



RESOURCE AND PATIENT MANAGEMENT SYSTEM

Master Patient Index

(AGMP)

Technical Manual

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Division of Information Technology

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Revision History

| Date of Change | Location of Revision | Revision |
|----------------|---|---|
| 06/2021 | All sections | First published |
| 06/2022 | Multiple | Updated for patch 1 |
| 08/2023 | Preface Sections 1.0, 2.4.4, 2.5.6, 2.8, 3.1, 7.3, 11.0 | Updated information based on deprecation of the Treating Facility List file and associated menu options |
| 08/2023 | Section 2.1 | Removed Patient Merge recommendation |
| 08/2023 | Section 2.2 | Removed requirements for earlier releases |
| 08/2023 | Section 2.3 | Updated security key name |
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Preface

For over 20 years, hospitals and health centers of the Indian Health Service and numerous tribal health programs have utilized an information system called the Resource and Patient Management System (RPMS). The RPMS Master Patient Index (MPI) is a suite of software applications designed to improve quality of care and patient safety in Direct Indian Health Service/Tribal/Urban facilities.

Traditionally, patient records have been maintained separate from those at other facilities. MPI was developed to establish the framework for sharing patient information between sites. The MPI creates a common database that allows patients and healthcare providers to work together to create a unified healthcare plan.

During the initialization to the MPI, each active patient record receives an Integration Control Number (ICN), also known as an Enterprise Unique Identifier (EUID). The creation of the ICN or EUID allows access to MPI patient data and provides a means through a single best record to bring disparate records and facilities together. For example, Patient A is seen at multiple facilities and data is sent to MPI. MPI must link all disparate records into a single best record by using a matching matrix. The matching matrix uses weighted factors in various data fields to determine if the records belong to the same patient.

Benefits of using MPI include an improvement in patient care because providers can share data common to a single patient across the enterprise. Upon implementation of this software package, a site will become part of the network of sites that share key demographic data for patients via HL7 messaging.

The MPI interface transfers patient data via HL7 messages to the MPI database. The RPMS HL7-Optimized (HLO) application and Ensemble production interface work together to send patient admission, discharge, and transfer (ADT) information to the MPI and to receive and store information.

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1.0 Introduction

The Master Patient Index (MPI) is composed of a unique list of patients and a current list of facilities where each patient has been seen. This enables the sharing of patient data between operationally and regionally diverse systems. Each record (or index entry) in the MPI contains a small amount of patient data used to identify individual entries.

An MPI is a dynamic, secured directory of uniquely identifiable persons with links to their medical and insurance data located anywhere within the enterprise. MPI software utilizes a variety of probabilistic and other forms of matching algorithm protocols to evaluate and match identities. The mission of the MPI is to uniquely identify a patient and to link that patient's data throughout the Indian Health Service (IHS) facilities using the Integration Control Number (ICN), also known as the Enterprise Unique Identifier (EUID). The MPI is the authoritative source of a patient's ICN, the enterprise-wide identifier for IHS facilities and the key to accessing a patient's record. The accuracy of patient information and patient identification directly affects clinical, administrative, billing, and interdepartmental processes.

One factor contributing to unreliability of a database is duplicate records. If there are duplicate entries in the MPI for a patient, a physician will not see a complete picture of the care provided at other sites. In addition, inter-facility consults between sites cannot be accomplished. Duplicate entries in the MPI require examination to verify whether they are or are not the same patient with more than one ICN. Therefore, identifying ways to deal with duplicate records is a standard part of the process. One way to begin managing duplicate records is to clean files to reduce the number of duplicate records before they are placed in the MPI. Whether files are reviewed before or after the MPI is implemented, duplicate record management must occur on an ongoing basis once the database is in place.

An MPI can provide comprehensive, accurate patient record information to practitioners at the point of care to enhance patient safety, efficiency, and effectiveness in healthcare delivery for American Indian/Alaska Native (AI/AN) people. The MPI can provide real-time data that can be used for quality improvement measurements.

With the MPI's ability to uniquely differentiate patients who are seen at more than one facility and to provide a list of all facilities at which a patient receives care, the door is open for use by other applications. As IHS moves closer to having one electronic record for each patient and being able to share that record among stakeholders, it is critical that each patient's unique record identity is maintained and that duplicate patient records are eliminated.

This document focuses on identifying the requirements for an interface that enables secure communication of specified data between the RPMS database and the MPI database in a way that easily and quickly enables users of the MPI to obtain updated information about patients and health care providers, and enables RPMS administrators to identify problems, provide maintenance, and support the interface.

This interface includes the following functionality:

- **HL7 A28 Add a Patient Message from RPMS:** Sends patient data to the MPI when the Add a Patient option is used in Patient Registration (AG)
- **HL7 A08 Update a Patient Message from RPMS:** Sends patient data to the MPI whenever cross-referenced fields are edited in Patient Registration (AG) edit screens
- **HL7 A40 Merge a Patient Message from RPMS:** Sends patient data to the MPI whenever two patients are merged within Patient Merge (BPM)
- **HL7 A01 Check in and Check out Message from RPMS:** Sends patient data to the MPI whenever a patient is checked in or checked out
- **HL7 A03 Admissions and Discharges Message from RPMS:** Sends patient data to the MPI whenever a patient is admitted or discharged
- **HL7 M05 Location Master File Message from MPI:** Receives treating facility information from the MPI whenever a patient is seen at a new facility or two patient records are linked in the MPI. Beginning in patch 2, the treating facility list is deprecated and M05 messages are not processed, although the central MPI may still send messages to RPMS.

2.0 Implementation and Maintenance

2.1 General Information

The Master Patient Index application consists of two parts, which reside in separate Ensemble/HealthShare databases. The RPMS part of the MPI interface, which includes options, security keys, routines, and protocols, uses the AGMP namespace in the RPMS database. The Ensemble part of the interface, which includes classes and an Ensemble production, is located in the AGMPI package in the AGMPI database.

The interface was previously implemented as Patient Registration (AG) version 7.2. Installing the AGMP 1.0 version of the interface replaces the AG 7.2 version.

2.2 System Requirements

- Master Patient Index version 1.0 patch 1

2.3 Security Keys

AGMPZMENU. Key for the main AGMPI menu, which contains both the upload menu and the menu to send individual messages. This should be given to site managers or those assigned responsibility for monitoring the MPI messaging module. Prior to patch 2, the security key was named AGMPZMGR.

