance levels. It is your job to ensure that system resources are utilized efficiently.

Monitoring system performance and user satisfaction is an ongoing process. Although your system undoubtedly worked smoothly initially, over time, system performance can be affected by changes in usage patterns and by modifications made in response to changing communication needs. If you are familiar with how your system operates under normal conditions and monitor your system performance regularly, you can identify and address problems before they affect user communication.

2.2 System Performance Monitoring

A good way to monitor system performance is to check the system routinely and see that things are working normally for your organization. To build awareness of normal performance patterns, you can take the following actions:

- Develop a baseline of statistics of how your system operates.
- Monitor daily operations to see how system performance changes over time from the baseline.

2.2.1 Creating a Baseline

Your system was designed to handle a predicted call usage and traffic pattern. Over time, as changes occur in your user community, radio usage and traffic patterns change. Those changes can affect system performance. A statistical baseline gives you a way to measure the amount and type of change and also helps you to identify what modifications can be made to keep your system operating at the necessary performance level.

You will want to create a system performance baseline whenever major changes occur with your system (for example, after a rollout of a large set of radios or the addition of another agency onto the system.) A baseline should include enough data to give you an accurate picture of how your system is performing, especially in respect to call handling. Data that should be collected include the following:

- The overall number of calls
- The type of calls
- The duration of calls
- The number of sites involved in calls

- The number of zones involved in calls
- The types of busies

2.2.2
Daily Monitoring

Once you have a baseline, develop a routine of monitoring the activity of your system. System performance can be affected by the addition of radios, radio users, talkgroups, multigroups, or console dispatch positions. In addition to regularly monitoring the system, note changes in traffic patterns in each zone. You can compare traffic and usage to the baseline data, and adjust system configuration to optimize performance, if necessary, before these changes cause performance problems for your user community.

The following are suggested actions to include in a daily system monitoring routine:

- Note alarms and system equipment status using the Unified Event Manager (UEM) application.
- View most current activity graphs using the Dynamic Reports application.
- Note changes to roaming and usage patterns using the Affiliation Display application.
- View channel status using the ZoneWatch application.
- Read technician messages, if applicable (you access all technician messages for a zone through the Zone Controller object in the application).
- Look at zone-level and system-level basic statistics reports and compare the number of calls to the number of busies.
- Note any complaints from radio users.
- Inform users on any changes to be made, if necessary.

Use the different performance monitoring tools to identify performance issues and their causes. Implement a process for obtaining user feedback, and note issues such as users thinking they have features that they do not have, or not having access to needed sites. Determine if users require extra training about their radio capabilities or if their configurations should be updated to satisfy changing communication needs. When making configuration changes, consider the effect of the changes on other radio users and change other affected areas (such as radio RSS programming) as well.

2.3
System Performance Issues

This section covers the identification and solving of system performance issues.

2.3.1
Identifying the Cause of System Performance Issues

In a large system, performance issues may not have one specific problem source. A combination of factors together may create busies for the radio users. For example, busies can be caused by physical infrastructure limitations:

- Not enough channels at a site for the changed traffic load
- Not enough LAN/WAN transport bandwidth for a changed traffic load

Or they could be as a result of configuration, including:

- Overloading a specific site due to valid site settings
- Overloading specific channels due to modulation selections
- Overloading LAN/WAN bandwidth paths due to network settings

Based upon the problems reported by your users, you can determine the cause of the busies using the PNM applications.

2.3.2
Solving the System Performance Issues

Just as there can be more than one cause for a performance problem, there is more than one solution available to solve the problem. For example, a problem of an overloaded site could be solved by adding extra channels or by reconfiguring valid site settings for a number of talkgroups at that site.

No one solution is generally the only "right" decision. Each solution must be made in light of system operational needs, organizational needs, budget, mission, and so on. Additionally, each possible solution has impact on other aspects of system operation. For example, adding a channel to a site may impact your site link capability.

