Department of Veterans Affairs
Decentralized Hospital Computer Program

DHCP
HEALTH LEVEL SEVEN
(HL7)
TECHNICAL MANUAL

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Preface

The DHCP Health Level Seven (HL7) software package provides an interface that allows DHCP applications to exchange healthcare data with other applications using the HL7 protocol. This manual provides technical information for use by IRM Service personnel to operate and maintain the DHCP HL7 software.

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Introduction

Overview

The first step in understanding the DHCP Health Level Seven (HL7) package is a basic understanding of HL7 itself. HL7 is a standard protocol which specifies the implementation of interfaces between two computer applications (sender and receiver) for electronic data exchange in healthcare environments. HL7 allows healthcare institutions to exchange key sets of data from different application systems. Specifically, it defines the following:

- The data to be exchanged
- The timing of the interchange
- The communication of errors to the sending/receiving application

The formats are generic in nature, and must be configured to meet the needs of the two applications involved. An HL7 interface specification should be written detailing what formats (events, messages, segments, and fields) will be used, and the lower level protocol that will be implemented in order for the two applications to interface with one another. Appendix A of this manual is an example of an HL7 interface specification.

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

- 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, etc.).

Overview, cont.

In addition to the field separator character, there are four other special characters called *encoding characters*. Encoding characters are also defined in the MSH segment. They operate on a single field in an HL7 segment. Each encoding character must be unique, and serves a specific purpose. None of the encoding characters can be the same as the field separator character.

- The first encoding character is the *component separator*. Some data fields can be divided into multiple components. The component separator is used to separate adjacent components within a data field.

- The second encoding character is the *repetition separator*. Some data fields can be repeated multiple times in a segment. The repetition separator character is used to separate multiple occurrences of a field.

- The third encoding character is the *escape character*. Data fields defined as text or formatted text can include escape sequences. The escape character is used to separate escape sequences from the actual text.

- The fourth encoding character is the *sub-component separator*. Some data fields can be divided into components, and each component can be further divided into sub-components. The sub-component separator is used to separate adjacent sub-components within a component of a field.

The DHCP HL7 Package

The purpose of the DHCP HL7 package is to assist DHCP applications in exchanging healthcare information with other applications using the HL7 protocol. The DHCP HL7 package consists of a set of utility routines and files that provide a generic interface to the HL7 protocol for all DHCP applications. The DHCP HL7 package can be divided into two parts:

- Lower level protocol support between sending and receiving applications
- DHCP interface to the HL7 protocol

Lower Level Protocols

The term lower level refers to a portion of the Open Systems Interconnect (OSI) model. The OSI model is divided into seven layers or levels. The lower levels (Layers 1 through 4) support the actual movement of data between systems. This includes the actual physical connection between the systems and the communications protocol used.

The DHCP HL7 package supports the following lower level interfaces:

- HL7 Hybrid Lower Layer Protocol over an RS-232 connection
- DHCP MailMan messages
- X3.28

Using these lower level interfaces, the DHCP HL7 package can support Layers 1 through 4 of the OSI model and eliminate the need for DHCP applications to write lower level interfaces each time they want to exchange data with another application.

These lower level interfaces provide the following functions:

- Receive and send HL7 messages.
- Validate the HL7 Message Header (MSH) information.
- Invoke the appropriate DHCP application routine to process the data in the message.
- Send HL7 accept acknowledgment (ACK) messages back to the sending application.

The DHCP Interface to the HL7 Protocol

With the release of V. 1.6, DHCP HL7 supports several methods for interfacing to the HL7 protocol. The method established by V. 1.5 is still supported (for backwards compatibility), and a new method is introduced, as well as new routines, file structures, templates, menus, and options. There are some significant differences between the V. 1.5 and V. 1.6 interface methods, as shown in the following table.

V. 1.5 Interface Method	V. 1.6 Interface Method
One sender and one receiver per message.	One sender, one or more receivers.
Sender and receiver must be on different systems.	Sender and receiver can be on the same or different systems.
Messages must go through a communications protocol.	Messages sent to applications on the same system do not have to go through a communications protocol.
All messages are processed in the background.	Messages are processed in either the foreground or background, based on the priority assigned by sending/receiving applications.
No support for event points.	Event points are supported.

The DHCP HL7 package assists DHCP applications in interfacing to the HL7 protocol. In addition to the lower levels mentioned previously, all applications must perform the following upper level functions in order to exchange data with another application:

- Event analysis
- Data extraction
- Data filing
- Data formatting
- Message administration

Currently, the functions of event analysis, data extraction, and data filing must be performed by each application package. The DHCP HL7 package provides the following utilities to assist the application package with data formatting:

- Creation of HL7 Message Header (MSH) segments
- Utility calls to convert HL7 data to VA FileMan formats and vice versa
- Validation of Message Header information for all HL7 messages received
- A set of pre-defined variables for use in building HL7 messages/segments

The DHCP Interface to the HL7 Protocol, cont.

The DHCP HL7 package provides the following functions to assist the application package with message administration:

- Support for tracking transmissions and providing a status for each
- Generation of reports on pending transmissions and transmissions with errors
- A queue for incoming and outgoing transmissions
- A real-time monitor to monitor active transmission links and their statuses

The DHCP HL7 package has been designed to be modular, table-driven, and extensible. It appears that with minor modifications, the package could support other protocols (e.g., EDI/X12) in addition to HL7. Current development efforts are concentrated on adding table-driven support for the functions of event analysis, data extraction, data filing, and data formatting. Once these three areas are automated, it will be possible for an application to implement a new HL7 interface to exchange data without writing M routines.

Related Manuals

For applications using the V. 1.6 interface method, you might also want to refer to the following manuals:

- DHCP HL7 V. 1.6 Developer Manual
- DHCP HL7 V. 1.6 Installation Guide
- DHCP HL7 V. 1.6 Package Security Guide
- DHCP HL7 V. 1.6 Release Notes
- DHCP HL7 V. 1.6 User Manual

For applications using the V. 1.5 interface method, you might also want to refer to the following manuals:

- DHCP HL7 V. 1.5 Developer Manual
- DHCP HL7 V. 1.5 Installation Guide
- DHCP HL7 V. 1.5 Package Security Guide
- DHCP HL7 V. 1.5 Release Notes
- DHCP HL7 V. 1.5 Technical Manual
- DHCP HL7 V. 1.5 User Manual

Organization of this Manual

The information in this manual is divided into the following sections:

- *Preface* - States the purpose of the software and the intended audience for this manual.
- *Table of Contents* - Lists the topics in the order in which they appear in this manual.
- *Introduction* - Provides an overview of the software and its purpose, refers you to related manuals, and explains the organization of this manual.
- *Resource Requirements* - Discusses the software and hardware requirements for this version of DHCP HL7.
- *Implementation and Maintenance* - Points you to the instructions for implementing the software and its various tools; provides maintenance and troubleshooting tips.
- *Routines* - Provides a complete list of package routines with their descriptions and the supported entry points for this version with their descriptions and parameters.
- *Files* - Provides a complete list of package files and their descriptions; a flow chart to illustrate the pointer relationships between the various files; discussion about globals and global growth; and a complete list of package cross-references with their descriptions.
- *Exported Options* - Contains a menu diagram of all options exported with the package.
- *Archiving and Purging* - Discusses the archiving and purging capabilities of the package.
- *External Relations* - Provides a list of minimum versions of other packages that must be installed prior to installing this version of DHCP HL7, and contains a list of custodial Database Integration Agreements (DBIAs).
- *Internal Relations* - Discusses option dependencies and SACC exemptions.
- *Variables* - Provides a list of package variables and arrays with their descriptions.
- *How to Generate Online Documentation* - Provides tips for accessing technical online information.
- *Glossary* - Provides a list of terms used in this manual with their definitions.
- *Appendices* - Contain supplemental information.
- *Index* - Provides an alphabetical listing of the topics presented in this manual.

Resource Requirements

Minimum Versions Required

The following minimum package versions are required in order to install this version of DHCP HL7:

- Kernel V. 7.1
- VA FileMan V. 21.0
- VA FileMan V. 7.1
- OE/RR V. 2.5

Resource Consumption

- The ^HL global will consume approximately 17K of disk space for static file entries, and about 1K of disk space for every 10 entries in the HL7 MESSAGE TEXT file (#772).
- The ^HLCS global will consume approximately 50K of disk space for every 100 messages (500 byte average length) in the HL LOGICAL LINK file (#870).
- The ^HLMA global will consume approximately 400 bytes for every 10 entries in the HL7 MESSAGE ADMINISTRATION file (#773).
- CPU usage is insignificant for a few links, but will increase linearly as more links are added.

Implementation and Maintenance

Implementation

The DHCP HL7 V. 1.6 Installation Guide provides detailed step-by-step instructions for package implementation. To implement application interfaces, logical links, and client/server protocols, use the Interface Workbench [HL INTERFACE WORKBENCH] option in the V. 1.6 OPTIONS Menu [HLMENU 1.6].

Maintenance

You should queue the Purge Message Text Entries [HL PURGE TRANSMISSIONS] option on the HL7 Main Menu (HL MAIN MENU) to run as a daily background task. This purges outgoing transmissions in the HL7 MESSAGE TEXT file (#772) that meet the following criteria:

- They have been successfully transmitted.
- They are at least seven days old.

You can also run the Purge Message Text Entries [HL PURGE TRANSMISSIONS] option from the menu to purge messages with a status of ERROR IN TRANSMISSION. *You should review error messages before using this option.*

Troubleshooting Tip

While the HL7 protocol requires no actual maintenance, you might want to refer to the Callable Routines in the Routines Section of this manual for guidance in troubleshooting, debugging, etc.

Routines

Routine List with Descriptions

The following list of routines in V. 1.6 of the DHCP HL7 package are grouped into the following categories:

- Routines that support the V. 1.5 interface method
- Routines that support the V. 1.6 interface method
- Routines that support both the V. 1.5 and V. 1.6 interface methods

Routine Name	Description	Version Supported
HLCHK	Validates data in the HL7 Message Header (MSH) segments of all incoming messages, and creates and sends "AR" error type acknowledgment messages.	V. 1.5
HLCS	Communications Server Module routine.	V. 1.6
HLCS1	Manage incoming and outgoing filers menu [HL MANAGE FILERS] options.	V. 1.6
HLCSDL, HLCSDL1, HLCSDL2	X3.28 Lower Layer Protocol (LLP) routines.	V. 1.6
HLCSDR, HLCSDR1, HLCSDR2	HL7 V. 2.2 Hybrid Lower Layer Protocol (HLLP) routines.	V. 1.6
HLCSFMN, HLCSFMN0, HLCSFMN1	Filer Monitor routines.	V. 1.6
HLCSHDR	Creates an HL7 message header from an IEN in the MESSAGE TEST file (#772).	V. 1.6
HLCSIN	Incoming background filer.	V. 1.6
HLCSLNCH	Start LLP [HL START] and Stop LLP [HL STOP] options on the Communications Server [HL COMMUNI-CATIONS SERVER] menu.	V. 1.6
HLCSMM, HLCSMM1	MailMan LLP routines.	V. 1.6
HLCSMON, HLCSMON1, HLCSTERM	Systems Link Monitor routines.	V. 1.6
HLCSORA1, HLCSORA2, HLCSORAT	Custom report routine.	V. 1.6
HLCSOUT	Outgoing background filer.	V. 1.6
HLCSQUE, HLCSQUE1, HLCSQUED	Logical Link Queue Management utility routines.	V. 1.6
HLCSRE1, HLCSREP, HLCSREQ, HLCSRES, HLCSRQ	Message Requeuer routines.	V. 1.6

Routine List with Descriptions, cont.