Table 2-1: Security keys and the roles they are assigned to

| Security Key | Description | Assign To |
|--------------|------------------------|---|
| AGMPZMENU | LOCKS MPI MANAGER MENU | Site managers and anyone responsible for the interface. |

2.4 HL7 Messaging

HL7 (Health Level Seven) is a standard protocol that specifies the implementation of electronic data exchange between two computer applications (sender and receiver) in healthcare environments. HL7 allows healthcare institutions to exchange key sets of data from different application systems. Specifically, it the standard defines the following:

- The data to be exchanged
- The timing of the interchange
- The communication of acknowledgments and errors to the sending application

The formats are general in nature and must be configured to meet the needs of the two applications involved. An HL7 interface specification should be written detailing which formats (events, messages, segments, and fields) will be used and which lower-level protocol will be implemented in order for the two applications to interface with one another.

The HL7 protocol defines the content and format of abstract messages and transactions for interface capabilities for various areas, including the following:

- Admission, discharge, and transfer (ADT)
- Order entry
- Query
- Financial applications such as charge, payment adjustments, and insurance
- Ancillary data reporting for laboratory, radiology, pharmacy, etc.

In HL7, information is exchanged using HL7 messages when an event occurs in an application. Each HL7 message consists of one or more HL7 segments. A segment can be thought of as a record in a file. Each segment consists of one or more fields separated by a special character called the field separator. The field separator character is defined in the Message Header (MSH) segment of an HL7 message. The MSH segment is always the first segment in every HL7 message. Each field is assigned an HL7 data type (e.g., numeric, text).

2.4.1 Outbound Patient ADT

The MPI application uses five outbound HL7 message types:

- **ADT A28 Add Person Information** sends patient data to the MPI when the Add a Patient option is used in Patient Registration (AG).
- **ADT A08 Update Patient Information** sends patient data to the MPI whenever cross-referenced fields are edited in Patient Registration (AG) edit screens.
- **ADT A01 Admit/Visit Notification** sends patient data to the MPI whenever a patient is admitted or checked in.
- **ADT A03 Discharge/End Visit** sends patient data to the MPI whenever a patient is discharged or checked out.
- **ADT A40 Merge Patient – Patient Identifier List** sends patient data to the MPI whenever two patient records are merged within Patient Merge (BPM).

After the initial installation of the MPI application, there is a patient load of all existing patients with no ICN. All patients are included, because initially no patient will have this field populated. This background job creates an A28 (Add Person Information) message for each patient without an ICN. This initial load is a TaskMan job that sites run at the site. The time required to run this job depends on the number of patients and the system activity. It runs with a low priority.

After the load is completed, new registrations and updates are triggered by certain events in Patient Registration, such as adding/registering a patient, editing patient demographic information, checking a patient in or out, or admitting and discharging a patient. Registration messages can be sent manually as well.

2.4.2 Inbound ACKs

When the MPI receives an ADT message, it sends an ACK (acknowledgment) message synchronously back to the sending RPMS system. This ACK message contains a commit acknowledgment code, which indicates whether the message was received and understood.

Once the central MPI processes the ADT message, it returns an ACK message asynchronously to the RPMS system that sent the ADT message. This ACK message contains an application acknowledgment code, which indicates whether the message was processed. If the ADT was successfully processed, the ACK message also contains the value of the ICN assigned to this patient.

2.4.3 Inbound MFN

When a patient has been added to MPI, the MPI transmits an MFN M05 (Location Master File) message to all associated facilities to update the local Treating Facility List. Associated facilities are all facilities linked in the MPI to a particular patient.

2.4.4 Outbound MFK

Originally, when the RPMS system received an MFN message and updated the Treating Facility List (#391.71) file, it transmitted an MFK (master file acknowledgment) message back to the central MPI indicating that the MFN message was processed. This functionality was removed in patch 2 due to the deprecation of the Treating Facility List. Now, when the RPMS system receives an MFN message, it marks the message complete without any further processing and without generating an MFK message.

2.5 HL7 Message Types

2.5.1 ADT/ACK A28 – Add Person Information

The purpose of the ADT A28 message is to establish a patient on the MPI so that the patient record can be viewed across the enterprise and to allow multiple systems and respective master patient databases to communicate activity related to a person regardless of whether that person is currently a patient on each system. Each system has an interest in the database activity of the others in order to maintain data integrity across an enterprise. To the enterprise systems, the person may be a current patient or a potential future patient.

The person whose data is being sent should be identified in the PID segment using the PID-3 (Patient Identifier List) field. An A28 message requests the establishment of an ICN and stores the patient identifiers (e.g., social security number, claim number, or other unique identifiers) as passed in the PID-3 field. Other identifiers such as deprecated identifiers (e.g., local IEN) can be sent in the PID-4 (Alternate Patient ID - PID) field, which are also stored as an alternative ID on the MPI for that system to include in subsequent communication from the MPI. Each new system needs to register the identifier list and assigning authority with the MPI development group.

2.5.1.1 ADT/ACK A28 Message Structures

Table 2-2 and Table 2-3 detail the structure of the ADT A28 and ACK A28 messages, respectively.

Table 2-2: ADT A28 message structure

| ADT^A28 Segments | Segment Description |
|------------------|--|
| MSH | Message Header |
| EVN | Event Type |
| PID | Patient Identification |
| [PD1] | Additional Demographics |
| PV1 | Patient Visit |
| [ZPD] | IHS-Specific Patient Information Segment |

Table 2-3: ACK A28 message structure

| ACK^A28 Segments | Segment Description |
|------------------|------------------------|
| MSH | Message Header |
| MSA | Message Acknowledgment |
| [ERR] | Error |

2.5.1.2 Sample ADT/ACK A28 Messages

Figure 2-1 contains a sample ADT A28 message, which is sent from RPMS to the central MPI.

Note: Only RPMS systems can add patients to the MPI at this time.

```
MSH^~|\&^RPMS-MPI^14752~1.2.3.4:1234~DNS^MPI
^8990~:8899~DNS^20100708094653-0600^^ADT~A28^14752 1198^T~^2.4^^AL^NE^
EVN^A28^^^398~DEMO~USER~~~~~USIHS&&0363~L~~~NI~IHS FACILITY ID -NOT-A-REAL
FACILITY&14752&L^^14752
PID^1^V^V~~~USIHS&&0363~NI~IHS FACILITY ID - NOT-A-REAL FACILITY&14752&L|779358
654~~~USSSA&&0363~SS~IHS FACILITY ID - NOT-A-REAL FACILITY&14752&L|7296~~~USIHS&
```

```
&0363~PI~IHS FACILITY ID - NOT-A-REAL FACILITY&14752&L|V~~~USIHS&&0363~NI~IHS FA
CILITY ID - NOT-A-REAL FACILITY&14752&L~~200910205571-0700^^DEMO~MARION~M~~~~L
^DEMO~JEREMIAH~DARRYL~~~~M^19630808^F^DEMO~JEREMIAH~DARRYL^^BOX 123~~KETTLE
RIVER~MN~~~P~|~~MINNEAPOLIS~MN~~~N^^~|~~|~~|~~|^^^|^^^|^^^|^^^|^^^|^^^|^^^|
ZPD^1^997^C^01^UNSPECIFIED^7296~0000109481~516~19316~|7296~0000109482~517~17493
~|
```

