

Mobile Applications System Description

6.1 Mobile Applications System Description

6.2 STARS Mobile Data System Overview

The following document describes the scope for the mobile data applications systems included in STARS. This document describes system functionality. For system implementation responsibilities, please refer to the Statement of Work in Section 1.

The system is composed of the following components (or subsystems):

- Mobile Data Computer (MDC) Subsystem
- Premier MDC Mobile Application (and VSP CAD Interface support) as identified in Appendix 10a.
- Premier Automatic Vehicle Location (AVL) and Graphic Geofile Manager (GGM), Advanced Tactical Mapping (ATM)

6.3 Premier MDC Overview

The Premier MDC mobile application will provide the following to the Commonwealth of Virginia:

- ASTRO 25 Integrated Voice and Data (IV&D) Network support,
- Intra-agency and inter-agency text messaging,
- POP3 Email Integration Capability to access MS Exchange Server for Outlook email,
- Support of the VSP CAD Interface
- GPS support for the Premier ATM and AVL, as described in this AVL System Description,
- A disaster recovery solution through site diverse, primary and backup, fault tolerant Message Switch servers.
- Compatible with Microsoft NT Based Operating System for Windows Client and Windows Server.

6.4 Premier AVL Overview

Automatic Vehicle Location (AVL) system uses Global Positioning System (GPS) satellites to track and monitor vehicle location and status. Motorola will provide equipment that complies with the National Marine Electronics Association (NMEA) 0183 protocol for GPS devices. To utilize this technology, vehicles will be equipped with specialized GPS receivers. These receivers will be mounted in the vehicle and connected to both the mobile data computer and an external antenna.

The Premier AVL system will include:

- An AVL subsystem to track the location of mobile units in the field. Based on the limited bandwidth of the ASTRO 25 IV&D system, the unit location will be manually requested by the dispatcher at the ATM workstation and automatically sent with commands identified in Section 6.11.3.
- ATM mapping capabilities for automatic vehicle locator capabilities, unlimited intelligent map layers, shortest path routing, in-vehicle mapping, and aerial photographic overlays. With the AVL subsystem, ATM allows vehicles and events to be displayed on the same geographic display. One (1) ATM license will be provided for each of the seven VSP dispatch centers and SPHQ NOC. The ATM display is the geographic display system that utilizes ESRI software to display the locations of AVL units and their status. The creation of commonplace map layers used within ATM occurs through GGM.
- GPS receivers will be provided for the mobile units identified in Appendix 9 (please see the subscriber system description Section 10 for more details).

6.5 Premier MDC Mobile Application Overview

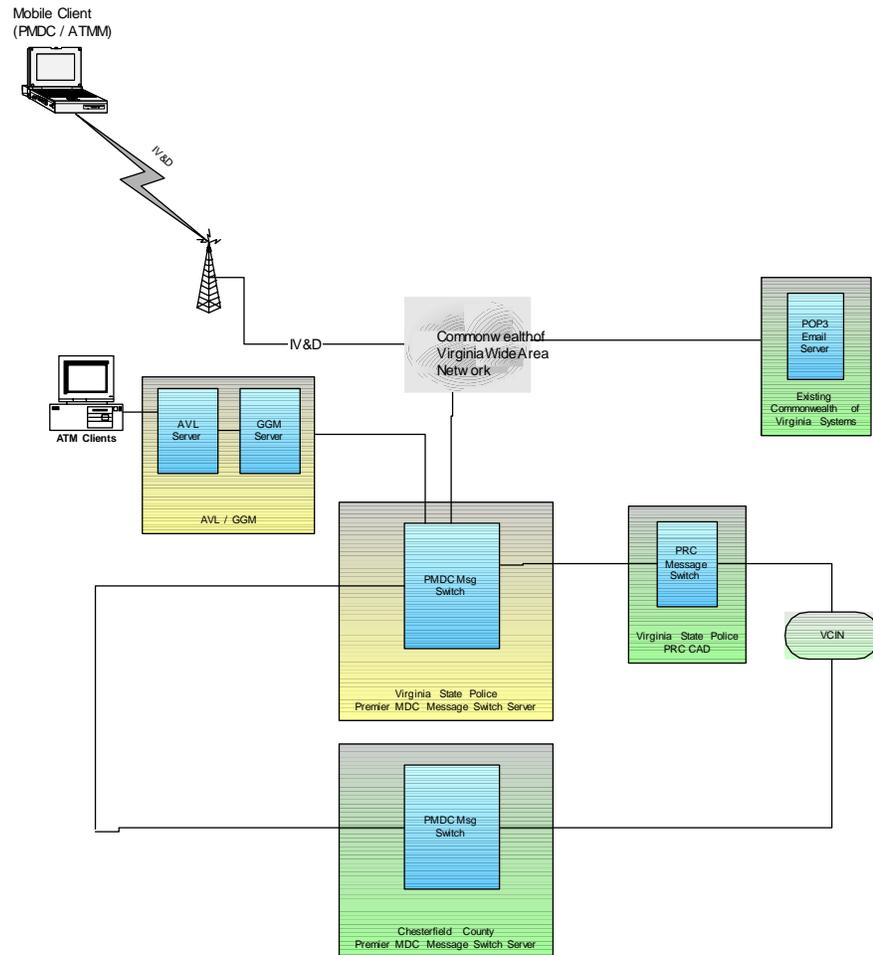
The Premier MDC™ mobile data system will provide mobile data functionality over the ASTRO 25 IV&D network. Motorola is including two client configurations of Premier MDC, one for VSP that offers full CAD Interface capabilities, and one for other Sworn Officers that do not require the CAD dispatch functionality of the Interface. These configurations are described in more detail below.

The Premier MDC Client Configuration for the Commonwealth:

1. VSP Mobile Client: CAD Dispatch, VCIN Queries, POP3 email access, GPS support, and Messaging
2. Other Sworn Officers Mobile Client: VCIN Queries, POP3 email access, and Messaging

In the vehicle, a Microsoft Windows-based laptop (MDC) will run Premier MDC Client software featuring an intuitive graphical user interface (GUI).

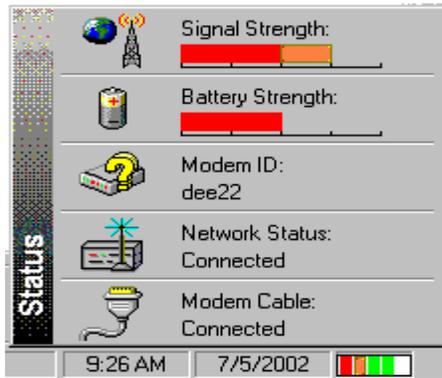
In house, a Microsoft Windows server runs Premier MDC Server (Message Switch) software. The Message Switch provides an interface to the radio infrastructure on one side and to specified-host systems (see Figure 6-1) on the other. The Message Switch routes messages between host applications and the mobile computer based on the transaction being performed and the unit identifier or ID. It also provides comprehensive security, logging, and statistical reporting capabilities for supervisors and administrators.



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Figure 6-1

Premier MDC uses Motorola's communications middleware to manage data transmissions between the mobile devices and the Message Switch. The middleware compresses and encrypts data between the Client and the Message Switch for fast and totally secure communications. For the Commonwealth, Premier MDC will run over the ASTRO 25 IV&D network. Should the Commonwealth want to extend the STARS Message Switch to other VA Jurisdictions, Premier MDC also supports most commercial private and public data networks as well as proprietary and IP-based networks, including Local Area Networks (LANs) or Wide Area Networks (WANs) using the IP protocol. Add-on jurisdictions can be handled as a separate purchase.



Regardless of the network type, Premier MDC incorporates a radio modem status indicator on the client software. This indicator provides information on Signal Strength, Battery Strength of the laptop, Radio Modem ID, Network Status and Radio Modem Cable Connected status. The user selects the indicator box at the bottom of the screen to see the pop-up status indicator list. Figure 6-2 depicts the radio's modem strength indicator seen on the client.

Figure 6-2 – Radio Modem Strength Indicator

The following Premier MDC modules are designed for the ASTRO 25 IV&D network:

- VSP CAD Interface – For CAD dispatch, VCIN access, self-initiated calls, status reporting and download of other vehicle and call statuses to the VSP CAD system.
- Messaging – All VSP car-to-car Messaging will be passed through the VSP CAD Interface for logging and required administrative functions. All car-to-car messaging will be logged in the PMDC Message Server.

Motorola will functionally test the above listed features in the Premier MDC acceptance test plan in Section 12a. The performance models and associated commitments for the data network are provided in the ASTRO 25 IV&D System Description.

The Premier MDC system will additionally be capable of the following features. Motorola is testing these features over the ASTRO IV&D network. System performance guarantees are based on parameters as outlined in Section 4.

- **Attachments** - Messages with attachments can be sent on an occasional basis. The attachment size should be limited to 15 kilobytes or less. This feature may be implemented at the discretion of the STARS Project Manager.

- **POP3/SMTP Interface** - Premier MDC POP3 server integration will allow integration with the VSP Microsoft Exchange Server for Outlook for sending and receiving e-mail directly through the Messaging Module. In addition, Premier MDC clients can also send messages to e-mail addresses outside of the Premier MDC system to the existing Exchange Server for Outlook at SPHQ. This feature may be implemented at the discretion of the STARS Program Director.

To integrate POP3/SMTP with the MCTs, the Microsoft Exchange Server for Outlook at SPHQ will provide a POP3/SMTP interface. In addition, Motorola will need to work closely with the VSP Exchange Administrator to configure the mobile users Exchange mailboxes to perform optimally in a mobile environment. The Premier MDC Message Switch cannot limit the information being sent from the Exchange Server for Outlook. Therefore, if a user is sent several emails or large files at one time, the network performance can be severely affected. The VSP Exchange Administrator will configure Exchange Server account parameters and limit the size of attachments being sent to the mobile users. The Commonwealth will monitor the performance of email integration over this network and determine the impacts on performance.

- **Automated Vehicle Location (AVL) Interface**– For transmission of GPS data from the client device, through the Message Switch, to the Premier AVL System.

6.6 Design Assumptions

6.6.1 User Interface

Screen Layout/Design, Toolbars and Function Keys - Motorola will configure the screen layouts, the Premier MDC toolbars and function keys to the Commonwealth's requirements and the client interfaces described in Section 6.5. Motorola supports post acceptance customer desired screen modifications utilizing Motorola technical field engineering resources to capture and document the requested changes, submit these requests into configuration engineering, and test the modifications made by configuration engineering in the customer environment. Ultimately, every customer specific client configuration is stored and documented by Motorola until the final system acceptance in a repository so that customer required support services are effective and efficient. This process enables Motorola to maintain a higher degree of quality control and support.

Motorola will train five Commonwealth technical resources (trainees) to modify as an additional methodology for implementing modifications to the appearance of existing PMDC screens and toolbars. Motorola will provide the Premier MDC Custom Management Utility tool. Trainees designated by the Commonwealth will possess the requisite experience and background required to maintain and modify the PMDC system.

Motorola will train the five trainees to modify existing PMDC screens by making changes to HTML files, CSS files, an INI file, XML files, and Toolbar Buttons and function keys. By modifying the HTML and CSS files the Commonwealth will be able to manipulate the font, color and location of individual fields on PMDC forms. Field validation rules may be modified by making changes to the XML files.

Motorola will provide five (5) licenses of the GUI-based program to modify the main PMDC INI file and toolbar button functionality. The graphical toolbar editor allows the trainees to change the various toolbars within PMDC. The trainees can add and remove toolbar buttons as well as change a button's caption, hotkey and position within the toolbar. The PMDC INI editor allows the user to manipulate the approximately 450 configurable settings within PMDC. The editor does not however validate any user changes so caution must be exercised when using this utility.