Your Motorola Solutions field representative can help in determining possible solutions and in understanding the impacts of any possible solution to your system.

2.4
Performance Management Applications

Performance Management tools are used to monitor, collect, log, and evaluate network performance and resource utilization data. Performance applications for the radio resources are described in this section.

Private Network Management (PNM) applications collect statistics of radio resource usage in the Zone Statistics Server (ZSS) and System Statistics Server (SSS) for radio units, talkgroups, channels, sites, zones, and system-wide activity report generation.

Separate, optional performance applications display real-time communications activity (such as, ZoneWatch) or collect traffic statistics over predetermined intervals for report generation (such as Dynamic and Historical Reports). Historical statistics are aggregated into detailed and summarized reports on both an individual zone and system-wide basis. Statistics are available on an hourly basis for 10 days, daily for 62 days, and monthly for 3 years at a zone, site, channel, and user. Zone statistics are also available on 15 minutes basis for 25 hours. They are useful for the system monitoring in troubleshooting, sizing, and monitoring. PNM also has archival and export features for saving reports or offline data analysis.

To check time intervals for zone-level and system-level objects, see the *Historical Reports* manual.

2.4.1
Zone Historical Reports

This application produces reports on radio infrastructure and radio resource usage within an identified zone. A predefined set of reports, with field selection capability, is supplied to produce "standard" or tailored reports. Custom reports can be developed using Historical Reports underlying Crystal Reports reporting engine.

Historical Reports are generated automatically or on demand. Automatic reports are produced at a specific scheduled time and date or on a recurring time and date interval. Reports can be sent to the monitor screen, a printer, `.csv`, `.xml`, or `.doc` and other files.

2.4.2
System-Wide Historical Reports

The System-Wide Historical Reports application is introduced with the PNM system for multiple zone systems. Radio traffic statistics from multiple zones, including InterZone traffic, are accumulated in the System Statistics Server and collated to produce system-wide reports.

Next Gen ISSI (NGI) feature provides an enhanced interconnectivity solution to communicate with up to 24 other P25-compatible systems.

2.4.3
Dynamic Reports

Dynamic Reports are intended for short-term monitoring. Report intervals may be set for 15 seconds, 1 minute, or 15 minutes, and up to 100 intervals can be collected. Multiple objects and up to 12 statistics can be included in a single report. Like for the Historical Reports, a complete set of predefined Dynamic Reports is provided. Reports can be output to the client PC workstation display, printer, or file.

This display provides zone-level, real-time line charts that illustrate channel utilization for all call types - group, private, interconnect, control channel, and dynamically blocked calls, and others.

2.4.4
ZoneWatch

ZoneWatch is a performance management tool having customize able displays and grids to monitor real-time communications activity in a single zone. The information displayed can help system managers be proactive in making better resource planning decisions, such as when additional channels need to be added to busier sites.

2.4.4.1
ZoneWatch Grid Screen

Air traffic within a single zone is displayed on a site/channel grid. Real-time call activity for each channel is displayed in its respective cell.

2.4.4.2
ZoneWatch Control Display

This display presents call activity messages that can be used to isolate errors, trace the progress of a call and troubleshoot, or analyze current system activity. It also provides information about activity occurring on the control channel, such as rejects, emergency alarms, and unit affiliations.

2.4.5
Affiliation Display

Upon initial power-up and as mobile users move across a geographic area covered by one radio site to another, ASTRO® 25 mobile, and portable radios affiliate to the zone and site now providing the radio service. The responsibility for providing radio service to the unit is thus "handed-off" to another zone and/or site. This mobility management function allows the zone controller to have knowledge of the site currently serving the unit, such that the unit can be immediately connected or included in private or group dispatch calls without having to broadcast to all sites.