Figure 2-1: ADT-A28—Add Person or Patient Information message sent from RPMS to MPI

Figure 2-2 contains a sample ACK A28 commit acknowledgment returned from the central MPI to the sending RPMS.

```
MSH^^|\&^MPI^8990^RPMS-MPI^14752^20100708094702.267-0700^^ACK~A28^29501^T^2.4^^^
NE^NE
MSA^CA^14752 1198
```

Figure 2-2: ACK-A28--Commit acknowledgment sent from MPI to RPMS

Figure 2-3 contains a sample ACK A28 application acknowledgment sent from the central MPI to the sending RPMS.

```
MSH^^|\&^MPI^8990^RPMS-MPI^14752^20100708094721-0600^^ACK~A28^23696-se^T^2.4^^^A
L^NE
MSA^AA^14752 1198^^^DFN=1000592558
```

Figure 2-3: ACK-A28—Application acknowledgment sent from MPI to RPMS

2.5.2 ADT/ACK A08 – Update Patient Information

The A08 trigger event occurs when patient demographic information has changed or has been edited. For example, an A08 event can be used to notify the MPI of a change of the patient's name or address.

Note: Updates to specific patient demographic data will trigger the broadcast of a HL7 ADT A08 message. Because there is no set way of identifying when an edit to patient information is complete, these edit events are marked as needing to be transmitted in the ADT/HL7 PIVOT file (#391.71). The background job AGMP A08 BCKGRND UPDATE TSK, scheduled in TaskMan, periodically broadcasts the HL7 ADT A08 message, containing any changes to data, to the MPI.

2.5.2.1 ADT/ACK A08 Message Structures

Table 2-4 and Table 2-5 detail the structure of the ADT A08 and ACK A08 messages, respectively.

Figure 2-6 contains a sample ACK A08 application acknowledgment message sent from the MPI to the sending RPMS system.

```
MSH^~|\&^MPI^8990^RPMS-MPI^14752^20100708101527-0600^^ACK~A08^23697-se^T^2.4^^^A
L^NE
MSA^AA^14752 1201^^^DFN=1000592558
```

Figure 2-6: ACK-A08—Application acknowledgment sent from MPI to RPMS

2.5.3 ADT/ACK A01 – Admit/Visit Notification

An A01 event is intended to be used for patient admission or check-ins only. An A01 event is sent as a result of a patient undergoing the admission or check-in process.

2.5.3.1 ADT/ACK A01 Message Structures

Table 2-6 and Table 2-7 detail the structure of the ADT A01 and ACK A01 messages, respectively.

Table 2-6: ADT A01 message structure

| ADT^A01 Segments | Segment Description |
|------------------|--|
| MSH | Message Header |
| EVN | Event Type |
| PID | Patient Identification |
| [PD1] | Additional Demographics |
| PV1 | Patient Visit |
| [ZPD] | IHS-Specific Patient Information Segment |

Table 2-7: ACK A01 message structure

| ACK^A01 Segments | Segment Description |
|------------------|------------------------|
| MSH | Message Header |
| MSA | Message Acknowledgment |
| [ERR] | Error |

2.5.3.2 Sample ADT/ACK A01 Messages

Figure 2-7 contains a sample ADT A01 message, which is sent from RPMS to the MPI.

```
MSH^~|\&^RPMS-MPI^14752~1.2.3.4:1234~DNS^MPI
^8990~:8899~DNS^20100708102554-0600^^ADT~A01^14752 1204^T~^2.4^^^AL^NE^
EVN^A1^^^398~DEMO~USER~~~~~USIHS&&0363~L~NI~IHS FACILITY ID -NOT-A-REAL F
ACILITY&14752&L^14752
PID^1^1000592558V803451^1000592558V803451~NI~IHS FACILITY ID - NO
T-A-REAL FACILITY&14752&L|779358654~SS~IHS FACILITY ID - NOT-A-REA
```


2.5.5 ADT/ACK A40 – Merge Patient - Patient Identifier List

When a merge is performed using the BPM Patient Merge application, an A40 message is triggered and sent to the MPI.

2.5.5.1 ADT/ACK A40 Message Structures

Table 2-10 and Table 2-11 detail the structure of the ADT A40 and ACK A40 messages, respectively.

Table 2-10: ADT A40 message structure

| ADT^A40 Segments | Segment Description |
|------------------|---------------------------|
| MSH | Message Header |
| EVN | Event Type |
| PID | Patient Identification |
| [PD1] | Additional Demographics |
| MRG | Merge Patient Information |
| PV1 | Patient Visit |

Table 2-11: ACK A40 message structure

| ACK^A40 Segments | Segment Description |
|------------------|------------------------|
| MSH | Message Header |
| MSA | Message Acknowledgment |
| [ERR] | Error |

2.5.5.2 Sample ADT/ACK A40 Messages

Figure 2-13 contains a sample ADT A40 message, which is sent from RPMS to the central MPI.

```
MSH^~|\&^RPMS-MPI^14752~1.2.3.4:1234~DNS^MPI
^8990~:8899~DNS^20100708111857-0600^^ADT~A40^14752 1216^T~^2.4^^AL^NE^
EVN^A40^^^398~DEMO~USER~~~~~USIHS&&0363~L~NI~IHS FACILITY ID -NOT-A-REAL
FACILITY&14752&L^^14752
PID^1^1000592558V803451^1000592558V803451~~~~USIHS&&0363~NI~IHS FACILITY ID - NO
T-A-REAL FACILITY&14752&L|779358654~~~USSSA&&0363~SS~IHS FACILITY ID - NOT-A-REA
L FACILITY&14752&L|7296~~~USIHS&&0363~PI~IHS FACILITY ID - NOT-A-REAL FACILITY&1
4752&L|1000592558V803451~~~~USIHS&&0363~NI~IHS FACILITY ID - NOT-A-REAL FACILITY&
14752&L~~200910205571-0700^^DEMO~MARION~M~~~~L^DEMO~JEREMIAH~DARRYL~~~~M^19
630808^F^DEMO~JEREMIAH~DARRYL^^BOX 123~~KETTLE RIVER~MN~~~P~|~~MINNEAPOLIS~MN~~
~N^^~|~~|~~|~~~~~|
MRG^V~~~~USIHS&&0363~NI~IHS FACILIIY ID&14752&L|3966~~~~USIHS&&0363~PI~IHS FACILIIY
ID&14752&L^^^^^DEMO~AUDREY~~~~~L|
```