The HTML, CSS and XML files can be modified with a text editor such as Notepad. Motorola will help the five Commonwealth technical resources gain an understanding of the files listed above, but Motorola will not provide training in the HTML, Javascript, or XML programming languages. Motorola will not provide any development tools used to work with these programming languages. The cost of developing, testing and deploying any modified screens will not be Motorola's responsibility.

The tools and training will allow the Commonwealth trainees to modify the screens after PMDC subsystem acceptance.

To protect the warranty support guarantees of the PMDC subsystem, Motorola will require the Commonwealth to follow the change submission process outlined below.

- The Commonwealth will modify and test their PMDC screens and queries. Once satisfied that all PMDC functionality is working as desired, the Commonwealth will use the Premier MDC Custom Management Utility tool to create a new installation image (i.e. the .PAK file).
- The Commonwealth will create a CD consisting of the .PAK file and the existing core files from the previous installation CD (mdcsetup.exe, setup.exe and setup.ini). The Custom PAK (.PAK file) should be numbered sequentially (one higher than the previous version) regardless of any changes to any of the three other files.

Additional transactions deployed by the Commonwealth are outside this Contract. Any erroneous customizations to PMDC that the Commonwealth makes, which require Motorola's assistance to remedy, will be billed on a time and materials basis.

Premier MDC™ is copyrighted and trademarked Software. All restrictions, terms and conditions of the Software License Agreement will apply to all modifications and the Commonwealth must reproduce all copyright and trademark contained on any customized or modified versions of Premier MDC™.

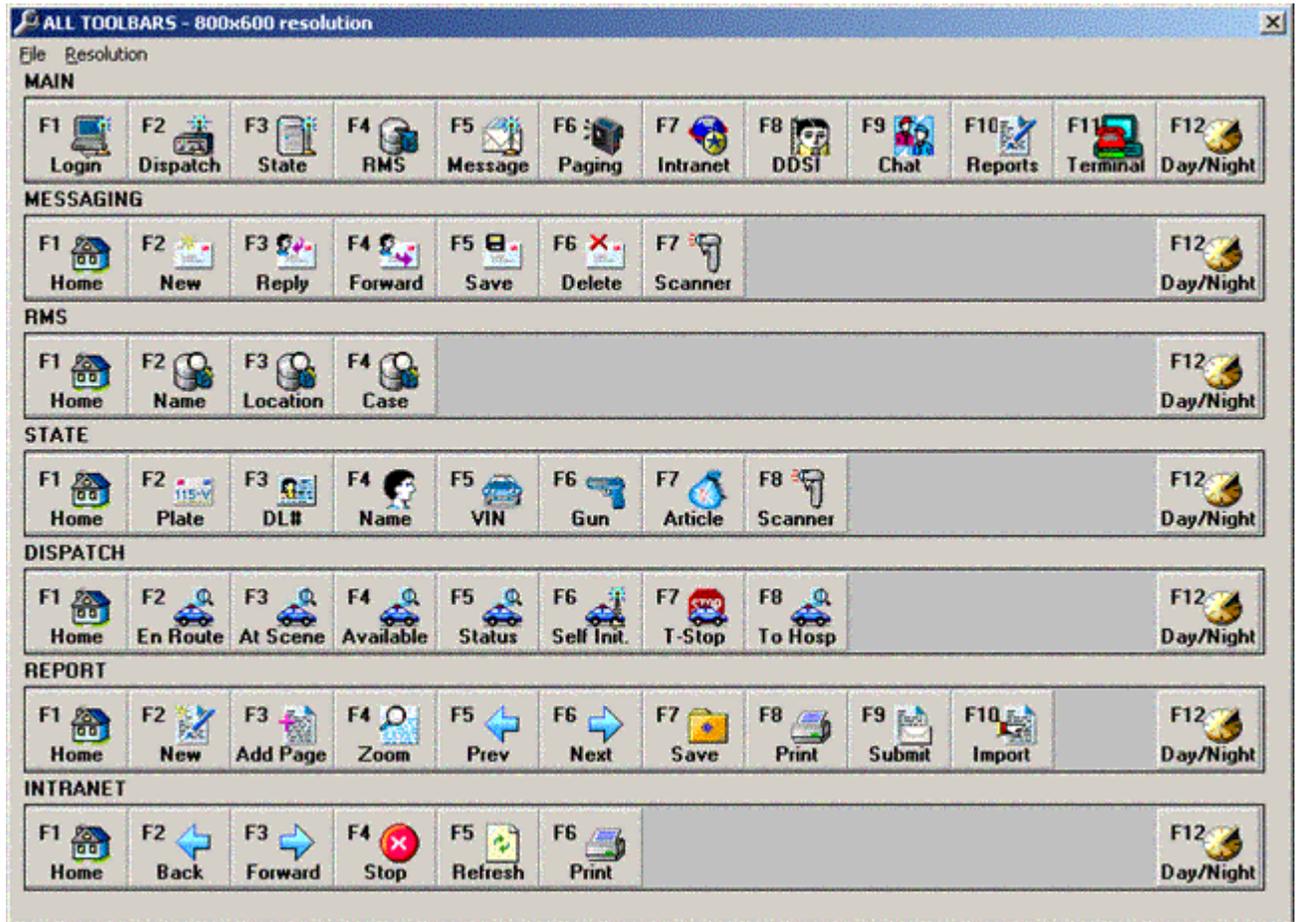
The client screens will be based on the requirements imposed by the VSP CAD Interface document and features scoped in this document. Motorola will configure the screen layout of each of the Premier MDC context sensitive toolbars and function keys to the Commonwealth's requirement, for the two requested Client Configurations defined in Section 6.5.

6.6.2 VSP CAD Interface

The functionality provided is bound by what is described in the Commonwealth provided document "Mobile Computer Command Interface for the Virginia State Police Computer Aided Dispatch System" (file name CAD Interface Specification revision (5).doc dated 4/13/04) in Appendix 10. Any functionality not described in this document has not been scoped in this project.

Motorola's development work to comply with writing to the VSP CAD Interface document, assumes the following:

1. There will be a TCP/IP Interface between the PMDC and VSP CAD Interface Message Switch. The PMDC Message Switch will not manage (interface to) multiple CAD systems.
2. The exact screens presented in the VSP CAD Interface document will not be provided. PMDC does not support multiple toolbars. Instead a main toolbar will be provided that allows the user to quickly access functions like CAD or Messaging. Once in CAD or Messaging a toolbar specific to that subsystem will be displayed. Several example toolbars are shown below.



3. The functionality requested in Sections, 5.4 and 5.5, in the Commonwealth’s “Mobile Computer Command Interface for the Virginia State Police Computer Aided Dispatch System” document will be provided as specified below:

Sections 5.4 and 5.5 Lock and unlock will be handled at the PMDC Client level.

Motorola will provide functionality required by the CAD Interface document in Appendix 10. While the client screens and toolbars will not visually match examples provided in the Interface document, all form fields will be presented to the VSP CAD Interface message switch as data strings, formatted as specified in the Interface document.

The Commonwealth will be responsible for managing and providing any necessary changes to the VSP CAD Interface, including development of a PMDC specific interface, and coordinate these changes with Motorola. Motorola will provide technical assistance.

Section 4.0, CAD TO CAD interface, in the VSP CAD Interface document in Appendix 10, is beyond the scope of this Contract. The Message Switch is not managing multiple CAD Systems.

Status Codes Available to Mobile Users – The Commonwealth is responsible for the VSP CAD configuration of the various status codes that are available for mobile users based on requirements. It is assumed that these status codes are those provided in the “Mobile Computer Command Interface for the Virginia State Police Computer Aided Dispatch System”. The Commonwealth will furnish the number of status keys (e.g., Acknowledge, En Route, At Scene) and their respective labels, and choose which ten (10) of these labels should appear at all times on the Premier MDC Client Main Menu screen.

The Premier MDC Message Switch is not replacing the VSP CAD Interface Message Switch. The VSP CAD Interface Message Switch is required to manage VCIN queries and external databases required for the CAD dispatchers, mobile users, and the Hierarchical configuration of the seven dispatch centers. The Premier MDC Switch will coexist with the VSP switch and support the mobile interface (as described in the CAD Interface document), the user registry for all mobile units, the RF network connectivity, and the AVL server routing.

6.7 Premier MDC Client Application

6.7.1 User Interface

Premier MDC features a graphical Microsoft Windows Client interface that is activated by keyboard, mouse, touch pad, or pen. Many of the functions within this document will be explained using actual screen images from the Premier MDC Client software that will run in the Commonwealth’s field vehicles. Actual screens will vary based on product release, the Commonwealth’s unique configurations for Public Safety clients, and requirements dictated by the VSP CAD Interface document. (Two client configurations have been included for the client types). During the implementation process, Motorola will work with the Commonwealth to configure the two client types.

The Premier MDC Client Application provides a toolbar that is configured prior to installation based on specifications provided by the Commonwealth in Appendix 10. The toolbar allows the mobile user single-keystroke access to major components within the system. Standard buttons will be configured for the Commonwealth’s users to access Messaging, VCIN / NCIC / NLETS, and CAD functions. If the Commonwealth expands its system to include more applications, the toolbar can be configured and updated for single-keystroke access to new system components.



Figure 6-3 - Premier MDC Configurable Toolbar

6.7.2 Log-in Security



Premier MDC features multiple levels of login security. Each user has a unique password and login that is valid on any appropriate mobile data device. Each user must complete a unique User Sign-on against an encrypted database table on the Message Switch. The following is a sample screen image for logging on to Premier MDC. The Commonwealth's logon screen may include additional fields based on each client type.

A screenshot of the Premier MDC login window. The window title is 'MDC Login'. The header area contains the text 'Premier MDC™ Mobile Data Solutions' and a small grid of four photos. On the left is a police badge with 'POLICE OFFICER' written on it. The main form area has three input fields: 'User ID' with the value 'TMOORE', 'Password' with masked characters '*****', and 'Unit #' with the value '123'. Below the fields is the Motorola logo and copyright information: 'Copyright Motorola Inc. 1999-2001. All Rights Reserved. Premier MDC is a mark of Software Corporation of America, a wholly owned subsidiary of Motorola Inc.' At the bottom are three buttons: 'Send', 'Clear', and 'Cancel'. A small red 'no hand' icon is in the bottom left corner.

Figure 6-4 - Required Log-in Validation

When a user signs on, the system has several levels of validation to complete:

- Validation of the mobile device address on the server
- Unit ID validation within the department
- Unit ID and password validation

6.8 VCIN/NCIC/NLETS Interface



Access to state and national criminal information databases from the mobile computer will be provided for Sworn Law Enforcement Officer mobile users.

Query information returned from VCIN/NCIC/NLETS will be displayed as it is forwarded by the CAD Interface message switch from the respective agency(s).

Query information returned from states that are not parsed, are displayed as forwarded by the CAD Interface message switch from the respective state.

The Main window contains a list of saved inquiry results. Users scroll through the list of responses on the top of the screen while detail for each response appears on the bottom of the screen.

The screenshot shows a software interface for 'Premier MDC - Police'. At the top, there is a menu bar with 'File', 'Utilities', 'Services', 'State', and 'Help'. Below the menu is a toolbar with function keys F1 through F12, each with an icon and a label: F1 Home, F2 Plate, F3 DL#, F4 Name, F5 VIN, F6 Gun, F7 Article, F8 Scanner, and F12 Day/Night. The main area is divided into two sections. The top section is a list of responses with columns for 'Received', 'Type', and 'Summary'. The bottom section is a detailed view of a driver's information, including name, address, date of birth, height/weight/race, license information, and various status fields.