Routine Name	Description	Version Supported
HLCSRV	Server routine for HL7 messages received through MailMan.	V. 1.6
HLCSUTL, HLCSUTL1, HLCSUTL2	Communications Server utility routines.	V. 1.6
HLDTIW01, HLDTIW02, HLDTIW01, HLDTIW03, HLDTIW04, HLDTIW05, HLDTIW2A, HLDTIW2B, HLDTIW2C, HLDTIWP0, HLDTIWP1, HLDTIWP2, HLDTIWP3, HLDTIWP4, HLDTIWP5, HLDTIWP6, HLDTIWU0, HLDTIWU1, HLDTIWU2, HLDTIWU3, HLDTIWU4, HLDTIWU5, HLLM, HLLM1	Interface Workbench Module routines.	V. 1.6
HLFNC, HLFNC1, HLFNC2, HLFNC3	Perform various functions, such as • Format names, dates, and times in HL7 or VA FileMan format. • Convert lower case letters to uppercase. • Convert DHCP phone number and address to HL7 format. • Calculate M10 and M11 checksums, etc.	Both: HLFNC, HLFNC1 V. 1.6: HLFNC2, HLFNC3

Routine List with Descriptions, cont.

Routine Name	Description	Version Supported
HLINI001, HLINI002, HLINI003, HLINI004, HLINI005, HLINI006, HLINI007, HLINI008, HLINI009, HLINI00A, HLINI00B, HLINI00C, HLINI00D, HLINI00E, HLINI00F. HLINI00G, HLINI00H, HLINI00I, HLINI00J, HLINI00K, HLINI00L, HLINI00M, HLINI00N, HLINI00O, HLINI00P, HLINI00Q, HLINI00R, HLINI00S, HLINI00T, HLINI00U, HLINI00V, HLINI00W, HLINI00X, HLINI00Y, HLINI00Z, HLINI010, HLINI011, HLINI012, HLINI013, HLINI014, HLINI015, HLINI016, HLINI017, HLINI018, HLINI019, HLINI01A, HLINI01B, HLINI01C, HLINI01D, HLINI01E, HLINI01F, HLINI01G, HLINI01H, HLINI01I, HLINI01J, HLINI01K, HLINI01L, HLINI01M, HLINI01N, HLINI01O, HLINI01P, HLINI01Q, HLINI01R, HLINI01S, HLINI01T, HLINI01U, HLINI01V, HLINI01W, HLINI01X, HLINI01Y, HLINI01Z, HLINI020, HLINI021, HLINI022, HLINI023, HLINI024, HLINI025, HLINI026 HLINI027, HLINI028, HLINI029, HLINI02A, HLINI02B, HLINI02C, HLINI02D, HLINI02E, HLINI02F, HLINI02G, HLINI02H, HLINI02I, HLINI02J, HLINI02K, HLINI02L, HLINI02M, HLINI02N, HLINI02O, HLINI02P, HLINI02Q, HLINI02R, HLINI02S, HLINI02T, HLINI02U, HLINI02V, HLINI02W, HLINI02X, HLINI02Y, HLINI02Z, HLINI030, HLINI031, HLINIS, HLINIT, HLINIT1, HLINIT2, HLINIT3, HLINIT4, HLINIT5	Init routines for DHCP HL7.	V. 1.6
HLLP	Implements the HL7 Hybrid Lower Layer Protocol. It is used as a communication protocol between a DHCP and non-DHCP application when the two applications are linked together through a port-to-port connection. It receives messages that originate from non-DHCP applications and sends replies. It also sends messages that originate from DHCP applications and receives replies.	V. 1.5
HLMA, HLMA0, HLMA1, HLMA2	Message Administration Module routines.	V. 1.6

Routine List with Descriptions, cont.

Routine Name	Description	Version Supported
HLNTEG, HLNTEG0	Integrity routines for the DHCP HL7 package. They provide checksums for the DHCP HL7 routines.	V. 1.6
HLONI001, HLONI002, HLONI003, HLONI004, HLONI005, HLONI006, HLONI007, HLONI008, HLONI009, HLONI010, HLONI011, HLONIT, HLONIT1, HLONIT2, HLONIT3	Onit routines for DHCP HL7.	V. 1.6
HLOPT, HLOPT1	Driver for all edit, print, and purge options in the DHCP HL7 package.	V. 1.5
HLPOST, HLPOST16, HLPOSTQ	Post-init routines for DHCP HL7.	V. 1.6
HLPRE16	Pre-init routine for DHCP HL7.	V. 1.6
HLSERV	Receives incoming HL7 messages from non-DHCP applications through DHCP MailMan and sends back acknowledgment messages.	V. 1.5
HLTASK	Called to create a background task to start the HL7 Hybrid Lower Layer Protocol routine HLLP for a non-DHCP application ad purge HL7 transmissions.	Both
HLTF, HLTF0, HLTF1	Called by the HLLP, HLSERV, HLTRANS, and HLCHK routines to record various information in the HL7 MESSAGE TEXT file (#772) for incoming and outgoing HL7 messages.	Both: HLTF V. 1.6: HLTF0, HLTF1
HLTP, HLTP0, HLTP01, HLTP1, HLTP2, HLTPCK1, HLTPCK1A	Transaction Processor Module routines.	V. 1.6
HLTRANS	Called by DHCP applications to create messages to send to non-DHCP applications. It interfaces with DHCP MailMan and the HLLP routine to transmit HL7 messages that it creates. It also interfaces with the HLTF routine to record information in the HL7 MESSAGE TEXT file (#772).	V. 1.5
HLUOPT, HLUOPT1, HLUTIL1, HLUTIL2, HLUTIL3	HL7 utility routines.	V. 1.6

Callable Routines

The following is a list of supported entry points into routines belonging to the DHCP HL7 package. These entry points should be used by individual DHCP packages using the V. 1.6 interface method. For each entry point listed, the following information is provided:

- Entry point name and description
- Required/optional input parameters
- Output parameters, if applicable

CREATE^HLTF(HLMID,MTIEN,HLDT,HLDT1)

If a batch of HL7 messages (more than one) is to be created, the application processing routine should invoke this entry point to obtain a message ID for the message being sent, and to create an entry in the MESSAGE TEXT file (#772).

Required Input Parameters:	HLDT, HLDT1, HLMID, MTIEN (These parameters must be passed by reference.)
Output Parameters:	All of the above input variables are returned as output variables.

GENACK^HLMA1(HLEID,HLMTIENS,HLEIDS,HLARYTYP,HLFORMAT, HLRESLTA,HLMTIENA,HLP)

After the MSH segment is created, the application processing routine should invoke this entry point to send the acknowledgment message, then quit to pass control back to the DHCP HL7 package. If the call to GENACK is successful, the HLRESLTA parameter will be returned equal to the message ID assigned to the message that was created. If the call was not successful, the HLRESLTA parameter will be returned with the following three prices of data: message ID (or 0 if no message ID was assigned)^error code^error message.

Required Input Parameters:	HLEID, HLMTIENS, HLEIDS, HLARYTYP, HLFORMAT, HLRESLTA, HLMTIENA, HLP (HLRESLTA must be passed by reference.)
Optional Input Parameters:	HLMTIENA, HLP("PRIORITY"), HLP("SECURITY")
Output Parameters:	HLRESLTA

Callable Routines, cont.

GENERATE^HLMA(HLEID,HLARYTYP,HLFORMAT,HLRESLT,HLMTIEN,HLP)

When this entry point is invoked, it loads the data in the HLA("HLS") local array or the ^TMP("HLS") global array into the MESSAGE TEXT file (#772), and the entry in the MESSAGE TEXT file (#772) is completed. The message is then delivered to the subscribers to the event driver protocol specified in the PROTOCOL file (#101). If the call to GENERATE^HLMA is successful, the HLRESLT parameter will be returned equal to the message ID assigned to the message that was created. If the call was not successful, the HLRESLT parameter will be returned with the following three prices of data: message ID (or 0 if no message ID was assigned)^error code^error message.

Required Input Parameters:	HLEID, HLARAYTYP, HLFORMAT, HLRESLT (HLRESLT must be passed by reference.)
Optional Input Parameters:	HLMTIEN, HLP("PRIORITY"), HLP("SECURITY"), HLP("CONTPTR")
Output Parameters:	HLRESLT

INIT^HLFNC2(EID,HL,INT)

To transmit HL7 messages, the DHCP application must develop a M routine (or, optionally, an entry point in a routine) for each type of HL7 message it will be sending. (Please refer to Appendix B for a list of supported HL7 message types.) The M routine should invoke this subroutine entry point to initialize variables needed to build an HL7 message for transmission to the receiving application.

Input Parameters:	EID, HL (HL must be passed by reference.)
Optional Input Parameters	INT
Output Parameters:	HL("ACAT"), HL("APAT"), HL("CC"), HL("ECH"), HL("ETN"), HL("FS"), HL("MTN")HL("PID"), HL("Q"), HL("SAN"), HL("SAF"), HL("VER")

Callable Routines, cont.

MSH^HLFNC2(HL,MID,RESULT,SECURITY

This is a function call used to build MSH segments if a batch of HL7 messages (more than one) is being created. The message ID for each MSH segment should be created by concatenating together:

1. The message ID returned by the call to CREATE^HLTF
2. A hyphen
3. A sequential, whole number starting with 1 (e.g., 12345-1).

NOTE: If only one HL7 message is being created, the routine should not make the call to CREATE^HLTF or create the MSH segment. The DHCP HL7 package will create the MSH segment for you.

Required Input Parameters: HL, MID, RESULT

Optional Input Parameters: SECURITY

Output Parameter: RESULT

Files

File List with Descriptions

The following is a list of files associated with DHCP HL7 V. 1.6 and their descriptions. Per VHA Directive 10-93-142 regarding security of software, some of the DHCP HL7 Data Dictionaries are not to be modified. The file descriptions of these files are so noted.