Figure 2-13: ADT-A40—Merge Patient – Patient Identifier List message sent from RPMS to MPI

Figure 2-14 contains a sample ACK A40 commit acknowledgment returned from the central MPI to the sending RPMS system.

```
MSH^~|\&^MPI^8990^RPMS-MPI^14752^20100708112130-0600^^ACK~A40^23700-se^T^2.4^^^AL^NE
MSA^CA^14752 1216
```

Figure 2-14: ACK-A40—Commit acknowledgment sent from MPI to RPMS

Figure 2-15 contains a sample ACK A40 application acknowledgment sent from the MPI to the sending RPMS system.

```
MSH^~|\&^MPI^8990^RPMS-MPI^14752^20100708112130-0600^^ACK~A40^23700-se^T^2.4^^^AL^NE
MSA^AA^14752 1216^^^DFN=1000592558
```

Figure 2-15: ACK-A40—Application acknowledgment sent from MPI to RPMS

2.5.6 MFN/MFK M05 – Location Master File

The purpose of the MFN M05 message was to transmit information about the facilities where the patient has been seen, to allow the RPMS system to maintain the Treating Facility List (#391.91) file. This file is now deprecated. As a result, the RPMS system does not process MFN messages and does not generate an MFK acknowledgment.

2.6 HL7 Escape Characters

HL7 encoding characters, if found within a data field, are automatically replaced with the proper escape sequence. The escape sequences used in MPI messaging are ^ = \F\, ~ = \S\, | = \R\, \ = \E\, & = \T\.

2.7 Obtaining Data Dictionary Listings

Technical information about files and the fields in files is stored in data dictionaries. Use the List File Attributes option on the Data Dictionary Utilities submenu in FileMan to print formatted data dictionaries.

2.8 AGMPI.PatientRegistration Production

The PatientRegistration production within the AGMPI package transports HL7 messages between the MPI and the RPMS system. It interacts with the RPMS database via the HLO globals ^HLB and ^HLA.

HL7 messages are retrieved from the RPMS system via the HLOGlobalInbound adapter. The adapter loops through the ^HLB “QUEUE” node, determining which messages are to be sent to the receiving facility by pulling information from the ^HLB and ^HLA global nodes. An HL7 message is formed and sent to the calling service. The service receives the HL7 message and determines whether the message is a valid message (using the AGMPI.RPMS.HL7 schema). If the message is valid, it is sent to the HL7 routing engine where the message is routed using the RPMS routing rule. ACK (acknowledgment) reply messages from the MPI are stored back into the RPMS ^HLB and ^HLA global nodes.

Messages are sent from the MPI to RPMS in real time. If the HL7 message is valid (using the AGMPI.MPI.HL7 schema), the Ensemble production places the messages into the ^HLB and ^HLA global nodes via the HLOGlobalOutbound adapter. Because the Treating Facility List file has been deprecated, if the received message is an MFN, the Ensemble production will mark it complete without any further processing.

3.0 Routines

3.1 Routines Description

Table 3-1: Routines with descriptions

| Routine Name | Description |
|--------------|--|
| AGMP1E00 | Environmental check routine |
| AGMP1P00 | Pre- and post-install routine |
| AGMP1P01 | Pre- and post-install routine for patch 1 |
| AGMP1P02 | Post-install routine for patch 2 |
| AGMPACK | A28/A08 ACK processor |
| AGMPADT | A01/A03 ACK processor; A01/A03/A28 message generator |
| AGMPBGP | Inbound message processor |
| AGMPCHK | Utilities for verifying the site's institution numbers |
| AGMPCLAS | Utilities for transporting classes via KIDS |
| AGMPEDIT | AGMP parameters editor |
| AGMPHL1 | Extension to AGMPHLO routine |
| AGMPHLO | MPI HL7 message generator |
| AGMPMFN | MFN message processor (deprecated) |
| AGMPMICN | Missing ICN background process |
| AGMPOPT | Utilities for opting out of and opting in to the MPI application |
| AGMPPID | PID segment builder |
| AGMPPIVT | Pivot table processor |
| AGMPPRST | Ensemble production status checker |
| AGMPPURG | HLO message purge |
| AGMPRPT1 | MPI reports |
| AGMPRPT2 | MPI reports |
| AGMPSMSG | Options for sending messages manually |
| AGMPVQQ | VQQ ACK processor (deprecated) |

4.0 Classes

4.1 Classes Description

Table 4-1: Classes

| Class | Description |
|----------------------------------|---|
| AGMPI.Adapters.AlertInbound | Ensemble adapter reading application alerts logged since the last alert email was sent |
| AGMPI.Adapters.HLOGlobalInbound | Ensemble adapter reading HL7 messages from the RPMS ^HLB and ^HLA global nodes |
| AGMPI.Adapters.HLOGlobalOutbound | Ensemble adapter writing HL7 messages to the RPMS ^HLB and ^HLA global nodes |
| AGMPI.AlertEmailAddress | Persistent class containing the alert email addresses |
| AGMPI.Alerts.AlertItem | Persistent class containing application alerts |
| AGMPI.Alerts.AlertLog | Persistent class containing the alerts that have been sent (via email) |
| AGMPI.Install.Installer | Installer class to create AGMPI database and namespace and to set up mappings |
| AGMPI.Install.PostInstall | Performs post-install steps in the AGMPI namespace |
| AGMPI.Install.PreInstall | Performs pre-install steps in the AGMPI namespace |
| AGMPI.Install.ProductionSettings | Persistent class for storing Ensemble production settings during installation |
| AGMPI.MPIAlertRouting | Routing class for alert messages |
| AGMPI.MPIMessageRouting | Routing class for messages received from the MPI system |
| AGMPI.Operations.MPI | Business operation sending HL7 messages to the MPI system |
| AGMPI.Operations.RPMS | Business operation sending HL7 messages to the RPMS system via the AGMPI.Adapters.HLOGlobalOutbound adapter |
| AGMPI.PatientRegistration | Ensemble production class |
| AGMPI.Process.AlertProcess | Business process logging the alert and determining whether to send an e-mail in response to the alert |
| AGMPI.RPMSMessageRouting | Routing class for sending messages to the MPI system |
| AGMPI.Services.Alert | Business service for sending logged application alerts |
| AGMPI.Services.MPI | Business service receiving HL7 messages from the MPI system |

| Class | Description |
|------------------------|---|
| AGMPI.Services.RPMS | Business service receiving HL7 messages from the RPMS system |
| AGMPI.Task.StatusCheck | Ensemble task to report status information about the production to RPMS |

4.2 Method List

4.2.1 AGMPI.Adapters.AlertInbound.OnTask

This method reads in logged application alerts that have not yet been emailed. It is invoked from the associated business service.