Received	Type	Summary
7/24 18:24	NCIC	MKE/WANTED PERSON
7/24 18:24	DRIVER	MD Driver ()
7/24 18:24	DRIVER	MD Driver (JACKSON SHETLAND DANIALS)
7/24 18:24	DRIVER	MD Driver (JIM MILLER)
7/24 18:24	DRIVER	MD Driver (JOHN H DOE)
7/24 18:24	NCIC	MKE/PROTECTION ORDER
7/24 18:24	NLETS	NLETS Response

Driver									
Name	JOHN H DOE								
Street	1234 EAST WILLOW DRIVE (Changed: 110191)								
City/State/Zip	FREDERICK MD 21702 F								
Date of Birth/Sex	031153 M								
Hgt/Wgt/Race	600 300 2-WHITE								
License									
OLN	Type	Class	Cycle	Issued	Expires	CDL Code	Endorsement	Restriction	
H-123-456-789	R	C	M-CLASS CM	030899	031104	N			
Suspended/Revoked	Points	CDL Disqualified							
NO									
Suspensions									
NONE									
Restrictions									
NONE									
PBJ Information									
NONE									

Data received: CAD Status: Available 7:00 PM 7/24/01

Figure 6-5 - View VCIN/NCIC/NLETS Response

6.8.1 VCIN QUERIES

Premier MDC enables queries to VCIN. The VSP CAD Interface provides security for access to VCIN, allowing only authorized individuals to initiate queries. Through single keystrokes, users can quickly access a wide variety of queries (as supported by the VSP CAD Interface), as shown in the sample toolbar below.



Figure 6-6 - VCIN Toolbar

The VSP CAD Message Switch ensures that requests are transmitted to VCIN. As responses are returned, they are transmitted back to the MDC.

6.8.2 NCIC Inquiry - NLETS Inquiry

Premier MDC supports multiple copy routing. Sending a VCIN inquiry may subsequently query NCIC or NLETS. NLETS and NCIC responses will be returned through VCIN.

The following are generic state screen shots from a state interface. Note: These are not the exact screens provided to the Commonwealth. Actual transactions and screen layout will vary based on the requirements of the CAD Interface document, as well as the VSP configuration and release of Premier MDC.

Sample vehicle Query

Queries can be run for Vehicle, Person, and Gun. The following screen is a sample screen for Vehicle Query. This screen allows the user to check the vehicle by the following criteria (as available in VCIN):

- By Plate
- By Vehicle Identification Number
- By Decal/Title

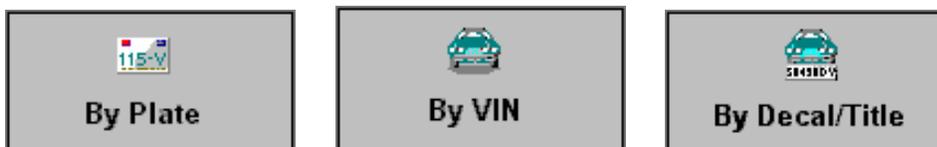


Figure 6-7 - Toolbar Buttons for VCIN Query

Shown below is a sample of the Vehicle Query screen used to send queries to VCIN. For easy entry and reading of license plate information, large fonts are used. Buttons on the left panel allow users to scroll through the different queries.

The screenshot shows a software window titled "New Query" with a sub-header "Query Vehicle by Plate". On the left is a vertical sidebar with icons and labels: "By Plate" (selected), "By VIN", "By Decal/Title", "Person", "Gang", "Boat", and "Article". The main form area contains the following fields:

- Plate:** A large text input field containing "ABC123" in blue, with a red asterisk to its right.
- State:** A dropdown menu currently showing "CALIFORNIA".
- Type:** A dropdown menu currently showing "Passenger".
- Year:** A text input field containing "1999".

To the right of the "Type" and "Year" fields is a note: "(Note: Type and Year are required only for out-of-state registration checks)". Below the form fields is an information icon and the text: "Returns Registration Information. Also Searches Warrants and Stolen Vehicle Files". A red asterisk is followed by the text: "* Indicates a Required Field". At the bottom right are three buttons: "Send", "Clear", and "Cancel".

Figure 6-8 - Create VCIN/NCIC/NLETS Vehicle Query by License Plate

Users will have the ability to run additional queries as specified by the CAD Interface document.

6.9 VSP CAD Interface Module



Motorola will configure the mobile CAD screen layout to the requirements of the VSP CAD Interface. The Commonwealth will be responsible for configuring the various status codes that are available for mobile users based on requirements. The Commonwealth will furnish the number of status keys (e.g., Acknowledge, En Route, At Scene) and their respective labels, and choose which ten (10) of these labels should appear at all times on the Premier MDC CAD toolbar.

- Premier MDC will provide all the VSP CAD functionality described in the CAD Interface document.

When the vehicle receives a digital dispatch:

- A visual and audio alarm can sound in the patrol car until the user presses the F1 key. The mobile user can press a single function key to view and/or hear the incident detail sent by the VSP CAD.

- The mobile user can press a single function key to transmit a status change (e.g., En Route, At Scene, etc.).
- Status changes will automatically be sent to the CAD, updated within the CAD system, and sent back to the mobile application.
- CAD calls can be dispositioned and closed wirelessly.

6.9.1 CAD Incident Details

Consistent with other Premier MDC modules, the main window for dispatch provides two panels – a summary list of calls received on the top of the screen, and details of the highlighted call on the lower panel. The actual dispatch message format and field names described in the VSP CAD Interface document will be displayed. Premier MDC enhances dispatch accuracy by allowing the user to refer to call information directly on the in-vehicle computer.

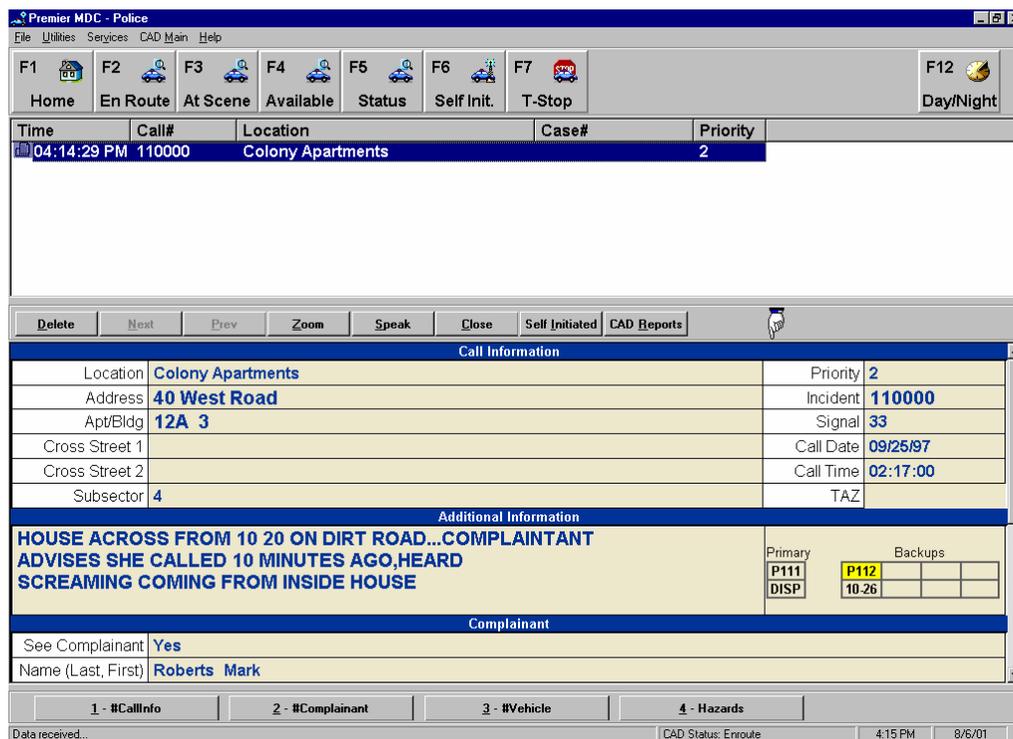


Figure 6-9 - Dispatch Incident Detail

A dynamic button bar toward the bottom of this screen may change with each incoming call, depending on what information is available in the CAD for that incident. Information such as premise history, previous alerts, or routing instructions is available for the call if sent from the CAD Statuses.



Premier MDC status reporting augments incident response procedures by allowing responding units to send status updates by use of function keys on the mobile computer. The mobile unit status report can then be processed by the VSP CAD application and presented to dispatchers on their CAD unit status displays.

Digital status reporting saves time for responding units and eliminates the need for dispatchers to affirm status reports over the voice radio channel, reducing overall voice traffic. The Message Switch supports automatic status code updates from the CAD.

The status component is a standard feature of the CAD Interface module. Prior to installation of the system, Motorola will work with the Commonwealth to support the status codes in Appendix 10. Motorola will configure these statuses on the Commonwealth's mobile application to match those on the CAD. Statuses will be accessible to the end user via single keystrokes for maximum convenience.

6.9.1.1 Common Statuses



In the vehicle, users will receive a digital dispatch from CAD and continually update the status throughout the life of the call. When the mobile user transmits a status change, the change is automatically sent to the CAD, updated within the CAD system and sent back to the mobile application. This sample screen shows the single-keystroke toolbar buttons for commonly used statuses. In this sample, En Route, At Scene, and Available are used.

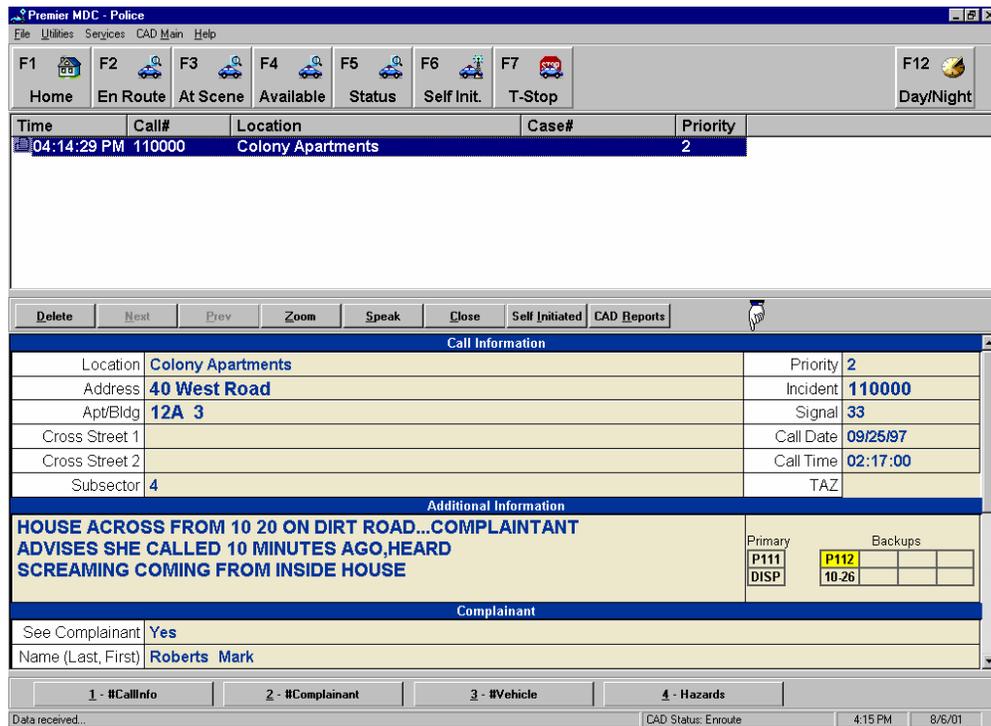


Figure 6-10 - CAD Screen with Standard Status Buttons

The vehicle's current status consistently appears on the bottom status bar of the mobile application, in sync with the unit's status on the CAD system. The status bar also shows date and time.

6.9.1.2 All Statuses



When the Status Change button is activated, a new screen will appear, as shown here. Field operators have single-keystroke access to statuses configured in the system.