The optional Affiliation Display provides a dynamic view of the sites to which all operating units are currently affiliated, displaying zone, site, and talkgroup details. This feature makes it easy to track and troubleshoot radios in the system. Affiliation Display is not a vehicle or unit locator in an absolute sense; affiliation only suggests the area in which the unit may currently be operating based on the unit's last affiliation and the site's radio coverage.

The focus of the Affiliation Display can be on an individual site, a specific talkgroup, or an individual radio. Graphing capabilities are also included.

2.4.6
Custom Historical Reports

Custom Historical Reports is similar to Historical Reports. Like Historical Reports, it uses a third-party application (SAP Crystal Reports®), but the difference is that you can create your own reports. You select the parameters for the report instead of using predefined parameters and templates that Historical Reports uses. Custom Historical Reports is a purchasable option.

Using a report generator, you create a customized report with the parameters that you want. Custom Historical Reports uses Crystal Reports to step you through a series of dialog boxes to define each set of parameters that you could include in the report. The Custom Historical Report features apply only to Historical Reports and not to Dynamic Reports.

2.4.6.1
Why Use Custom Historical Reports?

If you need to customize your performance reports (zone-level and system-level Historical Reports only), the Custom Historical Reports option is an additional software package that allows you to modify existing report templates and create new templates to meet your system needs.

Use Custom Historical Reports to create user-specific reports with usage of predefined data collected by Motorola Solutions.

2.4.6.2
Custom Historical Reports Features

Custom Historical Reports has the following features:

- The Report Expert wizard from Crystal Report allows you to select from all statistics available on ZSS/SSS. You can modify template files to suit your needs.
- Reports may be customized to suit your individual needs. Customization includes:
  - Group and sorting
  - Charts (bar, line, 3-D)
  - Top and bottom X filtering
  - Calculated values
  - Cross tab, form, form letter, drill-down reports
- Special formulas can be included in Custom Historical Reports to create certain effects.

2.4.6.3
Creating Custom Reports

Custom Historical Reports uses the following statistical data elements to generate a report:

- Zone
- System
- Channel
- Site and Console Site
- Talkgroup
- Radio User
- Talkgroup at Site

You can use two methods for creating custom reports.

- Using one of the predefined reports as a template (easiest way). You can use one of the standard reports as a template and modify it. Use this method whenever you are creating a report of the same general format with different statistics, or whenever a small modification satisfies your requirements. You can use the Report Designer feature of SAP Crystal Reports to customize a report.
- Develop a report from the beginning, which generally takes more time, but allows you greater flexibility.

2.4.6.4
Using Custom Report Data Dictionaries

When using either of the two methods to create a custom report, you must select a data dictionary for the report. All predefined reports are written using the dictionaries. When modifying an existing report, you may be prompted to supply the dictionary upon opening the report, in which case you must select the dictionary originally used to develop the report.

The first purpose is to provide a simple table view of zone and system data so that you do not have to deal with the underlying technicalities.

The second purpose is to isolate the database so that the reports (standard or custom) do not have to be rewritten each time the database structure changes.

NOTICE: All reports are installed as read-only files. Standard report template files should not be modified. A new report template should be created by copying or saving the desired report template to a new file in the same directory.