- **Input Parameter Description:**
None
- **Output Description:**
Returns an alert message to the business service that initiated the method

4.2.2 AGMPI.Adapters.HLOGlobalInbound.OnTask

This method reads the HL7 information from the ^HLB and ^HLA global nodes. It is invoked from the associated business service.

- **Input Parameter Description:**
None
- **Output Description:**
Returns the HL7 message(s) to the business service that initiated the method

4.2.3 AGMPI.Adapters.HLOGlobalInbound.GetFilemanDateTime

Returns a date and time in FileMan format.

- **Input Parameter Description:**
Number of days to add to the current date/time.
- **Output Description:**
Returns the current date/time plus an offset number of days in FileMan format

4.2.4 AGMPI.Adapters.HLOGlobalOutbound.FileMessage

This method writes HL7 information into the ^HLB and ^HLA global nodes as messages are received. It is invoked from the associated business operation.

- Input Parameter Description:
None
- Output Description:
Returns the HL7 message(s) written to the ^HLB and ^HLA global nodes

4.2.5 AGMPI.Adapters.HLOGlobalOutbound.GetNewIENA

Obtains an unused IEN for the ^HLA global (file 777), using the same algorithm as \$\$NEWIEN^HLOF777().

- Input Parameter Description:
None
- Output Description:
Returns an unused IEN for the ^HLA global

4.2.6 AGMPI.Adapters.HLOGlobalOutbound.GetNewIENB

Obtains an unused IEN for the ^HLB global (file 778), using the same algorithm as \$\$NEWIEN^HLOF778A().

- Input Parameter Description:
None
- Output Description:
Returns an unused IEN for the ^HLB global

4.2.7 AGMPI.Adapters.HLOGlobalOutbound.GetFilemanDateTime

Returns a date and time in FileMan format.

- Input Parameter Description:
Number of days to add to the current date/time.
- Output Description:
Returns the current date/time plus an offset number of days in FileMan format.

4.2.8 AGMPI.Adapters.HLOGlobalOutbound.SendAlert

Triggers an Ensemble alert message.

- Input Parameter Description:
Text of the alert.

- Output Description:
None

4.2.9 AGMPI.Install.Installer.setup

This method generates the code that creates the AGMPI database and namespace and sets up mappings. This method was generated automatically by Ensemble.

- Input Parameter Description:
The input parameters were specified by Ensemble and should not be altered.
- Output Description:
Status of the code generation

4.2.10 AGMPI.Install.Installer.SetupDefaults

This method is a placeholder for any defaults that need to be set up. This method was generated automatically by Ensemble.

- Input Parameter Description:
The input parameters were specified by Ensemble and should not be altered.
- Output Description:
Status

4.2.11 AGMPI.Install.PostInstall.RunTask

This method performs post-install tasks that must be run in the AGMPI namespace.

- Input Parameter Description:
None
- Output Description:
Status

4.2.12 AGMPI.Install.PreInstall.RunTask

This method performs pre-install tasks that must be run in the AGMPI namespace.

- Input Parameter Description:
None
- Output Description:
None

4.2.13 AGMPI.Operations.MPI.OnMessage

This method overrides the standard OnMessage() method for the EnsLib.HL7.Operation.TCPOperation class. It disables journaling in order to save journal space, then calls the parent method.

- Input Parameter Description:
Ensemble request message
- Output Description:
Ensemble response message

4.2.14 AGMPI.Operations.RPMS.OnMessage

This method overrides the standard OnMessage() method for the EnsLib.HL7.Operation.Standard class. It disables journaling in order to save journal space, then calls the parent method.

- Input Parameter Description:
Ensemble request message
- Output Description:
Ensemble response message

4.2.15 AGMPI.Services.Alert.OnProcessInput

This method accepts an alert message from the adapter and sends it to the EmailAlert business operation.

- Input Parameter Description:
Alert message
- Output Description:
None

4.2.16 AGMPI.Services.MPI.OnProcessInput

This method accepts an HL7 message, disables journaling to save journal space, then calls the parent method to process the message.

- Input Parameter Description:
HL7 message object
- Output Description:
Left over data

4.2.17 AGMPI.Services.RPMS.OnProcessInput

This method received an HL7 object, sets some HL7 object information, validates the message, and passes it to the RPMS routing engine.

- Input Parameter Description:
Inboundmessage: HL7 message object
- Output Description:
Returns the HL7 message(s) to a business process.

4.2.18 AGMPI.Task.StatusCheck.OnTask

This method writes information about the MPI production to a global to be read by the production check task in RPMS.

- Input Parameter Description:
None
- Output Description:
Status

4.2.19 AGMPI.Task.StatusCheck.SendEmail

This method sends an email containing production status information to the recipient list configured in the EmailAlert adapter.

- Input Parameter Description:
None
- Output Description:
Message indicating why the email could not be sent

4.2.20 AGMPI.Task.StatusCheck.GetStatusString

This method obtains the error text from a status object.

- Input Parameter Description:
Status object
- Output Description:
Error text

5.0 Schemas

5.1 Schema Description

Table 5-1: Schemas

| Schema | Description |
|---------------|--|
| AGMPI.MPI.HL7 | Schema for HL7 messages received from the central MPI. Based on HL7 2.4. |
| AGMP.RPMS.HL7 | Schema for HL7 messages being sent to the central MPI. Based on HL7 2.4. |

6.0 Files

6.1 File List

Table 6-1: Files and contents

| File # | Filename | Description |
|------------|----------------------|--|
| 9002021.01 | AGMP PARAMETERS | Contains parameters affecting the behavior of the AGMP application |
| 9002021.02 | AGMP CLASS TRANSPORT | Contains packed class definitions, which can be distributed via KIDS |

6.2 File Access

Table 6-2: Files and access

| File # | Filename | GL | RD | WR | LYG | DD | DEL |
|------------|----------------------|-------------------|----|----|-----|----|-----|
| 9002021.01 | AGMP PARAMETERS | ^AGMP(9002021.01, | @ | @ | @ | @ | @ |
| 9002021.02 | AGMP CLASS TRANSPORT | ^AGMPCLS(| @ | @ | @ | @ | @ |

6.3 Cross References

9002021.01 (AGMP PARAMETERS)

.01 HOME SITE

B regular cross reference

9002021.011 (MPI STATUS HISTORY SUB-FIELD)

.01 STATUS CHANGE DATE/TIME

B regular cross reference

9002021.02 (AGMP CLASS TRANSPORT)