File #	File Name	Description
101	PROTOCOL	A number of fields have been added to the PROTOCOL file (#101) to support messaging protocols for event drivers and event subscribers. The following two values were added to the TYPE field (#4) of the PROTOCOL file (#101): • E for Event Driver • S for Subscriber
770	HL7 NON-DHCP APPLICATION PARAMETER	This is the main file that sites must edit before they can begin receiving HL7 transmissions from another system using the V. 1.5 interface. It contains parameters associated with non-DHCP applications from which the DHCP system can accept HL7 transmissions. Use the Non-DHCP Application Parameter Enter/Edit [HL EDIT SITE PARAM] option on the V. 1.5 OPTIONS [HL MENU 1.5] menu to create/edit entries in this file. (Please refer to the DHCP HL7 V. 1.6 User Manual.)
771	HL7 APPLICATION PARAMETER (Former name: HL7 DHCP APPLICATION PARAMETER in V. 1.5)	This file contains a list of DHCP applications that are capable of sending/receiving HL7 transmissions for the V. 1.6 interface. It also contains application-specific parameters related to HL7 segments and messages used by each application. Before a site can receive HL7 transmissions, the application to which the HL7 transmissions are to be sent must be defined in this file by using the Interface Workbench [HL INTERFACE WORKBENCH] option on the V. 1.6 OPTIONS [HL MENU 1.6] menu. (Please refer to the DHCP HL7 V. 1.6 User Manual.) The application can be activated in either of the following ways: • Use the Activate/Inactivate action on the Currently Defined Applications screen of the Interface Workbench [HL INTERFACE WORKBENCH] option on the V. 1.6 OPTIONS [HL MENU 1.6] menu. • Use the Activate/Inactivate [HL EDIT APPL PARAM] option on the HL7 Main Menu (HL MAIN MENU).

File List with Descriptions, cont.

File #	File Name	Description
771.1*	HL7 FIELD	This file contains the definition of each standard field used by the system. The definitions in this file can be compiled into routines which can perform the basic checks of data received from, or sent to, another system.
771.2*	HL7 MESSAGE TYPE	This file contains a list of HL7 messages supported by the DHCP site.
771.3*	HL7 SEGMENT TYPE (Former name: HL7 SEGMENT NAME in V. 1.5)	This file contains a list of HL7 segments supported by the DHCP site.
771.4*	HL7 DATA TYPE	This file contains a list of HL7 data types and their corresponding processing rules.
771.5*	HL7 VERSION (Former name: HL7 VERSION SUPPORTED in V. 1.5)	This file contains a list of HL7 versions supported by the DHCP site.
771.6*	HL7 MESSAGE STATUS	This file is a table of statuses that are assigned to entries in the MESSAGE TEXT file (#772) by the Messaging System.
771.7*	HL7 ERROR MESSAGE	This file is a table of error codes and messages that can be assigned to entries in the MESSAGE TEXT file (#772) by the Messaging System.
771.8*	HL7 STANDARD	This file is a table of standard protocols supported by the Messaging System. *This file should not be modified locally.*
772	HL7 MESSAGE TEXT (Former name: HL7 TRANSMISSION in V. 1.5)	This file contains information related to the processing of all incoming and outgoing HL7 messages.
773	HL7 MESSAGE ADMINISTRATION	This file is used to create and maintain unique message IDs. It also contains a date/time when each ID was created.
779.001*	HL7 EVENT TYPE CODE	This file is a table of event codes that are used by the Messaging System. *This file should not be modified locally.*
779.002*	HL7 ACKNOWLEDGE-MENT CODE	This file is a table of codes used by the Messaging System when processing acknowledgment messages. *This file should not be modified locally.*
779.003*	HL7 ACCEPT/APPLICATION ACK CONDITION	This file is a table of codes used by the Messaging System when processing acknowledgment messages. *This file should not be modified locally.*
779.004*	COUNTRY CODE	This file is a table of country codes that are used by the Messaging System when building message header segments. *This file should not be modified locally.*
869.1	HL LOWER LEVEL PROTOCOL TYPE	This file contains the valid lower layer protocols for use with the HL7 package.

* File comes with data which will overwrite existing data.

File List with Descriptions, cont.

File #	File Name	Description
869.2	HL LOWER LEVEL PROTOCOL PARAMETER	This file contains the lower layer protocol parameters used by the HL7 package.
869.3	HL COMMUNICATION SERVER PARAMETERS	This is the parameter file used by the HL7 Communications Server.
870*	HL LOGICAL LINK	This file serves two purposes: 1. It is a FileMan-compatible transmission log. 2. The Lower Layer Protocols write and read directly from this file. (See routines HLCSDR1 and HLCSDR2.) This file stores parameters that govern the behavior of the Lower Layer Protocols. It also stores information that drives the Systems Link Monitor [HL MESSAGE MONITOR] display option on the Communications Server [HL COMMUNICATIONS SERVER] submenu of the V. 1.6 OPTIONS menu [HL MENU 1.6].

* File comes with data which will overwrite existing data.

File Flow Chart

FILE # AND NAME	POINTS TO		POINTED TO BY	
770	3.8	MAIL GROUP		
HL7 NON-DHCP	771	HL7 APPLICATION		
APPLICATION		PARAMETER		
PARAMETER	771.5	HL7 VERSION		
771	3.8	MAIL GROUP	101	PROTOCOL
HL7 APPLICATION	771.2	HL7 MESSAGE TYPE	770	HL7 NON-DHCP
PARAMETER	771.3	HL7 SEGMENT TYPE		APPLICATION
	779.004	COUNTRY CODE		PARAMETER
			771.1	HL7 FIELD
			772	HL7 MESSAGE TEXT
771.1	1	FILE		
HL7 FIELD	771	HL7 APPLICATION	771.1	HL7 FIELD
		PARAMETER		
	771.1	HL7 FIELD		
	771.3	HL7 SEGMENT TYPE		
	771.4	HL7 DATA TYPE		
	771.5	HL7 VERSION		
771.2	771.5	HL7 VERSION	101	PROTOCOL
HL7 MESSAGE TYPE			771	HL7 APPLICATION
				PARAMETER
771.3	771.5	HL7 VERSION	301.5	IVM PATIENT
HL7 SEGMENT NAME			771	HL7 APPLICATION
				PARAMETER
			771.1	HL7 FIELD
771.4	771.5	HL7 VERSION	771.1	HL7 FIELD
HL7 DATA TYPE				
771.5	771.8	HL7 STANDARD	101	PROTOCOL
HL7 VERSION			770	HL7 NON-DHCP
				APPLICATION
				PARAMETER
			771.1	HL7 FIELD
			771.2	HL7 MESSAGE TYPE
			771.3	HL7 SEGMENT TYPE
			771.4	HL7 DATA TYPE
			779.001	HL7 EVENT TYPE
				CODE
			779.002	HL7 ACKNOWLEDGE-
				MENT CODE
			779.003	HL7 ACCEPT/
				APPLICATION ACK
				CONDITION
			779.004	COUNTRY CODE

File Flow Chart, cont.

FILE # AND NAME	POINTS TO		POINTED TO BY	
771.6 **HL7 MESSAGE STATUS**			772	HL7 MESSAGE TEXT
771.7 **HL7 ERROR MESSAGE**			870	HL LOGICAL LINK
771.8 **HL7 STANDARD**			771.5	HL7 VERSION
772 **HL7 MESSAGE TEXT**	101 771 771.6 772 773 870	PROTOCOL HL7 APPLICATION PARAMETER HL7 MESSAGE STATUS HL7 MESSAGE TEXT HL7 MESSAGE ADMINISTRATION HL LOGICAL LINK	772	HL7 MESSAGE TEXT
773 **HL7 MESSAGE ADMINISTRATION**			772	HL7 MESSAGE TEXT
779.001 **HL7 EVENT TYPE CODE**	771.5	HL7 VERSION	101	PROTOCOL
779.002 **HL7 ACKNOWLEDGE-MENT CODE**	771.5	HL7 VERSION		
779.003 **HL7 ACCEPT/ APPLICATION ACK CONDITION**	771.5	HL7 VERSION	101	PROTOCOL
779.004 **COUNTRY CODE**	771.5	HL7 VERSION	771	HL7 APPLICATION PARAMETER
869.1 **HL LOWER LEVEL PROTOCOL TYPE**			869.2	HL LOWER LEVEL PROTOCOL PARAMETER
869.2 **HL LOWER LEVEL PROTOCOL PARAMETER**	3.5 3.8 869.1	DEVICE MAIL GROUP HL LOWER LEVEL PROTOCOL TYPE	870	HL LOGICAL LINK
870 **HL LOGICAL LINK**	771.7 869.2	HL7 ERROR MESSAGE HL LOWER LEVEL PROTOCOL PARAMETER	101 772	PROTOCOL HL7 MESSAGE TEXT

Globals

The globals ^HL, ^HLCS, and ^HLMA are the globals for DHCP HL7 V. 1.6. It is recommended that only ^HL and ^HLMA be journaled.

Global Growth

- The ^HL global will consume approximately 17K of disk space for static file entries, and about 1K of disk space for every 10 entries in the HL7 TRANSMISSION file (#772).
- The ^HLCS global will consume approximately 50K of disk space for every 100 messages (500 byte average length) in the HL LOGICAL LINK (#870) file.
- The ^HLMA global will consume approximately 400 bytes for every 10 entries in the HL7 MESSAGE ADMINISTRATION file (#773).

Cross-reference Descriptions

770 HL7 NON-DHCP APPLICATION PARAMETER

.01 NAME

770^B

Regular "B" cross-reference.

770^AC^MUMPS

This cross-reference is used in conjunction with the "AF" cross-reference on the FACILITY NAME field (#3) of the HL7 NON-DHCP APPLICATION PARAMETER file (#770) to validate the non-DHCP application name and non-DHCP facility name that are contained in the message header of each HL7 message that is received. This is a multi-key cross-reference which contains the name of the non-DHCP application in the first piece and the name of the non-DHCP facility in the second piece.

770^AD^MUMPS

This cross-reference is used in conjunction with the "AE" cross-reference on the DHCP STATION NUMBER field (#2) of the HL7 NON-DHCP APPLICATION PARAMETER file (#770) to validate the receiving DHCP facility for an HL7 message. This information is contained in the message header that is received with every HL7 message. This is a multi-key cross-reference that contains the name of the non-DHCP application in the first piece and the DHCP station number in the second piece.

Cross-reference Descriptions, cont.

770 HL7 NON-DHCP APPLICATION PARAMETER, cont.

2 DHCP STATION NUMBER

770^AE^MUMPS

This is the corresponding cross-reference to the “AD” cross-reference on the #.01 Field. See the description on the ”AD” cross-reference for further information.

770^AF^MUMPS

This is the corresponding cross-reference to the “AC” cross-reference on the #.01 Field. See the description for the “AC” cross-reference for further information.