2.4.6.5
Dynamic Reports

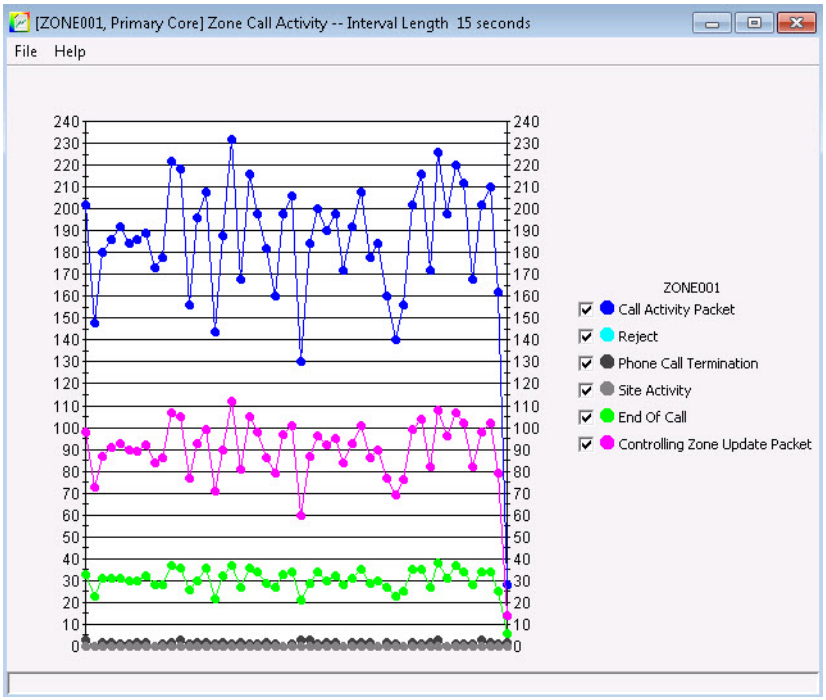
Dynamic Reports is a PNM Suite application that provides near real-time call data collection and allows you to display usage trends and patterns of activity for effective monitoring and reporting. Dynamic Reports is a purchasable option.

Dynamic Reports provides predefined parameters and template formats to display the value of multiple statistics for one or more managed objects. Once a report is activated, a Dynamic Report window appears and data is plotted according to the object and the time interval selected.

At the end of each interval, a new set of statistical values is added to the display. When the display reaches the specified number of intervals, each new interval added causes the removal of the oldest interval from the display. Dynamic Reports are not available at the system level.

See: Figure 1: Dynamic Report Example on page 23 for an example of a Dynamic Reports screen.

Figure 1: Dynamic Report Example



2.4.6.5.1

Why Use Dynamic Reports?

Use Dynamic Reports to monitor and report usage trends and patterns of activity. You can do the following:

- Generate real-time line graphs for a zone or site.
- Use predefined formats to display the value of multiple statistics for a zone or site.

Use the data to change how radios and talkgroups are managed. You can closely examine what happens during a shift or set period of time; for example, you can look at the busy count and see if calls are being missed.

Based on your monitoring, you could recommend system expansion or decide to modify your system design to improve communication.

2.4.6.5.2

Dynamic Reports Features

Dynamic Reports provide the following features:

- Zone Templates.
- RF Sites and Console Sites Templates.
- Timed Intervals.

2.4.6.5.3

Dynamic Report Zone Templates

Dynamic Reports allows you to create different types of zone-level reports for sites, busies, call activity, Push-to-Talks (PTTs), channel utilization, affiliations, and call rejects.

For example, the **Zone Call Activity** report provides statistics for determining the levels of different activities within the zone, such as rejects, site activity packets, and call activity packets.

NOTICE: You can find a complete list of report templates and descriptions in the Dynamic Reports online help.

2.4.6.5.4
Dynamic Report Site Templates

Dynamic Reports allow you to create different types of site level reports for channel utilization, busies, call activity, and PTTs. Separate templates are prepared for console sites.

For example, the **Site Busy Count** report contains statistics for the number of busies caused by lack of resources at this site and the number of busy calls originating at this site.

NOTICE: You can find a complete list of report templates and descriptions in the Dynamic Reports online help.

2.4.6.5.5
Dynamic Report Timed Intervals

Dynamic Reports allows you to view statistics in a predefined graphical form for zones and sites. Dynamic statistical data objects are presented in time-based intervals.

At the end of each interval, a new set of statistical values is added to the display. When the display reaches the specified number of intervals, each new interval added causes the removal of the oldest interval from the display.