.01 PACKAGE NAME

B regular cross reference

9002021.022 (XML SUB-FIELD)

.01 XML

B regular cross reference

9002021.023 (CLASS SUB-FIELD)

.01 CLASS

B regular cross reference

6.4 Table File

File: 9002021.01 AGMP PARAMETERS

Global: ^AGMP(9002021.01,

Table 6-3: Fields in file 9002021.01 AGMP PARAMETERS

| Field # | Field Name | Subscript | Piece | Type |
|---------|--------------------|-----------|-------|------|
| .01 | HOME SITE | 0 | 1 | F |
| .02 | ENABLED | 0 | 2 | S |
| .03 | UPLOAD TYPE | 0 | 3 | S |
| 1 | MPI STATUS HISTORY | 1 | 0 | M |

File: 9002021.02 AGMP CLASS TRANSPORT

Global: ^AGMPCLS(

Table 6-4: Fields in file 9002021.02 AGMP CLASS TRANSPORT

| Field # | Field Name | Subscript | Piece | Type |
|---------|--------------------------|-----------|-------|------|
| .01 | PACKAGE NAME | 0 | 1 | F |
| 1.02 | RPMS STATUS | 1 | 2 | S |
| 1.03 | RPMS DATE/TIME INSTALLED | 1 | 3 | D |
| 10 | XML | 10 | 0 | W |
| 11 | CLASS | 2 | 0 | M |

7.0 External Relations

7.1 Callable Routines

There are no callable routines in this package. All entry points and routines are called internally.

7.2 Published Entry Points

There are no published entry points in this package.

7.3 Exported Options

Table 7-1: Exported options and descriptions

| Option Name | Description |
|------------------------------|---|
| AGMP A08 BCKGRND UPDATE TSK | Background task that traverses the pivot table and generates an ADT A08 for each updated patient |
| AGMP ACK BCKGRND TSK | Background task that processes inbound messages (ACKs and MFNs) |
| AGMP EDIT SITE PARAMETERS | Edit AGMP parameters |
| AGMP HLO A28 ADD PATIENT | Generate an ADT A28 message manually |
| AGMP HLO MPI MANAGER OPTIONS | Contains all AGMP options |
| AGMP HLO PROCESS MFN | Process an MFN M05 message manually (deprecated) |
| AGMP HLO RESEND MSG | Resend an HL7 message |
| AGMP HLO SEND A01/A03 | Generate an ADT A01 or A03 message manually |
| AGMP HLO SEND A08 UPDATE | Generate an ADT A08 message manually |
| AGMP HLO SEND A40 | Generate an ADT A40 message manually |
| AGMP MPI EVENT/TYPE/ACK RPT | Report of messages of a given type (e.g., ADT) and event (e.g., A28) – disabled in patch 1 because it can display full SSNs |
| AGMP MPI ICN REPORT | Report of the number of patients without ICNs assigned and, optionally, a list of those patients |
| AGMP MPI MESSAGE TOTALS | Report of the number of MPI messages in the inbound and outbound queues |
| AGMP MPI MISSING ICN TSK | Background task that generates an ADT A28 message for each patient that doesn't have an ICN assigned |
| AGMP MPI MSG ERR SEG RPT | Report of central MPI errors reported in inbound acknowledgments – disabled in patch 1 because it can display full SSNs |

| Option Name | Description |
|------------------------------|--|
| AGMP MPI MSG ERR SEG TSK RPT | Task that reports central MPI errors reported in inbound acknowledgments |
| AGMP MPI PURGE HLO MSGS | Background task that purges old HL7 messages |
| AGMP MPI RPT MSGS BY DATE | Report of messages in a given date range |
| AGMP MPI RPTS AND DEBUG MENU | Contains AGMP reporting options |
| AGMP MPI UNSUCCESS MSGS | Report of unsuccessful messages in a given date range |
| AGMP MPI UNSUCCESSFUL MFE | Report of unsuccessful Treating Facility List updates (deprecated) |
| AGMP PROD STATUS TSK | Background task that monitors the status of the Ensemble production |

7.4 External Entry Points

This package calls the following documented entry points:

Table 7-2: External entry points and description

| Entry Point | Description |
|---------------------|---------------------------------------|
| PTLKNKIL^AG | Lookup patient |
| \$\$HLDATE^HLFNC | Create an HL7 formatted date |
| \$\$HLNAME^HLFNC | Get HL7 formatted name |
| \$\$HLPHONE^HLFNC | Get HL7 formatted phone |
| \$\$ADDSEG^HLOAPI | Add an HL7 message segment |
| \$\$NEWBATCH^HLOAPI | Start a new batch message |
| \$\$NEWMSG^HLOAPI | Create a new HL7 message |
| SET^HLOAPI | Set a field in an HL7 segment |
| \$\$SENDONE^HLOAPI1 | Send one HL7 message |
| \$\$RSEND^HLOAPI3 | Resend a message |
| \$\$NEXTSEG^HLOPRS | Get next segment |
| \$\$STARTMSG^HLOPRS | Begin processing a message |
| DEM^VADPT | Call to get PID demographic data |
| KVA^VADPT | Kill certain local variables |
| \$\$ADDR^VAFHLFNC | Create an HL7 formatted address |
| \$\$SITE^VASITE | Get station number for a given DUZ(2) |
| \$\$DIR^XBDIR | Interface to ^DIR |
| C^XBFUNC | Center a string |
| \$\$DT^XLFD | Get the current date |

| Entry Point | Description |
|--------------------|--|
| \$\$FMADD^XLFD | Add to a FileMan date |
| \$\$FMTE^XLFD | Get formatted date |
| \$\$HTFM^XLFD | Convert format from \$H to FileMan |
| \$\$NOW^XLFD | Get the current date/time |
| \$\$HLNAME^XLFN | Get formatted name |
| \$\$CJ^XLFS | Center justify a string |
| \$\$ADD^XPDME | Add options to a menu |
| BMES^XPDUTL | Insert a blank line before a message |
| SETUP^XQALERT | Set up alert call for mail group |
| EN^XQOR | Unroll protocols so subscribers will get unwrapped |
| \$\$NS^XUAF4 | Get facility info |
| \$\$STA^XUAF4 | Get station number |
| \$\$PROD^XUPROD | Report whether this is a production account |
| RESCH^XUTMOPT | Reschedule |
| \$\$VERSION^%ZOSV | Return Caché version |
| UNWIND^%ZTER | Unwind the stack for the error trap |
| ^%ZIS | Get device |
| HOME^%ZIS | Establish IO* variables for home device |
| ^%ZISC | Close device |
| ^%ZTLOAD | Queue a task |

8.0 Internal Relations

All users should be given access to the appropriate options and keys to those options, as needed. All of the options stand alone.