6 HL7 DEVICE

770^AL^MUMPS

This cross-reference is used in conjunction with the “ALOG” cross-reference on the START/STOP TRANSMISSION LOG field (#50) of the HL7 NON-DHCP APPLICATION PARAMETER file (#770). When the value of Field #50 is set to Start Transmission Log and the HL7 DEVICE field (#6) in the HL7 NON-DHCP APPLICATION PARAMETER file (#770) is defined, the “ALOG” cross-reference is set. The “ALOG” cross-reference is used as a flag by the HL7 lower level protocol routine (HLLP) to determine when to start and stop logging information related to HL7 transmissions. The log can be turned on during initial testing of the HL7 link and anytime additional debugging is needed. The information captured by the log is stored in nodes descendant from the ^TMP("HL",ION) node, where ION is the name of the DHCP device that is specified as the HL7 device in Field #6 of the HL7 NON-DHCP APPLICATION PARAMETER file (#770).

8 DHCP APPLICATION

770^AG

Regular cross-reference for relating DHCP applications to non-DHCP applications.

50 START/STOP TRANSMISSION LOG

770^ALOG^MUMPS

This cross-reference is used in conjunction with the “AL” cross-reference on the HL7 DEVICE field (#6) of the HL7 NON-DHCP APPLICATION PARAMETER file (#770) to set/delete a flag for starting/stopping the logging of HL7 transmission information. See the description of the “AL” cross-reference for further information.

Cross-reference Descriptions, cont.

771 HL7 APPLICATION PARAMETER

.01 NAME

771^B

Regular “B” cross-reference.

771^AC^MUMPS

This cross-reference is used in conjunction with the “AF” cross-reference on the ACTIVE/INACTIVE field (#2) to determine whether a specific application is active.

2 ACTIVE/INACTIVE

771^AF^MUMPS

This cross-reference is used in conjunction with the “AC” cross-reference on the NAME field (#.01) to determine whether a specific DHCP application is active.

.05, .01 HL7 SEGMENT

771.05^B

Regular “B” cross-reference.

.06, .01 HL7 MESSAGE

771.06^B

Regular “B” cross-reference.

771.1 HL7 FIELD

.01 NAME

771.1^B

Regular “B” cross-reference.

2 SEGMENT

771.1^C

Regular cross-reference to look up entries by HL7 segment name.

Cross-reference Descriptions, cont.

771.1 HL7 FIELD, cont.

.13, .01 APPLICATION

771.113^B

Regular “B” cross-reference.

2, .01 VERSION

771.12^B

Regular “B” cross-reference.

771.2 HL7 MESSAGE TYPE

.01 ABBREVIATED NAME

771.2^B

Regular “B” cross-reference.

3, .01 VERSION

771.23^B

Regular “B” cross-reference.

771.3 HL7 SEGMENT TYPE

.01 ABBREVIATED NAME

771.3^B

Regular “B” cross-reference.

3, .01 VERSION

771.33^B

Regular “B” cross-reference.

Cross-reference Descriptions, cont.

771.4 HL7 DATA TYPE

.01 NAME

771.4^B

Regular “B” cross-reference.

3, .01 VERSION

771.43^B

Regular “B” cross-reference.

771.5 HL7 VERSION

.01 VERSION

771.5^B

Regular “B” cross-reference.

771.6 HL7 MESSAGE STATUS

.01 NAME

771.6^B

Regular “B” cross-reference.

771.7 HL7 ERROR MESSAGE

.01 SHORT TEXT

771.7^B

Regular “B” cross-reference.

771.8 HL7 STANDARD

.01 NAME

771.8^B

Regular “B” cross-reference.

Cross-reference Descriptions, cont.

772 HL7 MESSAGE TEXT

.01 DATE/TIME ENTERED

772^B

Regular “B” cross-reference.

3 CLIENT APPLICATION

772^AE^MUMPS

This cross-reference is used in conjunction with the “AC” cross-reference on the TRANSMISSION TYPE field (#4) and the “AD” cross-reference on the DATE/TIME PROCESSED field (#21) to determine outgoing transmissions for a specific application that need to be transmitted.

772^AG^MUMPS

This cross-reference is used in conjunction with the “AH” cross-reference on the MESSAGE ID field (#6) to look up and link initial HL7 messages with reply/acknowledgment messages.

772^AI^MUMPS

This cross-reference is used in conjunction with the “AJ” cross-reference on the ORIGINAL MESSAGE TEXT field (#8) to look up a subscriber entry based on the server entry to which it is linked.

4 TRANSMISSION TYPE

772^AC^MUMPS

This cross-reference is used in conjunction with the “AE” cross-reference on the CLIENT APPLICATION field (#3) and the “AD” cross-reference on the DATE/TIME PROCESSED field (#21) to determine outgoing transmissions for a specific application that need to be transmitted.

6 MESSAGE ID

772^C

This cross-reference is used in conjunction with the “AG” cross-reference on the NON-DHCP APPLICATION field (#3) to look up and link initial HL7 messages with reply/acknowledgment messages.

772^AH^MUMPS

This cross-reference is used in conjunction with the “AG” cross-reference on the NON-DHCP APPLICATION field (#3) to look up and link initial HL7 messages with reply/acknowledgment messages.

Cross-reference Descriptions, cont.

772 HL7 MESSAGE TEXT, cont.

8 PARENT MESSAGE

772^AJ^MUMPS

This cross-reference is used in conjunction with the "AI" cross-reference on the CLIENT APPLICATION field (#3) to look up a subscriber entry based on the server entry to which it is linked.

11 LOGICAL LINK

772^STATUS2^MUMPS

M-type cross-reference used by background job to dequeue messages for external systems.

20 STATUS

772^AF

This cross-reference is used to produce the Awaiting/Pending HL7 Transmissions and Failed HL7 Transmissions reports.

772^STATUS1^MUMPS

M-type cross-reference that background job $Os through to dequeue messages for external systems.

21 DATE/TIME PROCESSED

772^AD^MUMPS

This cross-reference is used in conjunction with the "AE" cross-reference on the CLIENT APPLICATION field (#3) and the "AC" cross-reference on the TRANSMISSION TYPE field (#4) to determine outgoing transmissions for a specific application that need to be transmitted.

773 HL7 MESSAGE ADMINISTRATION

.01 DATE/TIME ENTERED

773^B

Regular "B" cross-reference.

Cross-reference Descriptions, cont.

779.001 HL7 EVENT TYPE CODE

.01 CODE

779.001^B

Regular “B” cross-reference.

01, .01 VERSION

779.0101^B

Regular “B” cross-reference.

779.002 HL7 ACKNOWLEDGEMENT CODE

.01 CODE

779.002^B

Regular “B” cross-reference.

01, .01 VERSION

779.00201^B

Regular “B” cross-reference.

779.003 HL7 ACCEPT/APPLICATION ACK CONDITION

.01 CODE

779.003^B

Regular “B” cross-reference.

01, .01 VERSION

779.00301^B

Regular “B” cross-reference.

Cross-reference Descriptions, cont.

779.004 COUNTRY CODE

.01 CODE

779.004^B

Regular “B” cross-reference.

01, .01 VERSION

779.00401^B

Regular “B” cross-reference.

869.1 HL LOWER LEVEL PROTOCOL TYPE

.01 NAME

869.1^B

Regular “B” cross-reference.

869.2 HL LOWER LEVEL PROTOCOL PARAMETER

.01 NAME

869.2^B

Regular “B” cross-reference.

869.3 HL COMMUNICATION SERVER PARAMETERS

.01 ONE

869.3^B

Regular “B” cross-reference.

32, .01 INCOMING FILER TASK NUMBER

869.32^B

Regular “B” cross-reference.

Cross-reference Descriptions, cont.

869.3 HL COMMUNICATION SERVER PARAMETERS, cont.

33, .01 OUTGOING FILER TASK NUMBER

869.33^B

Regular “B” cross-reference.

870 HL LOGICAL LINK

.01 NODE

870^B

Regular “B” cross-reference.

2 LLP PARAMETERS

870^ALLP

This cross-reference is used to link the HL LOWER LEVEL PROTOCOL PARAMETER file (#869.2) with the HL LOGICAL LINK file (#870). Using this cross-reference, you can locate the parameter associated with this link.

019, .01 MESSAGE NUMBER

870.019^B

Regular “B” cross-reference.

.01, .01 MESSAGE NUMBER

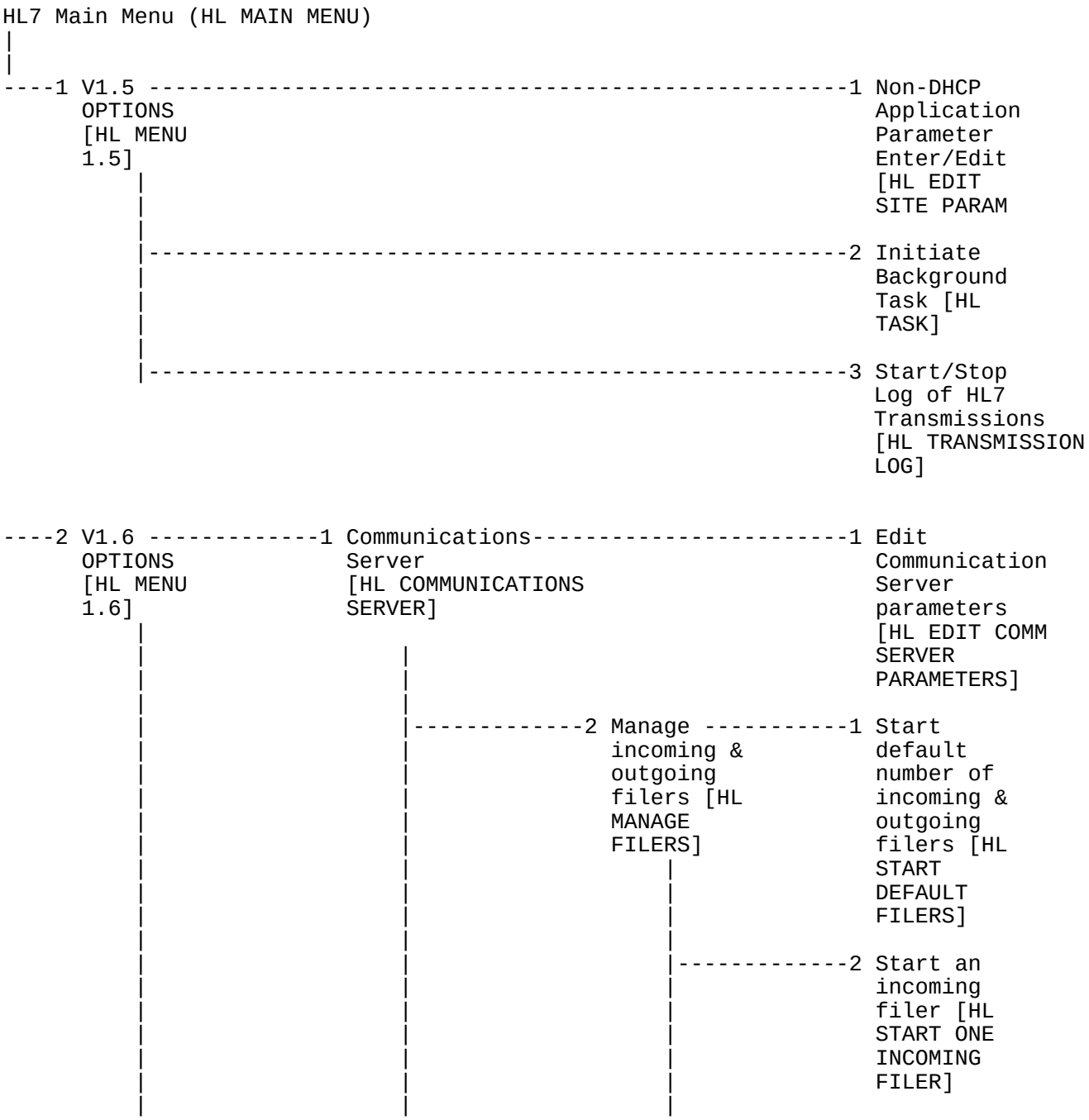
870.01^B

Regular “B” cross-reference.