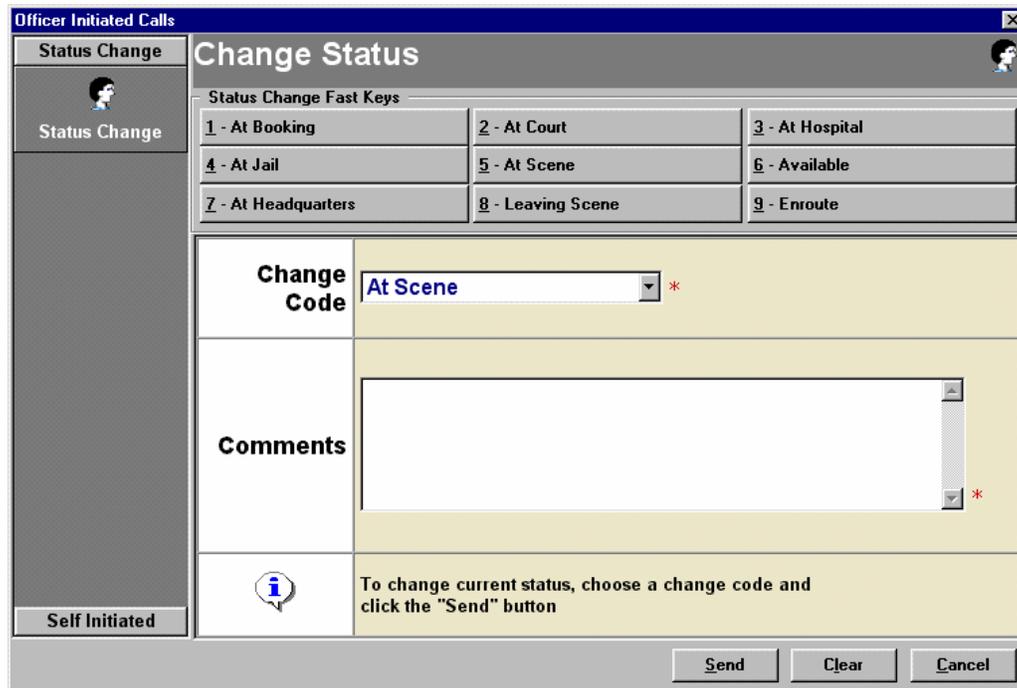


Figure 6-11 - Change Status – All Status Buttons

6.9.1.3 Status Inquiries

Premier MDC allows field units to query the CAD for real-time tracking of the statuses of other units and incidents, as long as the CAD supports this feature. This provides units access to the same information that dispatchers use for resource management. It also allows field units to monitor call activity for other users. Premier MDC status inquiries enhance the effectiveness and efficiency of field operations management.

6.9.1.4 Unit Status Detail and Active Incident List

The following pages show several sample screen illustrations from the mobile status component.



The Status module screen below allows a user to download Active Incident and Unit Statuses. In this scenario, the user is selecting to view All Unit Statuses. Options for viewing other statuses will be configured based on the tables maintained on the Commonwealth's CAD system.

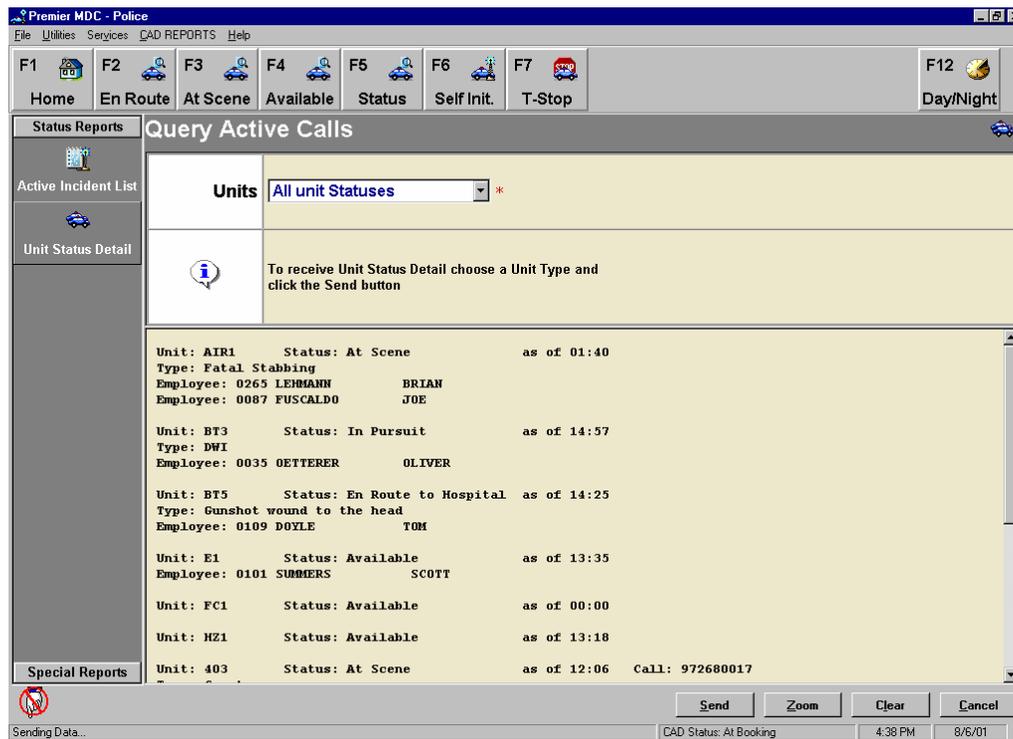


Figure 6-12 - Query All Active Call Statuses

6.9.1.5 Special Status Reports



Users also have the option of viewing special status reports. Sample screens from these Special Status Reports are shown below.

In the special status report shown below, a user on the Commonwealth's Premier MDC system can send a query to determine the status for a particular unit.

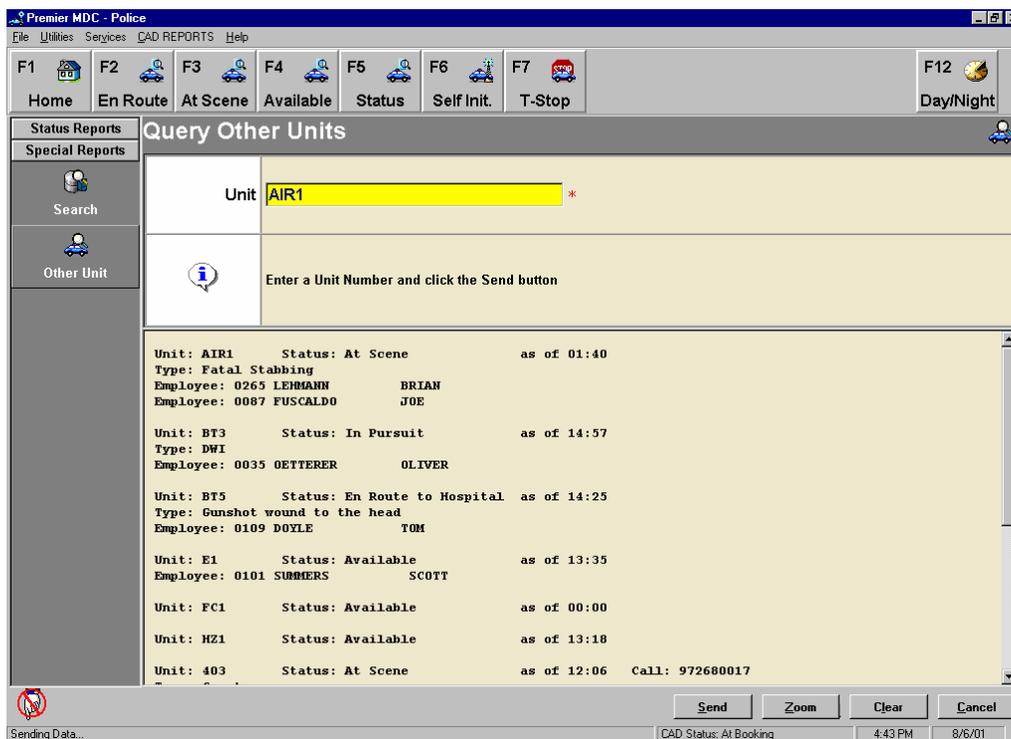
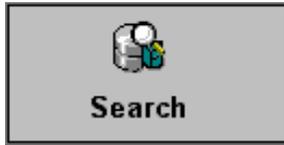


Figure 6-13 - Special Status Report / Status Query by Unit

6.9.2 Search



The sample screen below shows other status query options. Examples include viewing statuses based on the Incident Type, the Area, and the Date / Time range in which it occurred. Responses from the CAD appear on the bottom portion of the screen.

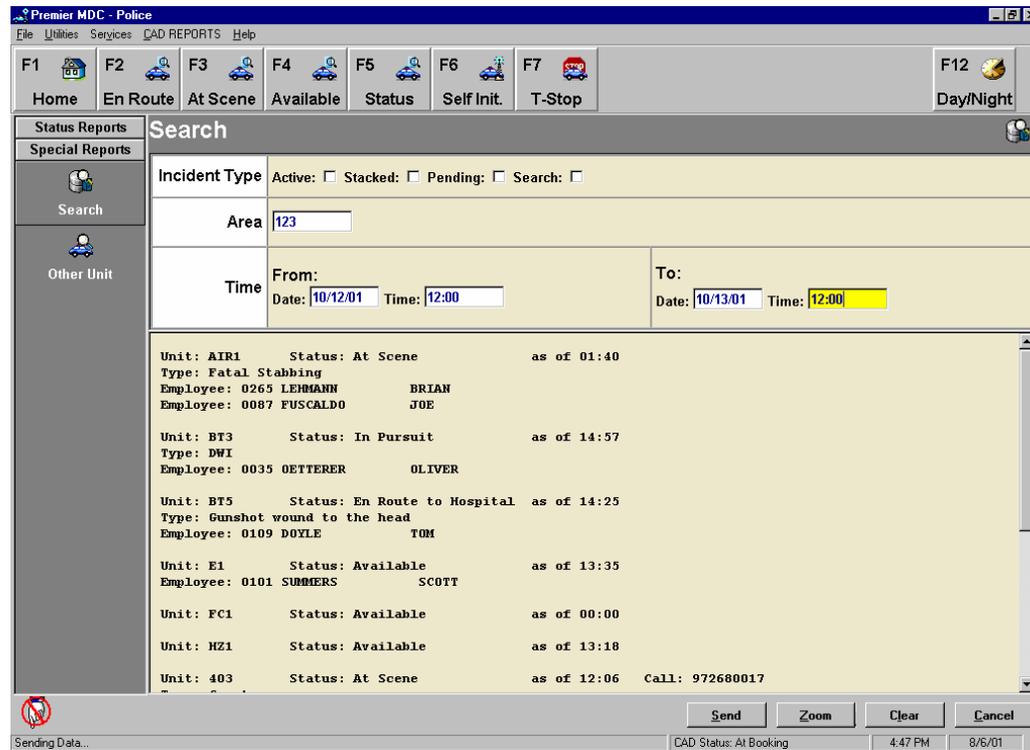


Figure 6-14 - Special Status Report / Other Query Options

6.10 Messaging



Messaging allows users to send free-form text messages between users running Premier MDC software operating on vehicle-based PCs or desktop-LAN-based workstations. It also allows messaging with dispatchers as enabled by the VSP CAD.

Consistent with the other modules, the main Windows screen for Messaging consists of a list of new and read messages in the top panel, with message details displayed in the lower panel. From this screen, users can also easily create, save, delete, or reply to messages. In addition, if a user is interrupted when creating a message, the user can save the message as a draft and return to it later. All messages between VSP mobile users will be copied to the VSP CAD Message Switch.