9.0 Mail Group

There is one mail group for this application: G.AGMP MPI. The users in this mail group receive notifications of errors via Veterans Administration (VA) alerts generated on both outbound and incoming messages.

The users in this group need the ability to review these messages and possibly take action and reprocess or resend messages.

10.0 Parameters

The AGMP application has one user-editable parameter: ENABLED. This parameter can be edited via the EDIT option on the MPI Manager Options menu. If this value is changed to DISABLED, then the entire MPI application is disabled. This option is intended for sites that wish to “opt out” of the central MPI. No messages will be generated for new patients, edited patients, or visits, and the central MPI application will not be updated. As a result, a site wishing to re-enable the AMGP application *must* open a help desk ticket and coordinate with the AGMP and MPI support teams *before* changing this setting to ENABLED.

```
MASTER PATIENT INDEX
DEMO HOSPITAL
EDIT AGMP SITE PARAMETERS
EDIT AGMP SITE PARAMETERS
Select whether to enable or disable the MPI application:
    Select one of the following:
        E      Enabled
        D      Disabled
MPI Application Status: Enabled//
```

Figure 10-1: Parameters

11.0 Menu Diagram

Figure 11-1 displays the main MPI menu and the RPT menu.

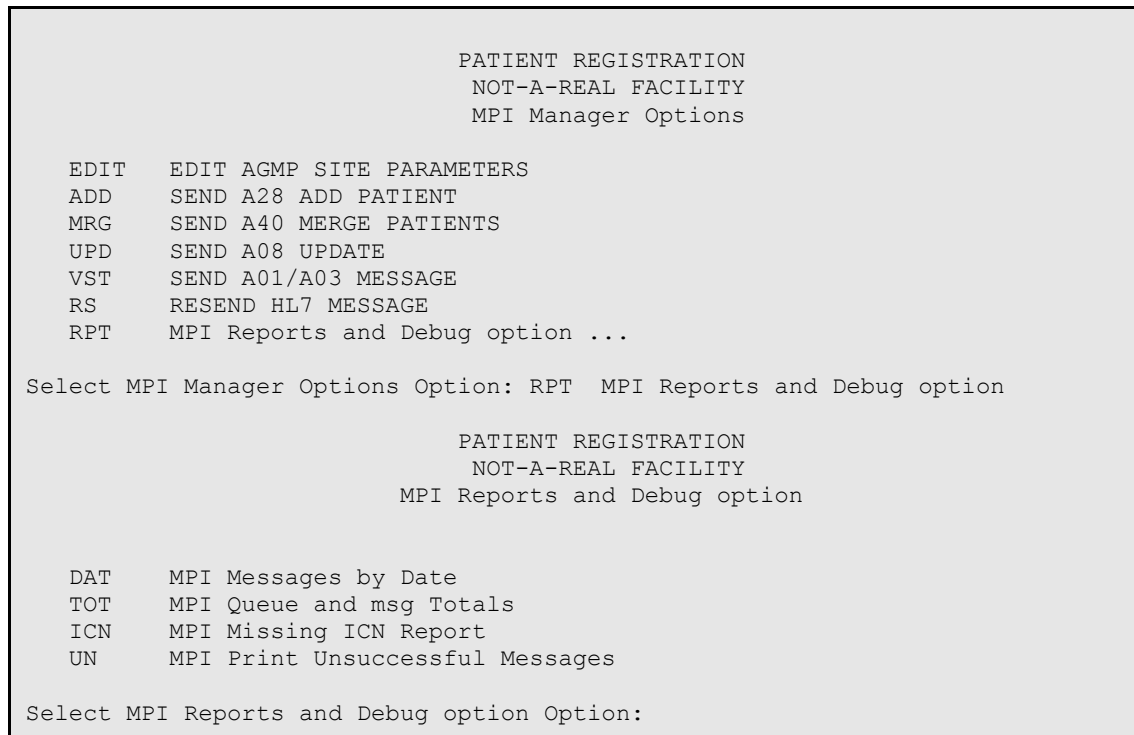


Figure 11-1: Menu Diagram for MPI and RPT menus

12.0 Protocols and Links

12.1 Protocols

Four protocols have been added to enable AGMPI to subscribe to registration, admission and discharge, check-in and check-out, and update events. Table 12-1 provides further information about the protocols.

Table 12-1: Protocols in the AG MPI application

| New Protocol | Parent Protocol | Sequence Number | Description |
|---------------------------|--------------------------|-----------------|--|
| AGMP MPI REGISTRATION | AG REGISTER A PATIENT | 40 | Sends registration information to the MPI. |
| AGMP MPI ADMIT DISCHARGE | BDGPM MOVEMENT EVENTS | 140 | Sends admit or discharge information to the MPI. |
| AGMP MPI CHECKIN CHECKOUT | BSDAM APPOINTMENT EVENTS | 40 | Sends check in or check out information to MPI. |
| AGMP MPI UPDATE | AG UPDATE A PATIENT | 40 | Sends update information to the MPI. |

12.2 Links

The HLO application uses logical links when building the message header (MSH) segment of the HL7 message. The NODE stored in the HL LOGICAL LINK file for AGMP is MPI.

```
Select OPTION: INQUIRE TO FILE ENTRIES

OUTPUT FROM WHAT FILE: HL LOGICAL LINK//
Select HL LOGICAL LINK NODE: MPI
  1  MPI
  2  MPIVA
  3  MPIVA DIR
CHOOSE 1-3: 1  MPI
ANOTHER ONE:
STANDARD CAPTIONED OUTPUT? Yes// (Yes)
Include COMPUTED fields: (N/Y/R/B): NO// - No record number (IEN), no
Computed
Fields

NODE: MPI                                LLP TYPE: TCP
  DEVICE TYPE: Persistent Client          STATE: Enabled
  AUTOSTART: Disabled                     TIME STARTED: JUL 02, 2012@10:50:11
  TIME STOPPED: JUL 02, 2012@10:50:11    SHUTDOWN LLP ?: NO
  QUEUE SIZE: 10                          TCP/IP ADDRESS: 1.2.3.4
  TCP/IP SERVICE TYPE: CLIENT (SENDER)    PERSISTENT: NO
```

TCP/IP PORT (OPTIMIZED) : 1234

Figure 12-1: HL LOGICAL LINK

13.0 Purging

Three tasks can be scheduled to purge old AGMP messages to reclaim database space and prevent keep the application running efficiently. The TaskMan task AGMP MPI PURGE HLO MSGS OPTION purges successfully processed HLO messages from RPMS. The TaskMan VAFH PIVOT PURGE task purges old entries from the pivot table. The Ensemble task AGMPI Message Purge Task purges old Ensemble messages from the AGMPI namespace. Instructions for scheduling these tasks can be found in *Master Patient Index Interface (AGMP) Installation Guide and Release Notes*.