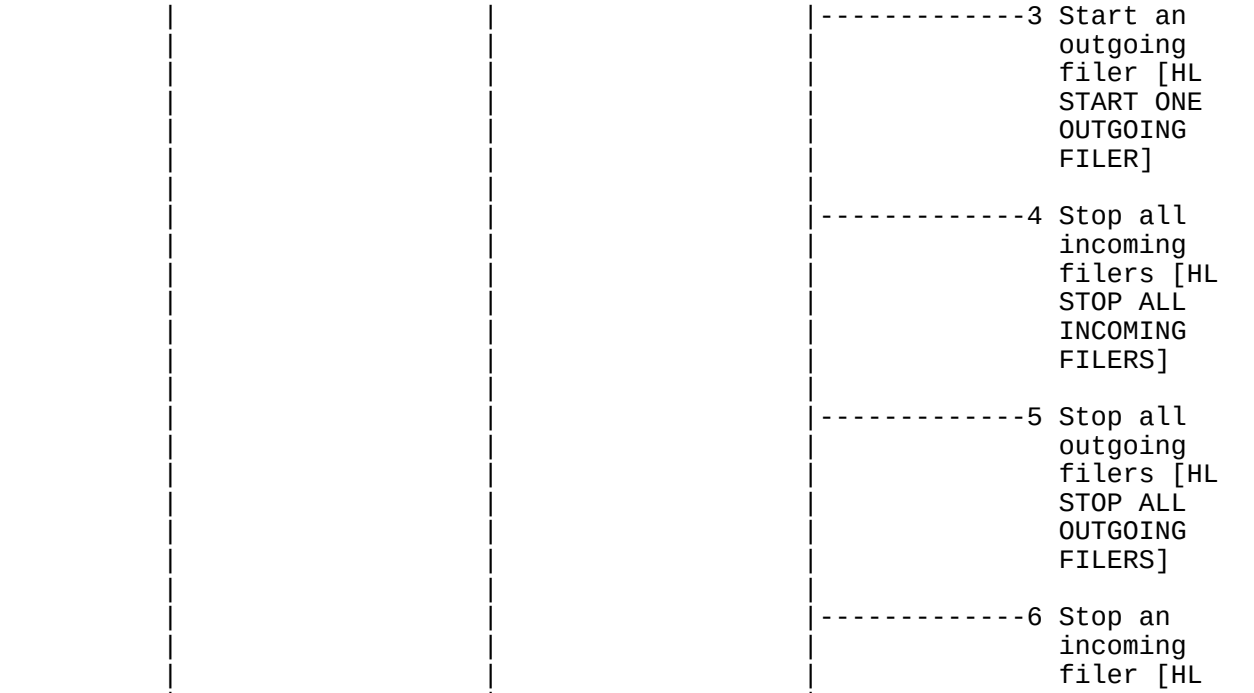
Exported Options

Menu Diagram

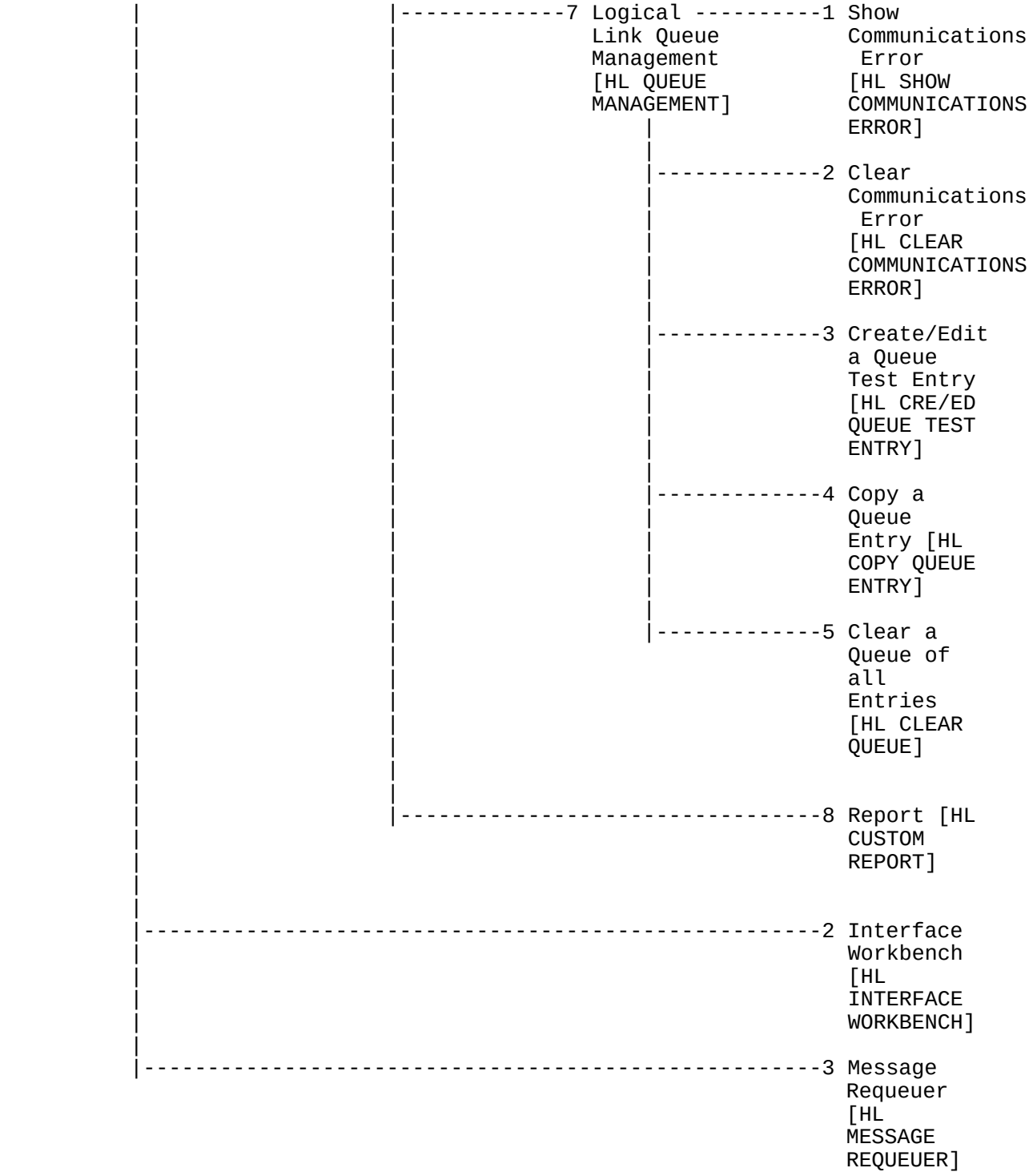
The following menu should be distributed to the appropriate IRM personnel. There are no locks or restrictions.



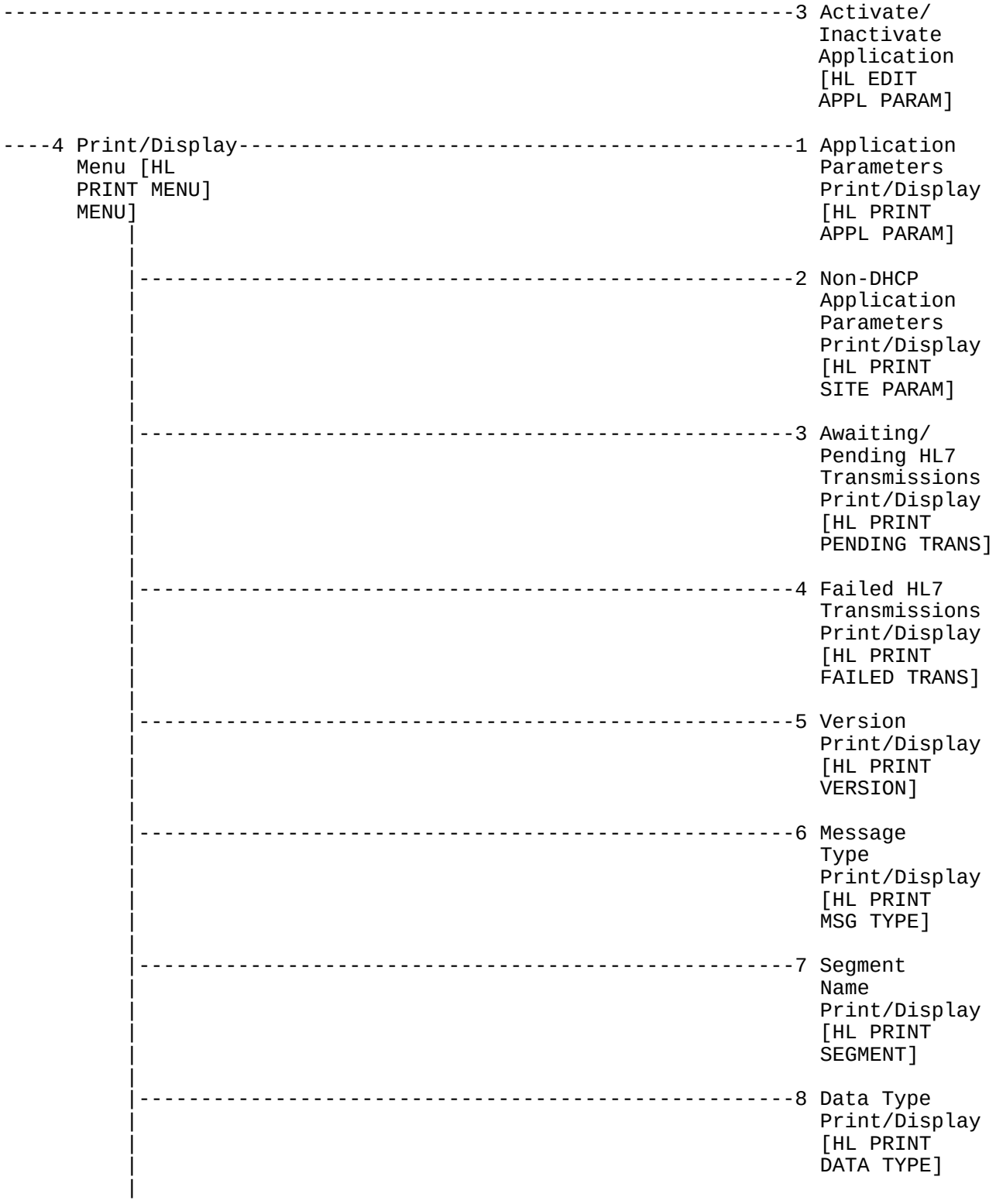
Menu Diagram, cont.