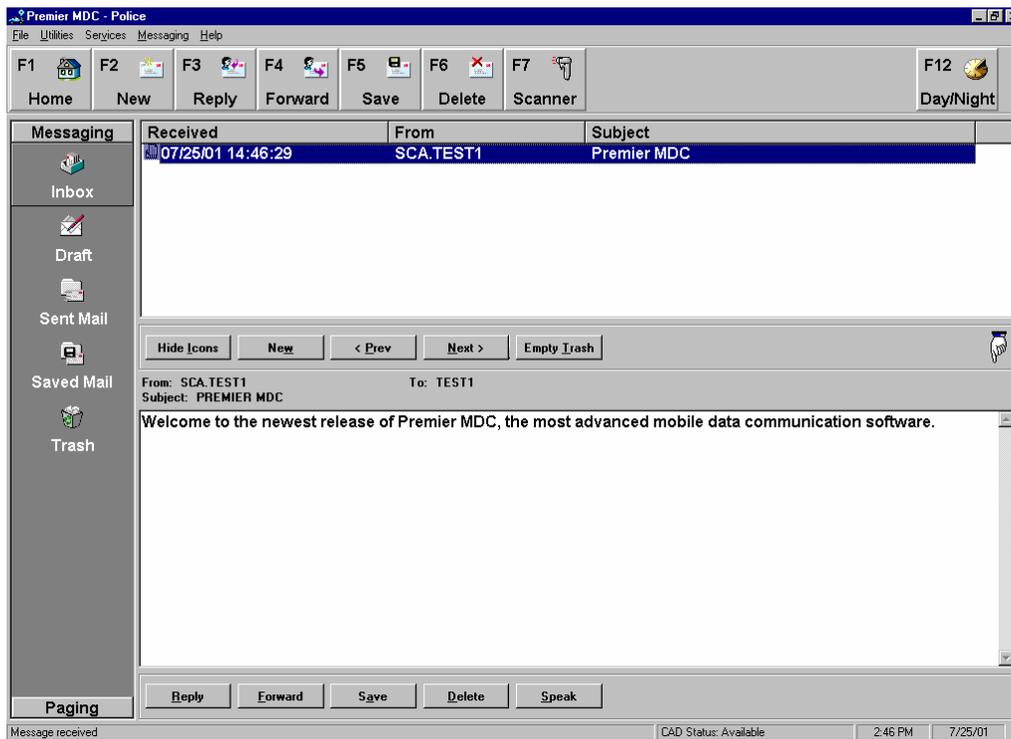


Figure 6-15 - Main Messaging Window

6.10.1 Create Message

Below is a sample of the screen used to create a new message. When addressing a message, users can enter known User IDs or view an address book of all users with names and IDs.

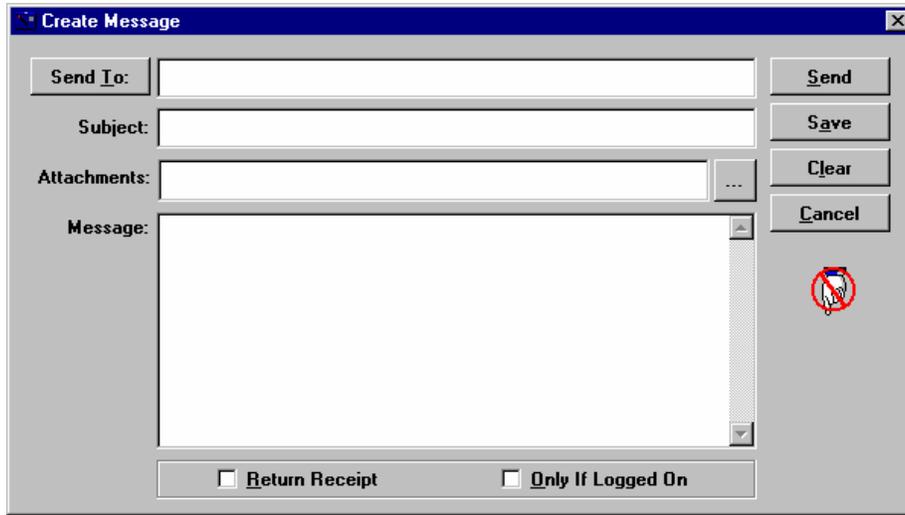


Figure 6-16 - Create Message Screen

6.10.2 Address Book

The user creating a message can easily create dynamic groups for routing the message to multiple users. Inactive users are indicated with a red “X.” Users can send messages to users whether or not the users are logged on. Users who are not logged on will receive the message when they log on.

Premier MDC automatically synchronizes address books between the clients and Message Switch to ensure the mobile unit address books are up to date. When the system updates the address books, a “Please Wait” message appears.

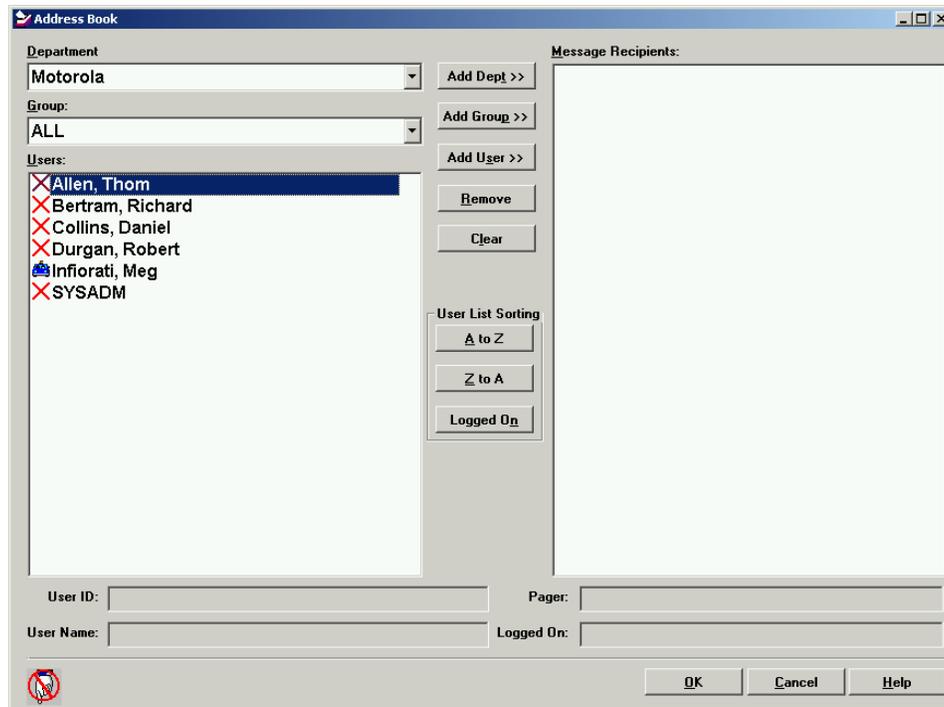


Figure 6-17 - Create Message/Address Book

6.10.3 Forwarding Messages

Once users receive a message, they can forward it to other users. Shown below is a sample screen showing a message being forwarded to another user.

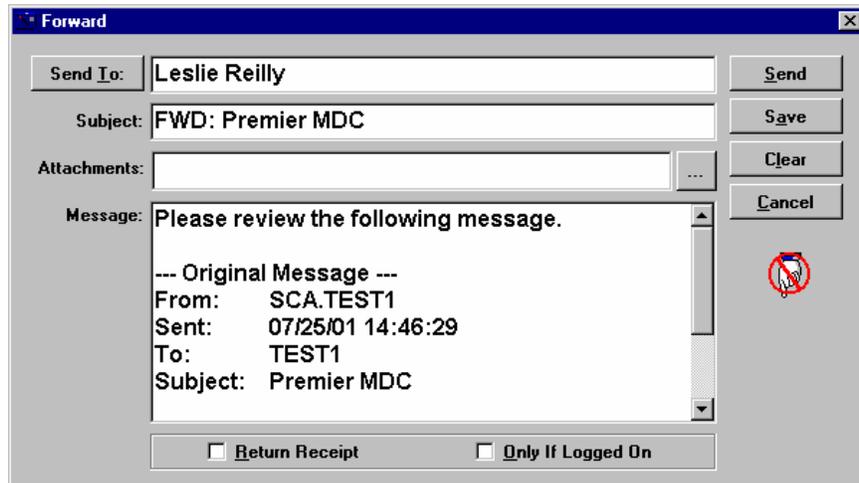


Figure 6-18 - Messages - Forwarding

6.11 Other Premier MDC Features

6.11.1 Attachments

Users can include attachments when creating a message. Attachments might include a report, photograph of a crime scene, or other files. Attachment size, is supported up to 15 kilobytes to maintain wireless network performance. For attaching photos, it is recommended that the Commonwealth convert the photo into the smallest possible file or thumbnail size.

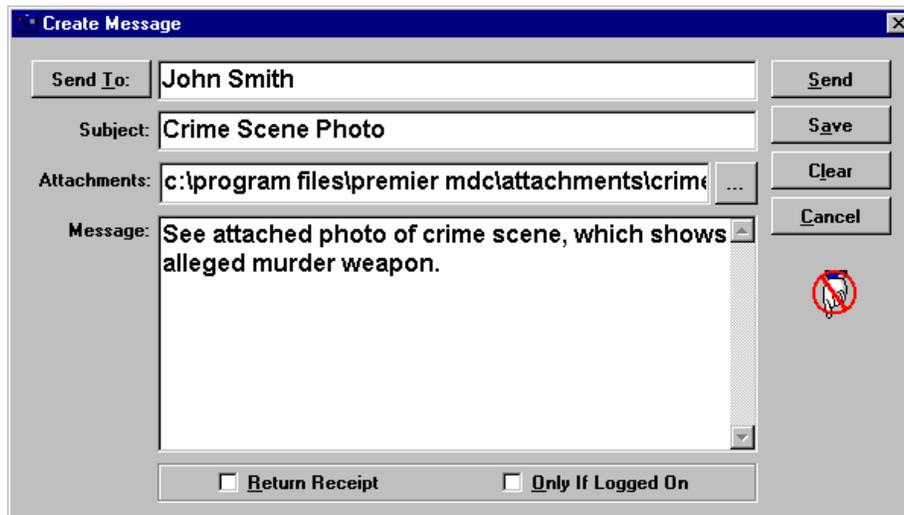


Figure 6-19 - Messaging - Attachments

6.11.2 POP3/SMTP Interface (for Email Integration)

Motorola will provide Premier MDC to send and receive e-mail directly through the Messaging Module using a POP3/SMTP Interface. SMTP and POP3 are standard protocols for sending and receiving Internet e-mail. SMTP (Simple Mail Transfer Protocol) allows Internet e-mail messages to be transferred among computers. POP3 (Post Office Protocol version 3) allows users to download their e-mail from a central mail server onto their own computer.

Premier MDC's POP3/SMTP interface works in conjunction with the VSP POP3/SMTP interface e-mail system. It allows the Commonwealth to configure an existing mailbox for each Premier MDC user so that a user can send and receive Internet-style e-mail directly from the car. When creating a message, users can send messages to other Premier MDC users or to an outside e-mail address, such as 'anyuser@email.com'.

Likewise, a Premier MDC user can check for new messages from the car. Through a simple keystroke combination, the user can check for mail in their central mailbox and download it to Premier MDC.

Users must manually initiate the search for mail; it will not occur at periodic intervals. In addition, Motorola recommends limiting the size of attachments (as stated above under attachments) to preserve the network for more vital functions such as dispatches and VCIN/NCIC responses.

It is the responsibility of the Commonwealth's e-mail administrators to limit the size of the attachments received by the Premier MDC Message Switch in order to protect the system's throughput integrity. This will be accomplished by giving mobile client users a separate email account.