14.0 How to Generate Online Documentation

The namespace is AG. All parameters, routines, options, etc., begin with AG.

This section describes some of the methods by which users can generate dental technical documentation. Online technical documentation pertaining to the Patient Registration MPI Interface software can be generated through the use of several Kernel options. These include, but are not limited to, the following:

- %INDEX
- Menu Management
- Inquire Option
- Print Option File
- VA FileMan
- Data Dictionary Utilities
- List File Attributes

Entering question marks at the “Select...Option” prompts also provides users with valuable technical information. For example, typing a single question mark (?) lists all options that can be accessed from the current option. Typing two question marks (??) lists all options accessible from the current one, showing the formal name and lock for each.

Typing three question marks (???) displays a brief description for each option in a menu, whereas an option name preceded by a question mark (?OPTION) shows extended help, if available, for that option.

For a more exhaustive option listing and further information about other utilities that supply online technical information, consult the DHCP Kernel Reference Manual.

14.1 %INDEX

This option analyzes the structure of a routine to determine in part if the routine adheres to RPMS Programming Standards. The %INDEX output can include the following components:

- Compiled list of errors and warnings
- Routine listing
- Local variables
- Global variables
- Naked globals
- Label references

- External references

By running %INDEX for a specified set of routines, you are afforded the opportunity to discover any deviations from RPMS Programming Standards that exist in the selected routines, and to see how routines interact with one another (for example, which routines call or are called by other routines).

To run %INDEX for the Patient Registration MPI Interface package, specify the **AGMP** namespace at the “Routine(s)?>” prompt.

14.2 Inquire Option

This menu management option provides the following information about a specific option:

- Option name
- Menu text
- Option description
- Type of option
- Lock (if any)

In addition, all items on the menu are listed for each menu option. To secure information about Patient Registration MPI Interface options, specify the AG namespace.

14.3 Print Option File

This utility generates a listing of options from the Option file (#19). You can choose to print all of the entries in this file, or you can specify a single option or range of options. For a list of Patient Registration MPI Interface options, refer to Section 9.0.

14.4 List File Attributes

This VA FileMan option enables you to generate documentation pertaining to files and file structure. Using the standard format of this option yields the following data dictionary information for a specified file:

- File name and description
- Identifiers
- Cross-references
- Files pointed to by the file specified
- Files that point to the file specified
- Input, print, and sort templates

In addition, the following applicable data is supplied for each field in the file:

- Field name, number, title, and description
- Global location
- Help prompt
- Cross-references
- Input transform
- Date last edited
- Notes

Using the Global Map format of this option generates an output that lists the following information:

- All cross-references for the file selected.
- Global location of each field in the file.
- Input, print, and sort templates.

14.5 Class Reference

Class documentation is generated by Ensemble for all classes. The reference gives general information about a class, in addition to listing and describing all of the class's properties, parameters, and methods.

To view the class documentation, open the Ensemble Documentation and select *Class Reference* from the menu bar. Select the AGMPI namespace from the drop-down menu at the top left, then select the class from the left frame.

14.6 Production Configuration

Specific settings for the production may be viewed via Ensemble's Management Portal.

In Ensemble's Management Portal, click the Ensemble button on the left, choose the AGMPI namespace, and then click Configure, then Production to navigate to the Production Configuration page.

Clicking on a business host in the left frame will display that host's settings in the right frame.

Glossary

Callable Entry Point

Place in a routine that can be called from an application program.

Cross-reference

An indexing method whereby files can include presorted lists of entries as part of the stored database. Cross-references (x-refs) facilitate lookup and reporting.

Entry Point

Entry point within a routine that is referenced by a “DO” or “GOTO” command from a routine internal to a package.

File

A set of related records or entries treated as a single unit.

FileMan

The database management system for RPMS.

Global

In MUMPS, “global” refers to a variable stored on disk (global variable) or the array to which the global variable may belong (global array).

INDEX (%INDEX)

A Kernel utility used to verify routines and other MUMPS code associated with a package. Checking is done according to current ANSI MUMPS standards and RPMS programming standards.

Kernel

The set of MUMPS software utilities that function as an intermediary between the host operating system and application packages, such as Laboratory and Pharmacy. The Kernel provides a standard and consistent user and programmer interface between application packages and the underlying MUMPS implementation. These utilities provide the foundation for RPMS.

Menu

A list of choices for computing activity. A menu is a type of option designed to identify a series of items (other options) for presentation to the user for selection. When menu-type options are displayed, the prompt includes the name of the menu preceded by the word “Select” and followed by the word “option,” as in “Select Menu Management option” (the menu’s “Select” prompt).

Namespace

A unique set of two to four alpha characters assigned by the database administrator to a software application.

Option

An item on a menu that provides an opportunity for users to select it, thereby invoking the associated computing activity. Options may also be scheduled to run in the background, non-interactively, by TaskMan.

Queuing

Requesting that a job or message be processed at a later time rather than within the current session.

Routine

A program or sequence of instructions called by a program that may have some general or frequent use. MUMPS routines are groups of commands that are saved, loaded, and called as a single unit via a specific name.

Variable

A character or group of characters that refers to a value. MUMPS recognizes two types of variables: local variables and global variables. Local variables exist in a partition of the main memory and disappear at sign-off. Global variables are stored on disk, potentially available to any user, and most persist across computing sessions. Global variables usually exist as parts of global arrays.

Acronym List

| Acronym | Term Meaning |
|---------|---|
| ACK | HL7 acknowledgment |
| ADT | Admit, Discharge, Transfer |
| AGMP | Namespace for the Master Patient Index RPMS application |
| EUID | Enterprise Unique Identifier |
| HLO | Health Level Seven Optimized |
| HL7 | Health Level Seven |
| ICN | Integration Control Number |
| IHS | Indian Health Service |
| IEN | Internal Entry Number. A unique number used to identify a record within a file. |
| MFK | Master File Acknowledgment |
| MFN | Master File Notification |
| MPI | Master Patient Index |
| MUMPS | Massachusetts General Hospital Utility Multi-Programming System |
| RPMS | Resource and Patient Management System |
| TFL | Treating Facility List |

Contact Information

If you have any questions or comments regarding this distribution, please contact the IHS IT Service Desk.

Phone: (888) 830-7280 (toll free)

Web: <https://www.ihs.gov/itsupport/>

Email: itsupport@ihs.gov