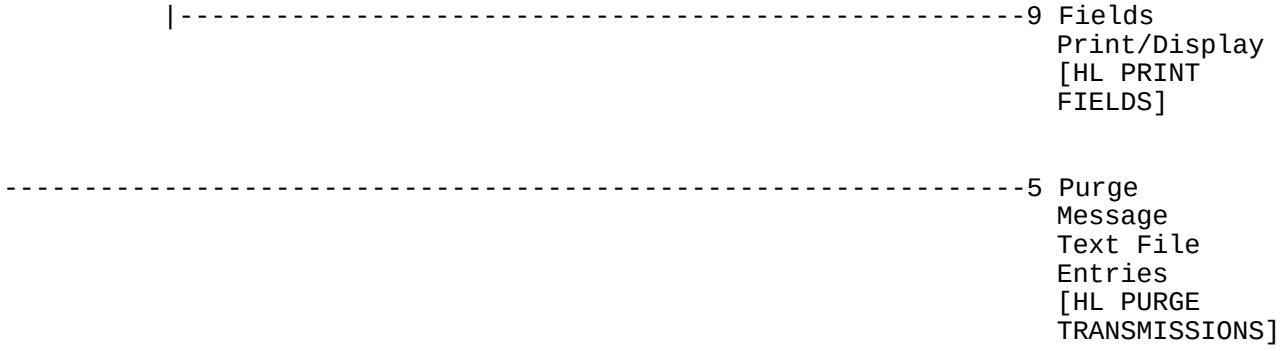
Menu Diagram, cont.



Menu Diagram, cont.



Menu Diagram, cont.



Archiving and Purging

Archiving

There is no archiving in the HL7 software package.

Purging

For purging, use the Purge HL7 MESSAGE TEXT File Entries [HL PURGE TRANSMISSIONS] option in the HL7 Main Menu (HL MAIN MENU), which purges entries from the HL7 MESSAGE TEXT file (#772). The purge will only delete entries that are at least seven days old.

The HL7 MESSAGE TEXT file (#772) contains a record of all outgoing HL7 transmissions and their statuses. The purge [HL PURGE TRANSMISSIONS] option purges all entries in the file that have been successfully transmitted and, optionally, those entries with a status of ERROR IN TRANSMISSION.

To purge entries with an error status, run the [HL PURGE TRANSMISSIONS] option directly from the menu, and answer YES at the "Purge entries that were not successfully transmitted?" prompt. *Entries with an error status should be reviewed before purging.*

It is recommended that this option be queued to run once a day as a background task in order to automatically purge entries that were successfully transmitted.

Example

```
Enter cutoff date for purge of HL7 MESSAGE TEXT file: T-13  (JAN 31, 1995)

Purge entries that were not successfully transmitted? NO// ??

Enter 'Yes' to purge entries whose status is 'error in transmission'.  If you
have reviewed/resolved the cause of the problem of those entries with an
'error' status answer 'Yes'.  Otherwise answer 'No'.

Purge entries that were not successfully transmitted? NO// Y  YES

Purge queued to run in background.
```

External Relations

Minimum Versions Required

The following minimum package versions are required in order to install this version of DHCP HL7:

- Kernel V. 7.1
- VA FileMan V. 21.0
- VA FileMan V. 7.1
- OE/RR V. 2.5

Database Integration Agreements (DBIAs)

DHCP HL7 V. 1.6 is the custodial package for the following integration agreements. To obtain more detailed information about these agreements, use the Integration Agreements Menu options in the DBA Menu on FORUM.

```
       940     NAME: DBIA940
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE: INCOME VERIFICATION          Albany
              USAGE: Private            APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION: Till Otherwise Agr  VERSION:
               FILE: 772                    ROOT: HL(772,
        DESCRIPTION:                        TYPE: File


       941     NAME: DBIA941
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE: INCOME VERIFICATION          Albany
              USAGE: Private            APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION: Till Otherwise Agr  VERSION:
               FILE: 771.3                  ROOT: HL(771.3,
        DESCRIPTION:                        TYPE: File


       942     NAME: DBIA942
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE: INCOME VERIFICATION          Albany
              USAGE: Private            APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION: Till Otherwise Agr  VERSION:
               FILE:                        ROOT:
        DESCRIPTION:                        TYPE: Other
```

Database Integration Agreements (DBIAs), cont.

```
      1169     NAME: DBIA1169-A
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE: MINIMAL PATIENT DA           Albany
              USAGE: Private            APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION: Till Otherwise Agr  VERSION:
               FILE: 771.5                  ROOT: HL(771.5,
        DESCRIPTION:                        TYPE: File


      1170     NAME: DBIA1169-B
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE: MINIMAL PATIENT DA           Albany
              USAGE: Private            APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION: Till Otherwise Agr  VERSION:
               FILE: 771.2                  ROOT: HL(771.2,
        DESCRIPTION:                        TYPE: File


     10106     NAME: HLFNC
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
              USAGE:  Supported         APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION:                     VERSION:
               FILE:                        ROOT:


     10107     NAME: HLFNC1
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
              USAGE: Supported          APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION:                     VERSION:
               FILE:                        ROOT:
        DESCRIPTION:                        TYPE: Routine


     10108     NAME: HLTF
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
              USAGE: Supported          APPROVED: APPROVED
             STATUS: Active              EXPIRES:
           DURATION:                     VERSION:
               FILE:                        ROOT:
        DESCRIPTION:                        TYPE: Routine
```

Database Integration Agreements (DBIAs), cont.

```
     10109     NAME: HLTRANS
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
             USAGE: Supported          APPROVED: APPROVED
            STATUS: Active              EXPIRES:
          DURATION:                     VERSION:
              FILE:                        ROOT:
       DESCRIPTION:                        TYPE: Routine


     10110     NAME: HL7 NON-DHCP APPLICATION PARAMETER
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
             USAGE: Supported          APPROVED: APPROVED
            STATUS: Active              EXPIRES:
          DURATION:                     VERSION:
              FILE: 770                    ROOT: HL(770,'B',
       DESCRIPTION:                        TYPE: File


     10136     NAME: HL7 DHCP APPLICATION PARAMETER
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
             USAGE: Supported          APPROVED: APPROVED
            STATUS: Active              EXPIRES:
         DURATION:
                                         VERSION:
              FILE: 771                    ROOT: HL(771,
       DESCRIPTION:                        TYPE: File


     10137     NAME: HL7 SEGMENT NAME FILE
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
             USAGE: Supported          APPROVED: APPROVED
            STATUS: Active              EXPIRES:
          DURATION:                     VERSION:
              FILE: 771.3                  ROOT: HL(771.3,
      DESCRIPTION:                        TYPE: File


     10138     NAME: HL7 TRANSMISSION FILE
  CUSTODIAL PACKAGE: HEALTH LEVEL SEVEN           Albany
SUBSCRIBING PACKAGE:
             USAGE: Supported          APPROVED: APPROVED
            STATUS: Active              EXPIRES:
          DURATION:                     VERSION:
              FILE: 772                    ROOT: HL(772,
       DESCRIPTION:                        TYPE: File
```

Internal Relations

All options of the HL7 Main Menu function independently provided the user has the appropriate VA FileMan access.

SACC Exemptions

```
1     DATE GRANTED:   DEC  7,1994
         Permanent exemption to use the following 1994 M standard language
         features:

            Set $Extract
            Merge
            Two Argument $Order (reverse $o)
```

Variables

Package-wide Variables

There are no package-wide variables associated with the DHCP HL7 software package.

Basic Variables

The following table provides a list of the basic variables, with their descriptions, that are used by the DHCP HL7 package for the V. 1.6 interface method. The variables are grouped into the following three categories:

- Variables created when an HL7 message is *received*
- Variables created when an HL7 message is being *sent*
- Variables created when HL7 messages are both *sent and received*

Variable Name	Description	When Created
EID	The IEN of the event driver protocol in the PROTOCOL file (#101) for the application that is sending this message.	Sent
HL	The array in which the output parameters will be returned. *This parameter must be passed by reference.*	Sent and Received
HL("ACAT")	The accept acknowledgment type from the PROTOCOL file (#101). (Optional)	Sent
HL("APAT")	The application acknowledgment condition of the sending application from the PROTOCOL file (#101). It is in the message header of the message received. This variable will be used by the receiving application to determine the type of acknowledgment, if any, that must be returned to the application that sent the message. (Optional)	Sent and Received
HL("CC")	The country code of the sending application from the HL7 APPLICATION PARAMETER file (#771). It is in the message header of the message received. (Optional)	Sent and Received
HL("DTM")	The date/time from the message header of the message received in HL7 format. (Optional)	Received

Basic Variables, cont.

Variable Name	Description	When Created
HL("DUZ")	If a valid DHCP access code is contained in the first component of the SECURITY field (#8) of the MSH segment, HLDUZ will equal the DUZ associated with this access code from the NEW PERSON file (#200) on DHCP. (Optional)	Received
HL("ECH")	The HL7 encoding characters (1 to 4 characters) to be used in extracting data from HL7 segments and fields. Each character must be unique and cannot match the HL7 field separator character. (See the variable HLFS for a definition of the field separator character.) The four encoding characters are the component separator, repetition separator, escape character, and sub-component separator, in that order. The default characters used by the DHCP HL7 package (when an application package does not define its own encoding characters) are ~|\&.	Sent and Received
HL("EID")	The IEN of the event driver protocol from the PROTOCOL file (#101) that generated the message.	Received
HL("EIDS")	The IEN of the subscriber protocol from the PROTOCOL file (#101) that is receiving the message.	Received
HL("ESIG")	This variable might not always exist. If a valid DHCP electronic signature code is contained in the third component of the SECURITY field (#8) of the MSH segment, HLESIG will equal the signature block printed name associated with this electronic signature code from the NEW PERSON file (#200) on DHCP.	Received
HL("ETN")	The 3 character event type name from the PROTOCOL file (#101) (e.g., A01 [Admit a Patient], O01 [Order Message], etc.).	Sent and Received
HL("FS")	The HL7 field separator character to be used in extracting fields of data from HL7 messages received, or building HL7 segments in messages sent. The field separator is only one character (e.g., ^).	Sent and Received
HL("MID")	The HL7 message control ID for the message received. A number that uniquely identifies the message.	Received
HL("MTN")	The three character message type name from the PROTOCOL file (#101) (e.g., ADT, QRY [Query], ORU [Observation Result Unsolicited], etc.).	Sent and Received

Basic Variables, cont.