6.11.3 GPS Integration/AVL Interface Module

An Automatic Vehicle Location (AVL) system uses Global Positioning System (GPS) satellites to track and monitor vehicle location and status. Motorola will provide equipment that complies with the National Marine Electronics Association (NMEA) protocol for GPS devices.

To utilize this technology, vehicles will be equipped with specialized GPS receivers. These receivers may either be mounted in the vehicle or integrated into the mobile computer and are connected to both the mobile data computer and/or an external antenna.

Premier MDC software is in constant communication with the GPS receiver and will be configured to transmit the latest available location data under one of two conditions:

- When the user initiates one of the following out of service type codes: traffic stop, rest area check, or occupied disabled vehicle.
- When the dispatcher requests a location update from the unit.

6.12 Premier MDC Message Switch Overview

At the heart of Motorola's mobile data system is the Premier MDC™ Server, or Message Switch. The Message Switch will provide message routing, logging, and security for the Commonwealth's Mobile Data Computers (MDCs).

6.12.1 Premier MDC Message Switch Software

The Premier MDC Message Switch is a 32-bit multi-threaded program. The Message Switch controls data sent between backend host systems (such as the VSP CAD Interface, VSP POP3) and mobile devices running the Premier MDC Client application.

The Premier MDC Message Switch communicates with the client application over a Motorola-supported RF network via Motorola's proprietary wireless communications middleware.

Motorola's middleware provides a variety of techniques for security and optimization of data throughput, such as encryption and compression, which are described in further detail later in this document.

The Message Switch also communicates with host systems via peer-to-peer, TCP/IP, and/or standard SNA (LU 6.2) connectivity, as appropriate for Commonwealth's unique hosts. The figure below depicts the Message Switch communication flow with host systems.

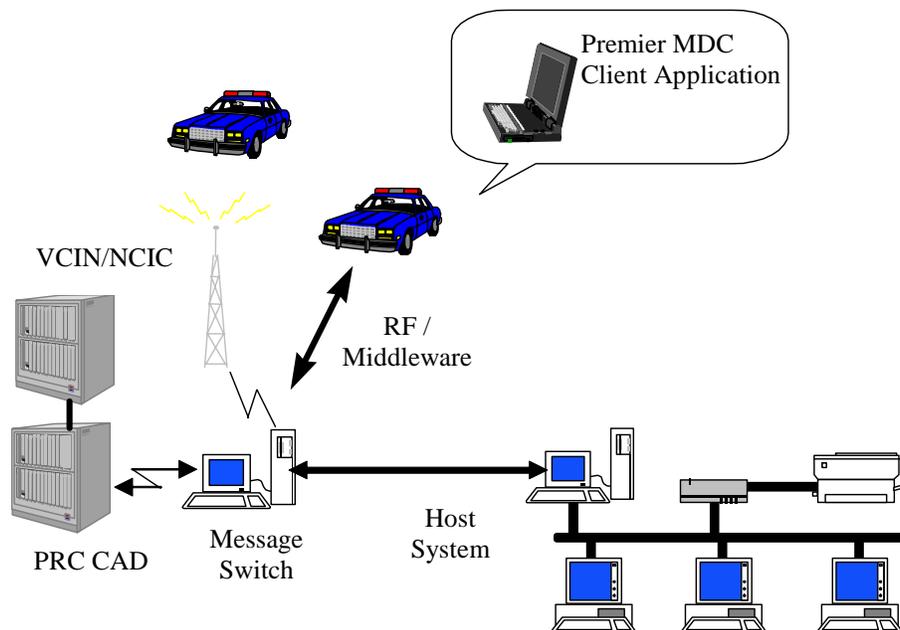


Figure 6-20 - Message Switch / Client Communication via RF / Middleware and Host Communications

6.12.2 Message Switch Console

A comprehensive Windows-based user interface provides the Commonwealth's System Administrator(s) at the SPHQ NOC with all the tools required to monitor system performance as well as set up, configure, and maintain the Premier MDC Message Switch.

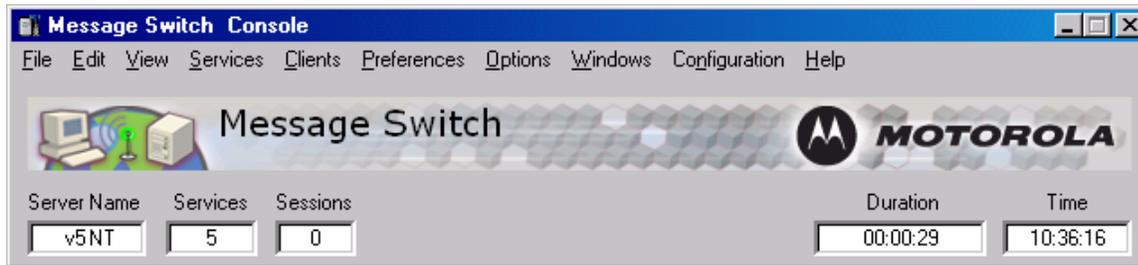


Figure 6-21 - Main Message Switch Console

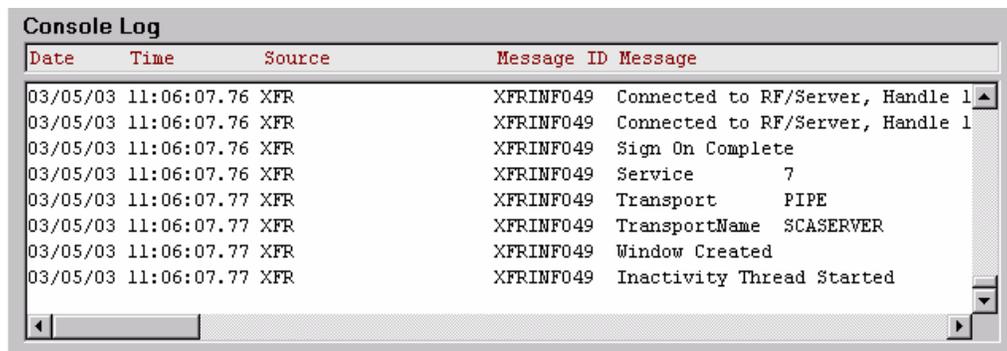
The Message Switch console provides a graphical user interface (GUI) for configuration, monitoring, and control of the Premier MDC system. From this screen, the Commonwealth's System Administrator can perform all functions for setting up and maintaining Premier MDC. Functions include:

- Adding/deleting/modifying Premier MDC services, including the CAD Modules and Messaging Module.
- Adding/deleting/modifying information in the Premier MDC User Registry. The User Registry allows the Administrator to control users/units/departments, and to set up system IDs, passwords, and security/access rights.
- Monitoring the log file and transactions that pass through the Message Switch.
- Running Server Administration Reports for statistical data on the nature of data processed by the Message Switch.
- Monitoring and troubleshooting connections to external systems and services.

The graphical user interface provides menu-driven commands for access to a variety of system components. It also provides red-and-green light indicators for monitoring connections to other systems, such as the RF network and backend hosts.

The Message Switch maintains a log file that acts as a tracking device for system usage—a database of all messages that pass in and out of the Premier MDC Message Switch. Within this database, the Message Switch maintains separate tables for each of the services. All transactions related to these interfaces are stored in their appropriate tables and are available for later audit / review by Server Administrators.

The System Administrators can view information stored in the log file through the lower part of the Message Switch console, as shown here. Information is provided for specific transactions that pass through the Message Switch, with date and time stamping, Source information, a Message ID, and a description of the nature of the transaction. The log file is also configurable, allowing Commonwealth’s System Administrators to specify and configure the level of detail that is displayed and logged.



Date	Time	Source	Message ID	Message
03/05/03	11:06:07.76	XFR	XFRINF049	Connected to RF/Server, Handle 1
03/05/03	11:06:07.76	XFR	XFRINF049	Connected to RF/Server, Handle 1
03/05/03	11:06:07.76	XFR	XFRINF049	Sign On Complete
03/05/03	11:06:07.76	XFR	XFRINF049	Service 7
03/05/03	11:06:07.77	XFR	XFRINF049	Transport PIPE
03/05/03	11:06:07.77	XFR	XFRINF049	TransportName SCASERVER
03/05/03	11:06:07.77	XFR	XFRINF049	Window Created
03/05/03	11:06:07.77	XFR	XFRINF049	Inactivity Thread Started

Figure 6-22 - Message Log Display

6.12.3 Message Switch System Reporting

The log file is viewed on a Message Switch console at the SPHQ NOC. Premier MDC also allows an Administrator to easily monitor log file information, such as user levels and data traffic, in a report format. These system administrator reports provide powerful information about how and when users are operating Premier MDC.

After running a system report, the Administrator can view it on screen, send it to a printer, or print it to file. Reports can also be exported for viewing and editing in other applications.

Message Switch system reports allow the Commonwealth's Administrator to monitor such functions as application data, messages sent, and queries performed. Reports are generated using Crystal Reports software, which is bundled as a standard component of the Message Switch. All reports are generated from an easy-to-use graphical interface, as shown below:

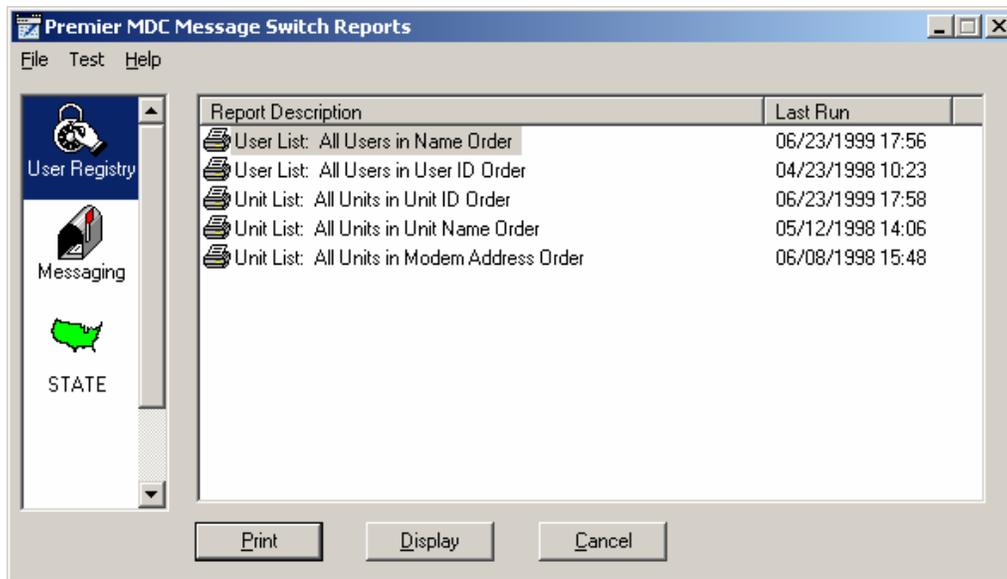


Figure 6-23 - Generating Message Switch System Administrative Reports

The following is a comprehensive list of sample reports available with Premier MDC:

SAMPLE REPORTS: USER REGISTRY

User List: All Users in Name Order

User List: All Users in User ID Order

Unit List: All Units in Unit ID Order

Unit List: All Units in Unit Name Order

Unit List: All Units in Modem Address Order

SAMPLE REPORTS: MESSAGING

Daily Usage Statistics (Last 7 Days to Today)
Weekly Usage Statistics (Last 8 Weeks)
Weekly Usage Statistics (Last 12 Weeks)
Monthly Usage Statistics (Last Month)
Monthly Usage Statistics (Last 6 Full Months)
Monthly Usage Statistics (Last 12 Full Months)
Usage Statistics by Prompted Date Range
All Messages by Date for the Last Full Week
All Messages by Date for the Last Full Month
All Messages by Specified Date Range
All Messages by User Name
All Messages by User Name and Date-Time Selection

SAMPLE REPORTS: STATE

Daily Usage Statistics (Last 7 Days to Today)
Weekly Usage Statistics (Last 4 Full Weeks)
Weekly Usage Statistics (Last 12 Full Weeks)
Monthly Usage Statistics (Last 3 Full Months)
Monthly Usage Statistics (Last 12 Full Months)
Usage Statistics Prompted by Date Range
All Queries by Date for the Last Full Week
All Queries by Date for the Last Full Month
All Queries During Specified Date Range
All Queries by User Name
All Queries by User Name and Date-Time Selection
All Queries During Specified Date and Time Range – Responses Received from State
All Queries During Specified Date and Time Range – Queries Sent to State

6.12.4 User Registry

The Message Switch User Registry allows a System Administrator to add, delete, and configure users on the system. It is primarily used to establish groups for messaging purposes, for logon security, and to set access privileges to different components of the system. An authorized administrator can configure access for a user to various system components. The User Registry is also where an administrator can establish identifiers for users, groups, departments, and mobile devices, as seen below (The following screen shot is a sample. The Commonwealth's system is not configured for a paging function.)