The timed intervals are defined as follows:

- 15 seconds (default), 1 minute, or 15 minutes
- 1 to 100 intervals

Dynamic reports are always presented on the screen. The graphing window needs to remain open to graph the data. From the screen, you can print the report and save it to disk.

2.4.7
InfoVista Reports

InfoVista can be installed at the Zone or System OSS level to collect performance information on the LAN and WAN devices. Additionally, HP Open View SNMP Data Collect and MIB browser allow the user to view performance statistics for any device as long as their MIBs are loaded in HP OpenView.

InfoVista is a performance monitoring tool that can provide a graphical representation of network statistics. The InfoVista client software can be loaded on any Windows Operating System Network Management (NM) client and launched from the NM client using the InfoVista icon located on the desktop or on the start menu.

In an ASTRO® 25 system, InfoVista provides the following features:

- Detection of all routers, LAN switches, WAN switches, Digital Access Cross-connect Switches (DACS), and PDG.
- Creation of single report instances for each discovered device. It can also provide group report instances.

2.4.8
Genesis Group Performance Management Software

Customer Reports on the performance of the Enhanced Data Channels are accomplished using the Genesis GenHPD product.

The Genesis GenHPD resides in the CEN and monitors the ASTRO infrastructure through the GTP, and PMI interfaces. The GenHPD is also able to obtain location information on specific subscriber radios through the LRRP interface to the IMW Common Location System.

The Genesis GenHPD shows the Percentage of Utilized Protected Delivered Load Per Data Access Group (DAG), that provides information how the Enhanced data channels are used. Apart from this, the Genesis GenHPD provides reports for IV&D and HPD site and User ID activity filterable by date, time, User ID, or site:

- Data Load (bytes) Per System
- Data Load (bytes) Per Site
- Data Use (bytes) Per ID
- Calculated Bitrate Per Site
- Calculated Bitrate Per ID
- Number of Users Per System
- Number of Users Per Site

2.5 Out-of-Band Management

Out-of-band management consists of a set of modems and one multi-port server. The server provides interfaces to the Ethernet LAN switch on one side and to the modems on another. The LAN interface provides connections to the serial (console) interfaces of all the devices at the master site. This connection provides the means to program an IP address in any device which in turn allows access to all the other programmable functions. The modems provide a method to dial into the terminal server connected to the master site LAN. Telnet is supported, as well as connectivity to the serial ports of the routers, switches, and servers.

See the front view of the Figure 2: Terminal Server on page 25. The front panel includes:

- Built-in modem port (RJ-11)
- Diagnostic port (RJ45)
- Operating LEDs
- 100 Mbps link LED
- RS-232 Port status LEDs (1–48)

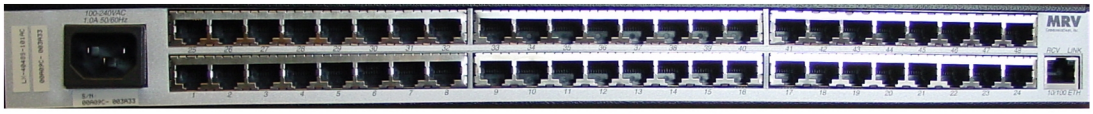
Figure 2: Terminal Server

Terminal_server_LX4048_front

See the Figure 3: Terminal Server - Rear View on page 26. The rear panel includes:

- 120 V Power Connector
- 48 RS-232 serial ports (RJ45)
- 1 10/100Base-T port (RJ45) with a link and receive LEDs

Figure 3: Terminal Server - Rear View



Terminal_server_LX4048_rear

2.5.1
Remote Analog Access

A feature supported by ASTRO® 25 is remote analog access. This allows properly configured PCs to dial into the network and access the Network Management applications through the terminal server and the LAN switch. Up to 24 ports of analog access is supported.

Once the dial-up client is granted access to the system through a login and password, the client can launch the zone manager applications other NM applications. Performance of applications such as ZoneWatch depends on the amount of bandwidth allocated to the connection.