Variable Name	Description	When Created
HL("PID")	The HL7 processing ID for the message received. (Normally, P for production, T for Training, D for Debug.)	Sent and Received
HL("Q")	Two quotation marks (""). This variable can be used to insert a null value in an HL7 field when building HL7 segments.	Sent and Received
HL("RAN")	The name of the receiving application from the HL7 APPLICATION PARAMETER file (#771) (e.g., Radiology).	Received
HL("SAF")	The name of the sending facility from the HL7 APPLICATION PARAMETER file (#771).	Sent
HL("SAN")	The name of the sending application (e.g., Radiology) from the HL7 APPLICATION PARAMETER file (#771) for the message received.	Sent and Received
HL("VER")	The version number of the HL7 protocol that was used to build the message being sent/received.	Sent and Received
HLA("HLA",I)	A local array consisting of HL7 segments that form an HL7 message where the variable I is a sequential, whole number starting with the number 1. This array is built by the DHCP application in order to send an HL7 message that is small enough to be built in the local partition space. Otherwise, the ^TMP("HLA") global array should be set.	Received
HLA("HLS",I)	A local array consisting of HL7 segments that form an HL7 message where the variable I is a sequential, whole number starting with the number 1. This array is built by the DHCP application in order to send an HL7 message that is small enough to be built in the local partition space. Otherwise, the ^TMP("HLS") global array defined below should be set.	Sent
HLARYTYP	This parameter specifies where the acknowledgment array is stored and whether it is a single message or batch acknowledgment. It must equal LM for Local/Single Message, LB for Local/Batch Message, GM for Global/Single Message or GB for Global/Batch Message.	Sent and Received
HLDT	The parameter in which the message date/time in internal VA FileMan format will be returned. *This parameter must be passed by reference.*	Sent and Received
HLDT1	The parameter in which the message date/time in HL7 format will be returned. *This parameter must be passed by reference.*	Sent and Received

Basic Variables, cont.

Variable Name	Description	When Created
HLEID	The IEN of the event driver protocol in the PROTOCOL file (#101). It is passed to the processing routine in the variable HL("EID").	Sent and Received
HLEIDS	The IEN of the subscriber protocol in the PROTOCOL file (#101). It is passed to the processing routine in the variable HL("EIDS").	Received
HLFORMAT	This parameter specifies whether the HLA array is pre-formatted in HL7 format. At this time, it should always equal 1.	Sent and Received
HLMID	The parameter in which the message ID will be returned. *This parameter must be passed by reference.*	Sent and Received
HLMTIEN	The parameter in which the IEN of the entry in the MESSAGE TEXT file (#772) created by the call to the entry point CREATE^HLTF.	Sent
HLMTIENA	The IEN of the entry in the MESSAGE TEXT file (#772) created by the call to the entry point CREATE^HLTF and returned in the MTIEN parameter.	Received
HLMTIENS	The IEN of the entry in the MESSAGE TEXT file (#772) for the subscriber application.	Received
HLNEXT	M code that is executed by the application to $O through the nodes of the Message Text global.	Received
HLNODE	A node from the Message Text global.	Received
HLP("CONTPTR")	The value that should go in the CONTINUATION POINTER field of the Message Header segment for the message being sent.	Sent
HLP("ERRTEXT")	If an error occurred during the processing of the incoming message, an error message (1 to 80 characters) should be passed in this parameter. (Optional)	Received
HLP("PRIORITY")	The default priority is delayed. Set this parameter equal to I for Immediate if this message should be delivered in the foreground (immediate).	Sent and Received
HLP("SECURITY")	Security information (1 - 40 characters) that the DHCP application wants included in the SECURITY field (#8) of the HL7 MSH or BHS segment when sending a message. (Optional)	Sent and Received
HLQUIT	A variable that indicates when there are no more nodes to process. If HLQUIT is not greater than zero, all message text has been processed.	Received

Basic Variables, cont.

Variable Name	Description	When Created
HLRESLT	The message ID assigned to this message and/or an error message will be returned in this parameter. This parameter must be passed by reference. If the call to GENERATE^HLMA is successful, this parameter will be returned equal to the message ID assigned to the message that was created. If the call was not successful, this parameter will be returned with the following three pieces of data: message ID (or 0 if no message ID was assigned)^error code^error message.	Sent
HLRESLTA	The message ID assigned to this message and/or an error will be returned in this parameter. This parameter must be passed by reference. If the call to GENACK is successful, this parameter will be returned equal to the message ID assigned to the message that was created. If the call was not successful, this parameter will be returned with the following three pieces of data: message ID (or 0 if no message ID was assigned)^error code^error message.	Received
INT	Indicates that only array values for an internal DHCP-to-DHCP message exchange should be utilized.	Sent
MID	The parameter in which the message ID will be returned.	Sent and Received
MTIEN	The parameter in which the IEN of the entry in the MESSAGE TEXT file (#772) (created by the call to the entry point CREATE^HLTF) will be returned. *This parameter must be passed by reference.*	Sent and Received
MTIENA	The IEN of the entry in the MESSAGE TEXT file (#772) created by the call to the entry point CREATE^HLTF and returned in the MTIEN parameter.	Received
PRIORITY	The default priority is delayed. Set this parameter equal to I for Immediate if this message should be delivered in the foreground (immediately). (Optional)	Sent and Received

Basic Variables, cont.

Variable Name	Description	When Created
RESULT	The message ID assigned to this message and/or an error message will be returned in this parameter. T*his parameter must be passed by reference.* If the call to MSH^HLFNC2 is successful, this parameter will be returned equal to the message ID assigned to the message that was created. If the call was not successful, this parameter will be returned with the following three pieces of data: message ID (or 0 if no message ID was assigned)^error code^error message.	Sent and Received
SECURITY	Security information (1 to 40 characters) that the DHCP application wants included in the SECURITY field (#8) of the HL7 MSH or BHS segment when sending a message. (Optional)	Sent and Received
^TMP("HLA",$J,I)	A global array containing all segments of the HL7 message that the receiving DHCP application wishes to send as a response. The variable I is a sequential, whole number starting with the number 1.	Received
^TMP("HLS",$J,I)	A global array containing all segments of the HL7 message that the receiving DHCP application wishes to send as a response. The variable I is a sequential, whole number starting with the number 1.	Sent

Arrays

The following table contains a list of arrays, with their descriptions, which are used by the DHCP HL7 V. 1.6 interface method.

Array Name	Description	When Created
^HL(772,HLDA,"IN",I,0)	A global array containing all segments of the HL7 message received. This is the data that the receiving DHCP application must process. HLDA is the variable as defined earlier in this section. The variable I is a sequential number starting with the number one.	Received
^TMP("HLS",$J,HLSDT,I)	A global array containing all segments of the HL7 message that the receiving DHCP application wishes to send. The HLSDT variable is as defined above. The variable I is a sequential number starting with the number one.	Sent

How to Generate Online Documentation

This section describes some of the various methods by which users can secure HL7 technical documentation. Online technical documentation pertaining to the HL7 software, in addition to that which is located in the help prompts and on the help screens which are found throughout the HL7 package, 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:" prompt can also provide users with valuable technical information. For example, a single question mark (?) lists all options which can be accessed from the current option. Entering two question marks (??) lists all options accessible from the current one, showing the formal name and lock for each. Three question marks (???) displays a brief description for each option in a menu while 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 which supply online technical information, please consult the DHCP Kernel Reference Manual.

%Index

This option analyzes the structure of a routine(s) to determine in part if the routine(s) adheres to DHCP Programming Standards. The %Index output might include the following components:

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

%Index, cont.

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

To run %Index for the HL7 package, specify the HL namespace at the "routine(s) ?>" prompt.

NOTE: HL7 initialization routines which reside in the UCI in which %Index is being run, compiled template routines, and local routines found within the HL namespace should be omitted at the "routine(s) ?>" prompt. To omit routines from selection, preface the namespace with a minus sign (-).

Inquire Option

This Menu Management option provides the following information about a specified 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 HL7 options, you must specify the HL namespace.

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 elect to specify a single option or range of options. For a list of HL7 options, please refer to the Exported Options section of this manual.

List File Attributes

This VA FileMan option allows 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(s):

- File name and description
- Identifiers
- Cross-references
- Files pointed to by the file specified
- Files which 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-reference(s)
- Input transform
- Date last edited
- Notes

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

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

For a comprehensive listing of HL7 files, please refer to the Files section of this manual.

Glossary

ACK	HL7 acknowledgment. This is a message transmitted back to the VAMC upon receipt of data at the EDR repository.
DHCP Application	A software package developed by the VA to support clinical or administrative functions at VA medical centers nationwide. It is written in M and, via Kernel, will run on all major M implementations, regardless of vendor.
HL7 Component	A field can contain multiple components separated by the HL7 component separator.
HL7 Field	A field is a specific unit of data. Each field is defined by the following set of characteristics: • Position in the Segment • Name • ID Number • Maximum Length • Optionality • Repetition • Table Assignment (optional) • Type
HL7 Hybrid Lower Layer Protocol	A communication protocol that supports Layers 1 through 4 of the OSI protocol.
HL7 Interface	The exchange of information between a DHCP application and the DHCP HL7 package.
HL7 Message	A message is the atomic unit for transferring data between systems. It is comprised of a group of HL7 segments in a defined sequence. Each message has a message type that defines its purpose. Each message is identified by a unique 3 character code.

HL7 Protocol	Health Level Seven. An application communications standard for text-type patient-specific data. Permits data exchange between diverse computer configurations with a variety of communications protocols. Communications take place by exchange of HL7 messages.
HL7 Segment	A segment is a logical grouping of one or more data fields separated by the HL7 field separator. Segments of a message might be optional or required. They might occur only once or might repeat multiple times. Each segment is identified by a unique 3 character code.
Lower Level Interface	Refers to Layers 1 through 4 of the Open Systems Interconnect (OSI) protocol for exchanging data between computer systems. Layers 1 through 4 ensure physical connectivity and error-free delivery of data between computer systems and are normally handled by a communication protocol independent of the HL7 protocol. In the DHCP HL7 package, the lower level interface is handled by either the DHCP MailMan package or the HL7 Hybrid Lower Layer Protocol.
Non-DHCP Application	A term used to refer to and distinguish between the two applications (the other is called the DHCP application) that will be exchanging data using the HL7 protocol.