The screenshot shows a Windows-style dialog box titled "User Properties" with a blue title bar. It has five tabs: "General", "Group Membership", "Access Rights", "Keywords", and "Paging Information". The "General" tab is selected. The form contains the following fields and controls:

- Department: A dropdown menu showing "Motorola".
- User Name: A text box containing "Smith, Joe".
- SSN: A text box containing "234-567-891".
- User ID: A text box containing "TEST1".
- Password: A text box containing "*****".
- External ID: An empty text box.
- Checked checkbox labeled "Paging".
- Password Expires In No Of Days: An empty text box.
- Buttons: "OK" and "Cancel" at the bottom right.

Figure 6-24 - User Registry – General User Properties

The User Registry also allows the administrator to set up groups for security and messaging purposes. The following shows the Group Membership panel on the User Properties dialog box, where the administrator can select groups to which a user belongs. (The following screen shot is a sample. The Commonwealth's system is not configured for a paging function.)

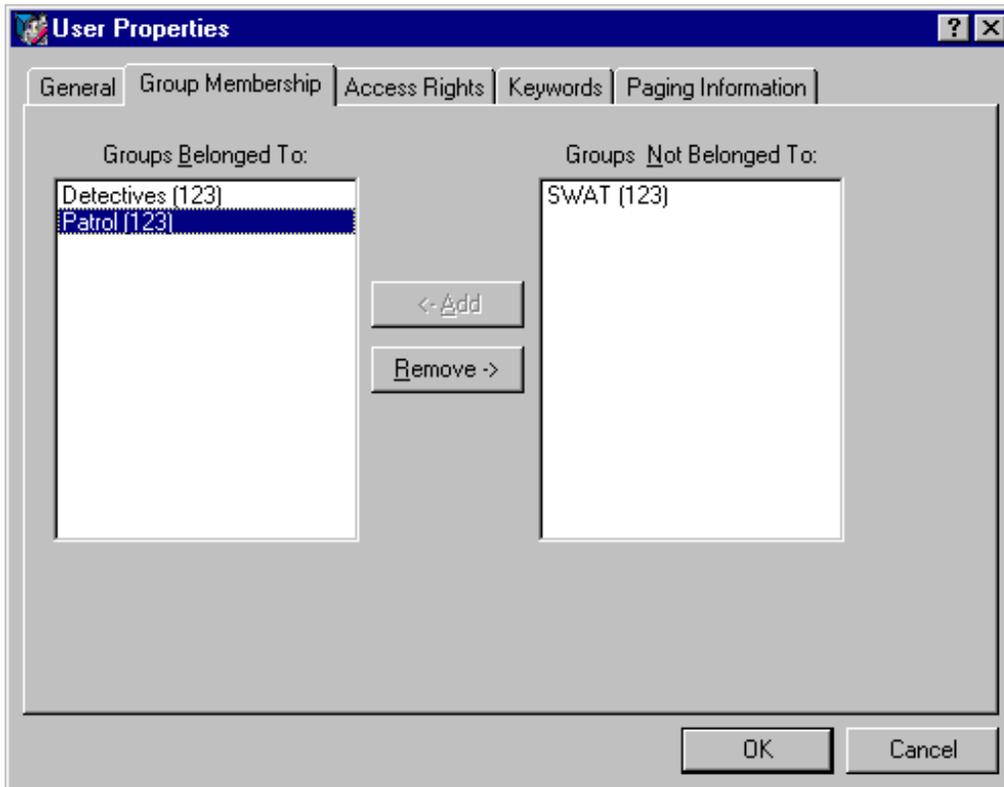


Figure 6-25 - User Registry - Group Membership

The User Registry allows the administrator to set up Access Privileges. The following shows the Access Rights panel on the User Properties dialog box, where an administrator can grant a user specific access rights for a particular service, such as CAD. (The following screen shot is a sample. The Commonwealth's system is not configured for a paging function.)

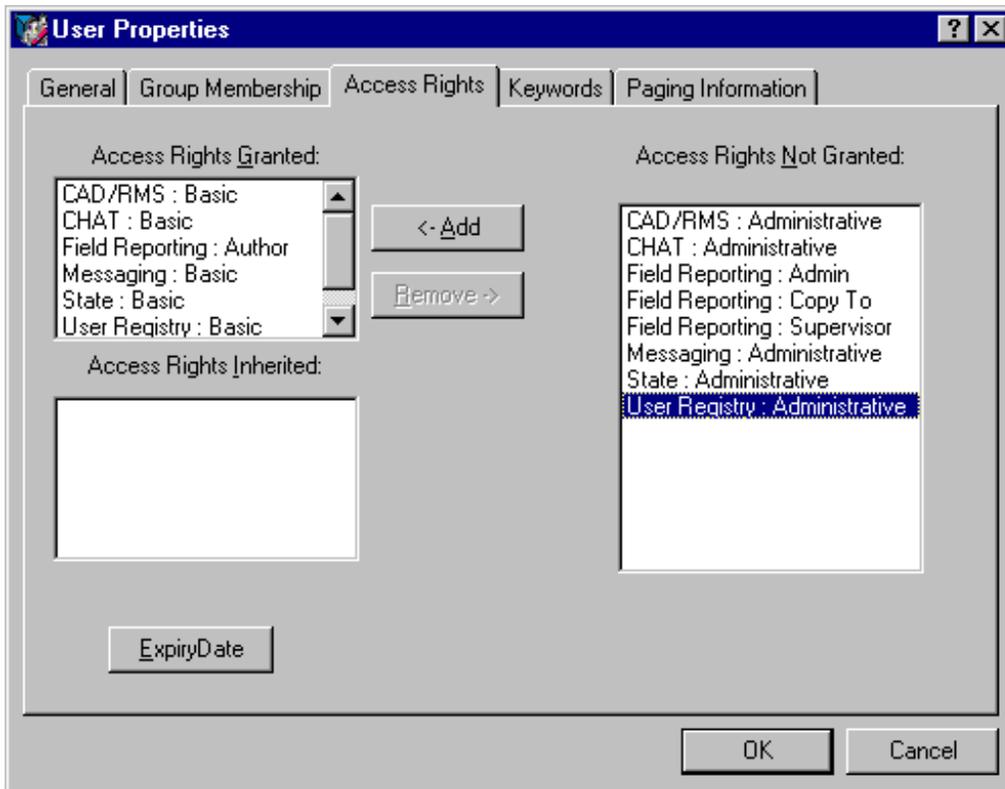


Figure 6-26 -User Registry – User Access Rights

6.12.5 Reliable Data Transfer / Connection Recovery

The Premier MDC Message Switch ensures delivery of data even if the network connection is temporarily interrupted (i.e., end-user device is out of coverage) and it automatically re-transmits unacknowledged data.

On the server end, Premier MDC's store-and-forward facility is used for the VSP CAD Interface modules within the Premier MDC Message Switch system. This feature stores messages and inquiries and forwards them when the destination can be reached. It is especially useful in the delivery of messages to users/users not logged on to the system when the messages are created. It is also essential in the delivery of information to the mobile users in the case of the vehicle traveling outside a specified coverage area, or in a 'Dead Spot' coverage area. When the mobile user returns to a covered area, the Premier MDC Message Switch sends the information it has stored in its queue, after it receives any transmission from the mobile unit.

6.12.6 Throughput Optimization

Premier MDC's middleware transport layer also provides a variety of techniques to facilitate network throughput. In addition to the compression algorithm, described later in this section, Premier MDC uses a Sliding Window protocol that segments long messages into packets. Smaller packets mean quicker response times. Premier MDC's middleware verifies that all packets are received and restores them to their proper order.

6.12.7 Compression

The Message Switch and the client software both use the Huffman compression algorithm to ensure that data traffic is minimized. The average compression rate ranges from 30-75%, depending on the amount of data transmitted.

6.12.8 Security & Encryption

Access to and control of transmissions is strictly controlled to protect the safety of personnel and the integrity of departmental operations. To prevent unauthorized interception and decoding of messages, Premier MDC encrypts all data from end to end. Premier MDC utilizes 128-bit AES (Advanced Encryption Standard)-based encryption as the default encryption level.

Premier MDC compresses at the Message Switch and then encrypts the data to be sent to the mobile unit. Once received by the mobile unit, the data is decrypted and decompressed. Likewise, data sent from the mobile units is compressed and encrypted and decrypted and decompressed at the Message Switch.

6.12.9 Multiple Network Support

The Premier MDC Message Switch can support separate networks concurrently. In this setup, the Message Switch operates on multiple networks at the same time, while some mobile clients run on one network and other clients run on a different network. Users log on to Premier MDC using client software configured to communicate over a specific wireless infrastructure. The Message Switch will route messages between users operating on different networks, helping an agency to achieve maximum wireless coverage. Multiple Network support will also support add-on STARS users that want to run Premier MDC, but will not be using the ASTRO 25 IV&D Network.

6.12.10 Fault Tolerant Message Switch Server Hardware

Motorola is providing a Stratus Fault Tolerant server as specified in this section. Stratus is a 99.999% uptime fault tolerant server solution that will provide no single point of failure while maintaining the highest level of data integrity.

To meet the uptime and redundancy requirements specified by the Commonwealth, Motorola will provide the Stratus ft (Fault Tolerant) server. The Stratus high-availability server incorporates the latest 4-way Intel® Pentium® processors, memory with Advanced ECC Memory functionality, and standard redundant, hot-plug power supplies to deliver the maximum performance and availability required in extremely demanding and mission-critical 4-processor computing environments. Features include the following:

- No Single point of failure
- No Data integrity issues
- No Interruption in processing
- No Loss of memory resident data
- No Failover time
- No Recovery time
- No Performance penalty

The Stratus® ftServer® 5240 system introduces a fault-tolerant, 2-way symmetric multiprocessing (SMP) server for Windows® 2000 applications. Powered by the high-performance Intel® Xeon™ processor, the 5240 system provides hardware fault tolerance, software availability, and integrated service technology proven for continuous business-critical computing. The ftServer 5240 system delivers 99.999% uptime.

Hardware fault tolerance. The ftServer architecture uses replicated hardware components to eliminate single points of failure and safeguard data integrity. The replicated components execute the same instructions at the same time, providing an active spare that continues to operate if its partner fails. Unlike a high-availability cluster, the Stratus approach does not impose recovery time. The end result is zero interruption in processing, zero loss of performance, and zero loss of data integrity, even in the event of component failure. Hot-swappable components can be replaced easily online while the ftServer system and applications continue normal operations.

Software availability. Stratus software availability extends the dependability of the Windows 2000 operating system with features that remove common sources of system and application failure and maximize uptime during repair or maintenance. These capabilities are implemented while preserving full compatibility with the Windows operating system environment. Applications and middleware do not need to be modified or made cluster-aware to operate on a Stratus ftServer system.