Appendix A. Sample HL7 Interface Specification

HEALTH LEVEL 7
INTERFACE SPECIFICATIONS
ALBANY INFORMATION SYSTEMS CENTER
DEPARTMENT OF VETERANS AFFAIRS

DECENTRALIZED HOSPITAL COMPUTER PROGRAM
EXCHANGE OF RADIOLOGY HEALTHCARE INFORMATION

MARCH 1993

1. PURPOSE

This document specifies an interface to the DHCP Radiology package based upon the HL7 protocol. It is intended that this interface form the basis for the exchange of healthcare information between the DHCP Radiology package and all non-DHCP systems, especially those non-DHCP systems that generate radiology results information.

2. OVERVIEW

2.1 Statement of Intent

The Albany IRM Field Office (IRMFO) is developing and plans to implement a generic interface to the HL7 protocol for use by the DHCP Radiology package in communicating with non-DHCP systems for the purpose of exchanging healthcare information. This interface might eventually be used by all DHCP clinical packages to exchange healthcare information with non-DHCP systems. The interface will strictly adhere to the HL7 protocol and will avoid using "Z" type extensions to the protocol wherever possible.

2.2 Scope

This document describes messages that are exchanged between the DHCP Radiology package and a non-DHCP system for the purpose of exchanging information concerning radiology results, specifically reports and impressions.

3. GENERAL SPECIFICATIONS

3.1 Communication Protocol

The HL7 protocol defines only the seventh level of the Open System Interconnect (OSI) protocol. This is the application level. Levels one through six involve primarily communication protocols. The HL7 protocol provides some guidance in this area. The communication protocols that will be used for interfacing with the DHCP Radiology package will be based on the HL7 Hybrid Lower Level Protocol which is described in the HL7 Interface Standards document.

3.2 Application Processing Rules

The HL7 protocol itself describes the basic rules for application processing by the sending and receiving systems. Information contained in the protocol will not be repeated here, therefore anyone wishing to interface with the DHCP Radiology package should become familiar with the HL7 protocol version 2.1.

3.3 Messages

The following HL7 messages will be used to support the exchange of Radiology data:

ACK	General Acknowledgment
ORF	Observational Report Response
ORM	Order
ORR	Order Response Message
ORU	Observational Results Unsolicited
QRY	Query Message

3.4 Segments

The following HL7 segments will be used to support the exchange of Radiology data:

MSA	Message Acknowledgment
MSH	Message Header
OBR	Observational Request
OBX	Result
ORC	Common Order
PID	Patient Identification
QRD	Query Definition

3.5 Fields

The following HL7 fields will be used to support the exchange of Radiology data for each of the segments listed in paragraph 3.4:

SEGMENT	FIELD SEQUENCE NUMBER	FIELD ELEMENT NAME
MSA	1	Acknowledgment Code
	2	Message Control ID
	3	Text Message
MSH	1	Field Separator
	2	Encoding Characters
	3	Sending Application
	4	Sending Facility
	5	Receiving Application
	6	Receiving Facility
	7	Date/Time of Message
	8	Security
	9	Message Type
	10	Message Control ID
	11	Processing ID
	12	Version ID
OBR	4	Universal Service Ident.
	7	Observation Date/Time
	8	Observation End Date/Time
	9	Collection Volume
	14	Specimen Received Date/Time
	16	Ordering Provider
	18	Placers Field #1 (Ward/Clinic)
	20	Fillers Field #1 (Ward/Clinic)
	22	Results Rpt/Status Chng-Date/Time
OBX	2	Value Type
	3	Observation Identifier
	5	Observation Results
ORC	1	Order Control
	9	Date/Time of Transaction
	14	Call Back Phone Number
PID	3	Patient ID (Internal ID)
	5	Patient Name
	7	Date of Birth
	8	Sex
	19	SSN Number - Patient

3.5 Fields

SEGMENT	FIELD SEQUENCE NUMBER	FIELD ELEMENT NAME
QRD	1	Query Date/Time
	2	Query Format Code
	3	Query Priority
	4	Query ID
	7	Quantity Limited Request
	8	Who Subject Filter
	9	What Subject Filter
	10	What Department Data Code

4. TRANSACTION SPECIFICATIONS

4.1 General

The flow of transactions between the DHCP Radiology package and the non-DHCP system can occur in one of two ways.

A. DHCP will notify the non-DHCP system that an exam has been done and the non-DHCP system will notify the DHCP system of the results of the exam once the report has been entered.

B. The non-DHCP system will query the DHCP system for an exam list for a patient or for a specific exam and the DHCP system will respond with the appropriate exam information. The non-DHCP system will then send the results of the exam(s) to the DHCP system once the report has been entered.

4.2 Specific Transactions

A. Complete Exam Sent to Non-DHCP System

When an exam is completed on the DHCP system, an Order (ORM) message is sent to the non-DHCP system. The ORM message would consist of the following segments:

ORM	ORDER MESSAGE
MSH	Message Header
PID	Patient Identification
ORC	Common Order
OBR	Observational Request
OBX	Result

4.2 Specific Transactions

EXAMPLE:

```
---------------
MSH^~|\&^RADIOLOGY^608^RADIOLOGY^NON-DHCP^199104301000^^ORM^12345^P^2.1
PID^^^55555~5~M11^^HL7Patient~One~X^^19300101^M^^^^^^^^^^123456789
ORC^NW^^^^^^^^199104301000
OBR^^^^7089898.8453-1~040391-66~L^^^199104301200^""^""^^^^^""^^3232~
HL7Doctor~One^^MEDICINE^^^^199104301000
OBX^^CE^P~PROCEDURE~L^^100~CHEST PA & LAT~L
OBX^^TX^M~MODIFIERS~L^^RIGHT, PORTABLE
OBX^^TX^H~HISTORY~L^^None
OBX^^TX^A~ALLERGIES~L^^BEE STINGS
```

The non-DHCP system then sends a General Acknowledgment (ACK) message back to the DHCP system.

EXAMPLE:

```
---------------
MSH^~|\&^RADIOLOGY^NON-DHCP^RADIOLOGY^608^199104301001^^ORR^54322^P^2.1
MSA^AA^12345
```

B. Results of Exam sent to DHCP System

When the exam results corresponding to the order that was sent by the ORM message in paragraph A are ready, an Observational Results Unsolicited (ORU) message is sent to the DHCP system. The ORU would consist of the following segments:

ORU	OBSERVATIONAL RESULTS UNSOLICITED
MSH	Message Header
PID	Patient Identification
OBR	Observational Request
OBX	Result

EXAMPLE:

```
---------------
MSH^~|\&^RADIOLOGY^NON-DHCP^RADIOLOGY^608^199104301010^ACCESS CODE~~
SIGNATURE CODE^ORU^12346^P^2.1
PID^^^55555~5~M11^^HL7Patient~One~X^^19300101^M^^^^^^^^^^123456789
OBR^^^^7089898.8543-1~043091-66~L^^^199104301200^""^""^^^^^""^^3232~
HL7Doctor~One^^^^MEDICINE^^199104301010
OBX^^TX^I~IMPRESSION~L^^HEART NORMAL SIZE
OBX^^ST^D~DIAGNOSTIC CODE~L^^NORMAL
OBX^^TX^R~REPORT~L^^Heart appears to be of normal size.
OBX^^TX^R~REPORT~L^^No infiltrate or abnormal mass noted.
```

4.2 Specific Transactions

The DHCP system would then send back a General Acknowledgment (ACK) message.

EXAMPLE:

```
---------------
MSH^~|\&^RADIOLOGY^608^RADIOLOGY^NON-DHCP^199104301011^^ACK^54320^P^2.1
MSA^AA^12346
```

C. Query for a List of Exams for a Patient

An alternate method for a non-DHCP system to determine which exams have been completed for a patient is to send a Query Message (QRY) to the DHCP system. The QRY would consist of the following segments:

QRY QUERY MESSAGE

```
-----------------------------------------
MSH^~|\&^RADIOLOGY^NON-DHCP SITE^RADIOLOGY^608^199104301100^ACCESS
CODE~~SIGNATURE CODE^QRY^12347^P^2.1
QRD^199104301100^R^I^Q1^^^5~RD^55555^OTH^PATIENT
```

The DHCP system would respond to the query with a list of up to five exams for patient 55555 in record-oriented format. In the following example, only one complete exam existed for the patient.

EXAMPLE:

```
---------------
MSH^~|\&^RADIOLOGY^608^RADIOLOGY^NON-DHCP^199104301101^^ORF^54321^P^2.1
MSA^AA^12347
QRD^199104301101^R^I^Q1^^^1~RD^55555^OTH^PATIENT
PID^^^55555~5~M11^^HL7Patient~One~X^^19300101^M^^^^^^^^^^123456789
OBR^^^^7089898.8453-1~043091-66~L^^^199104301200^""^""^^^^^""^^3232~
HL7Doctor~One^^^^MEDICINE^^199104301200
OBX^^CE^P~PROCEDURE~L^^110~CHEST 1 VIEW~L
OBX^^TX^M~MODIFIERS~L^^RIGHT, PORTABLE
OBX^^TX^H~HISTORY~L^^A history is not available for this patient.
OBX^^TX^A~ALLERGIES~L^^BEE STINGS
```

This query can be used to request a list of exams or just the most recent exam. To request the most recent exam, Field #7 of the QRD segment would specify one record as the quantity (1~RD) in Field #7. To receive a list of exams, more than one record would be specified as in the example above. For either of these queries, the full SSN of the patient or the first letter of the last name and the last four digits of the SSN can be passed as the Who Subject Filter. Likewise, this query can be used to request a specific exam. To do so, Field #7 would specify one record (1~RD), Field #8 would specify the exam number (e.g., 042891-666) or case number (e.g., 666), and Field #10 would specify the word EXAM.

Appendix B. Supported HL7 Message Types

ABBREVIATED NAME:	ACK	FULL NAME:	General Acknowledgment
ABBREVIATED NAME:	ADT	FULL NAME:	ADT Message
ABBREVIATED NAME:	ARD	FULL NAME:	Ancillary Report (Display)
ABBREVIATED NAME:	BAR	FULL NAME:	Add/Change Billing Account
ABBREVIATED NAME:	DFT	FULL NAME:	Detail Financial Transaction
ABBREVIATED NAME:	DSR	FULL NAME:	Display Response
ABBREVIATED NAME:	MCF	FULL NAME:	Delayed Acknowledgment
ABBREVIATED NAME:	OCF	FULL NAME:	Order Confirmation
ABBREVIATED NAME:	ORF	FULL NAME:	Observational Result/Record Response
ABBREVIATED NAME:	ORM	FULL NAME:	Order
ABBREVIATED NAME:	ORR	FULL NAME:	Order Response Message
ABBREVIATED NAME:	ORU	FULL NAME:	Observational Results Unsolicited
ABBREVIATED NAME:	OSQ	FULL NAME:	Order Status Query
ABBREVIATED NAME:	QRY	FULL NAME:	Query
ABBREVIATED NAME:	UDM	FULL NAME:	Unsolicited Display

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