Integrated service technology. Proactive service features are built into the ftServer system. ftServer maintenance software automatically monitors and diagnoses system events. Faults are isolated to the component level and corrective action is initiated automatically by the system. Call-home fault reporting and remote diagnostics allow service professionals to investigate and resolve issues remotely. Your system and applications remain online during troubleshooting, repairs, and upgrades. The worldwide 24 x 7 Stratus Service Network (SSN) enables fast remote diagnosis and resolution of critical hardware and software issues. Server specifications are located in Appendix 5.

6.13 STARS Automatic Vehicle Location System

Motorola is providing an AVL and mapping system as part of the STARS. This system consists of the following components:

- Premier Graphic Geofile Manager (GGM)
- Advanced Tactical Mapping Standalone (Premier ATM)
- Automatic Vehicle Location System Standalone (Premier AVL)

Each of these components is described in more detail below. The AVL system also requires the use of GPS receivers in the vehicle. The GPS receivers are described in the Subscriber section 10 of this contract.

6.14 Premier Graphic Geofile Manager (GGM)

The creation of commonplace map layers used within ATM occurs through Premier GGM. Premier GGM provides the ATM with an integrated mapping tool to manage all geographic data. Premier GGM works cooperatively with existing Geographic Information Systems (GIS) and has the capability to display the geofile as a graphic map on a color monitor. Premier GGM employs pull-down menus for selecting and viewing geographic layers (e.g., streets, city and county boundaries, beats and zones, and common places) at any scale. Additional functionality includes adding streets, street address ranges, and common place points; creating and changing beats, zones, and boundaries; and transforming this graphic map information into a high-speed file.

Premier GGM provides the following functionality:

- Manages one single coordinate-based map file for tactical mapping.
- Provides analysis tools to determine street address errors such as missing addresses, gaps in address ranges, overlaps in address ranges, flipped address ranges, and other logical address errors.
- Presents address errors to the GGM operator for correction.
- Creates or modifies response zones and beats using menu tools that can select geographic features such as streets, rivers, political boundaries, or census tract boundaries and copies those features to the response zone layer.
- Allows users to define colors for streets, rivers and lakes, response zones, beats, boundaries, and other features. Commonplace points are assigned symbols. Maps may be printed on laser printers or other printing devices.
- Includes comprehensive documentation, training, and support provided by public safety mapping professionals.

Because geofiles typically contain tens of thousands of records, even minor beat or boundary changes can involve the modification of thousands of records. With Premier GGM, changes are made simply by redrawing a boundary. Any records affected by the change will be automatically updated by Premier GGM. The addition of a street is simplified by allowing the administrator to draw the new street directly on the map.

6.15 Advanced Tactical Mapping Standalone

Premier ATM is a software product that seamlessly integrates with the AVL Server to provide the VSP Dispatcher and NOC Operator with a geographic display of emergency activities within their area of responsibility. With the AVL Server, Premier ATM integrates AVL tracking functions into one complete system.

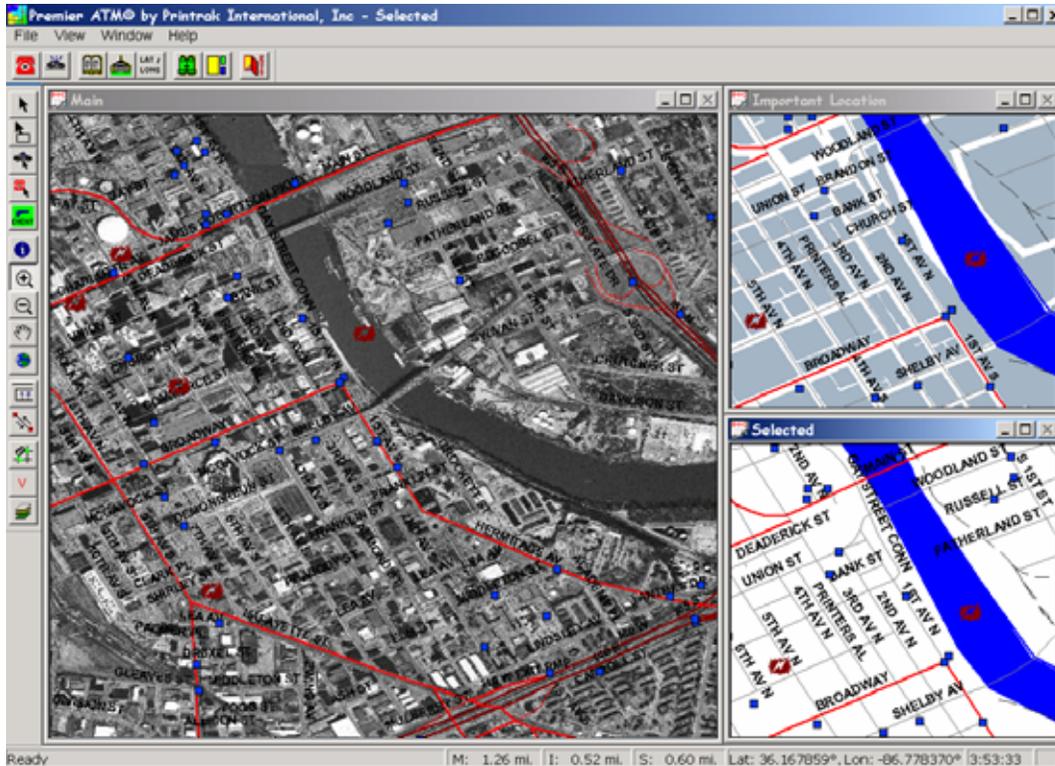


Figure 6-27 - ATM Screen Sample

The table below lists the map layers typically used in ATM.

Map Layer	Description
Street Centerlines	Contains street centerlines and associated attribute information such as the prefix, street name, street type, street suffix, right low address, right high address, left low address, left high address, classification code, and other attributes.
Freeways/Highways	Contains freeways, highways and associated attribute information. Motorola will extract this layer from the street centerline layer. This layer will be used primarily to enhance the speed of the geographic display at higher levels. The attributes for this layer will match the street centerline layer.
Major Roads	Contains major roads and associated attribute information. Motorola will extract this layer from the street centerline layer. This layer will be used primarily to enhance the speed of the geographic display at higher levels. The attributes for this layer will match the street centerline layer.
Intermediate Roads	Contains the intermediate arterials and associated attribute information. Motorola will extract this layer from the street centerline layer. This layer will be used primarily to enhance the speed of the geographic display at intermediate levels. The attributes for this layer will match the street centerline layer.
Boundaries	The boundary layers may include, but are not limited to, municipalities, law dispatch zones, fire dispatch zones and EMS response areas. Additional boundary layers that exist in the GGM or the GIS data may be included.
Hydrography	Waterways such as rivers, streams and lakes may be included in this layer. This layer will be used primarily for map orientation.
Common Places	Contains the common place locations. This layer will allow the ATM user to visualize any significant landmarks that may alter the planned response.
Annotation	ATM annotation capabilities will create automatic annotation (labels) for geographic map elements.

Table 6-1 - ATM Map Display Files

6.15.1 Workstation Hardware Specifications

GGM Mapstation:

- Evo D510 P4 2.4Ghz
- 40GB Disk Drive
- 256MB RAM
- 48x12x48 CD RW Drive
- Norton Antivirus
- Sound Card
- Graphics Card
- Fast Etherlink XL 10/100 PCI TX
- Windows 2000
- HP 17" CRT Monitor S7500
- Centura SQL Base

Motorola reserves the right to substitute this server with one equal or better to that which is specified with the STARS PD approval.

6.16 Automatic Vehicle Location System Standalone (Premier AVL)

Motorola's AVL Server Standalone is integrated to Motorola's Premier ATM Client systems to provide a complete AVL solution. The AVL Server handles communications with the ATM Client systems and the IV&D mobile systems. Features of AVL Server Standalone include the following:

- **Receives unit location information:** The AVL Server listens for messages that describe the current location of the vehicle. The vehicle latitude and longitude coordinates originate from the GPS receiver connected to the laptop in the vehicle. The coordinates are sent, via Premier MDC, to the ASTRO 25 IV&D radio network, to the Message Switch, and then passed to the AVL server. Please see the subscriber section for more details on the GPS receiver, laptops, and radios.
- **Distributes vehicle locations to ATM applications:** When a vehicle location is received for a unit that belongs to the ATM operator's coverage area, AVL Server notifies the ATM application of the unit's new location for graphic display in the ATM.
- **Stores vehicle location history in a database.** AVL Server stores the following in a Microsoft SQL Server database: date and time each vehicle location record is received, vehicle ID, and vehicle status. System Administrators can write SQL queries to access and archive information from the database.

- **Provides visual representation of server status and connections:** AVL Server displays the status of connections to the Message Switch, and active connections to ATM applications. The number of GPS-equipped units in service, and a summary of how they are reporting their locations are also displayed. Error, warning, and informational messages are displayed as necessary. Vehicle information, including the vehicle's current coordinates and the time the coordinates were received, as well as their unit call sign and status, are also displayed in spreadsheet fashion.

6.16.1 Features of Premier ATM with AVL Server Standalone

Premier ATM seamlessly integrates with the AVL Server to provide the dispatcher with a geographic display of emergency activities within their area of responsibility. It provides the following:

- Full database intelligence behind the ATM map.
- Ability to search and automatically zoom to a street, intersection, common place, or latitude/longitude coordinates.
- Ability to identify the shortest path with drive directions between two points, such as a unit and a selected location on the map. The shortest path feature takes into consideration user-defined one-way-streets, closed roads, elevated roads and other impassable routes during shortest path calculations. Impassable routes may be displayed in ATM by configuring specific color styles.
- Map layers are displayed or removed from display as needed with a single keystroke.
- Aerial photographs may be overlaid on the ATM map.
- Ability to zoom on all units or magnify a selected area by clicking a button.
- When the map scale changes, ATM automatically adjusts the size of the unit icon.
- Unit icons resemble the type of unit so dispatchers can easily visualize the unit types and geographic location. Each unit type is configured to display a unique icon in ATM. The unit ID is labeled above the unit icon and additional unit data may be displayed on the ATM map through the use of symbols, colors and labels. For instance, a particular unit status may be assigned a unique label color and font in ATM. All items specified are configurable.
- Preplans, such as building footprints, may be stored and retrieved from the ATM map.
- Automatic annotation of streets and other features.
- Automatic file distribution to ATM workstations.
- On line documentation and help.
- Ability to track selected units. The ATM operator simply clicks the unit icon from the ATM toolbar and a list of units is presented. The user checks the unit to track and the selected unit is tracked in the ATM Selected window.

6.16.2 Server Hardware Specifications

- HP/Compaq DL760R02 X2000-2 MB, 4096 MB (4P) with 250 GB hard disk storage (configured to support RAID 5).
- Redundant Power Supply
- Remote Insight Lights-Out
- DLT Tape Drive
- 42U Rack
- Microsoft Windows 2003 Server or a current subsequent equivalent version.
- Microsoft SQL Server

*Motorola reserves the right to substitute this server with one equal or better to that which is specified with Commonwealth approval.

6.17 Design Assumptions

- For the ATM, AVL, and the Premier MDC Message Switch will handle the RF Network transport. There will not be any integration between the ATM, AVL, and the VSP CAD in this scope.
- One (1) ATM license has been provided for each of the seven (7) VSP Division Headquarters and one for the STARS NOC. The ATM software will be installed on Motorola provided workstations, meeting the specifications provided in Section 6.15.1.
- The system has been designed for on-demand polling from the ATM workstation. More frequent polling falls outside of the ASTRO 25 IV&D network performance model.
- AVL position updates that occur as a result of the events specified in Section 6.11.3, will be processed by the ATM workstation.

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