

The RamSoft HL7 Integration Philosophy

Dear Customer,

At RamSoft we are committed to playing our part in ensuring that America's health system runs efficiently and that the seamless communication of electronic healthcare information extends beyond technical, corporate and vendor boundaries.

That is why we take seriously to every aspect of HL7 conformance and have set very high standards when developing our PowerServer™ products to exchange, integrate, share, and retrieve patient data from 3rd party vendors. We have a proven track record in successfully integrating with many other practice management systems including, but not limited to:

- Eclipsys
- Intergy RIS by Sage
- MagView
- Meditech RIS
- MobileX DDS
- PowerScribe by Nuance
- RPMS by the US Department of Health and Human Services
- WebMD by Sage

It is important that our customers have the flexibility and freedom to select any vendor they choose and have the confidence that the implementation will comply with all HL7 application and messaging standards. Our process allows for very flexible HL7 integrations and is fully customizable to maximize interoperability between systems.

Furthermore, we at RamSoft will dedicate the time and resources needed to work with you to ensure an optimized and fully tested integration – satisfaction guaranteed.

Sincerely,
The RamSoft Team



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PowerServer

HL7 Conformance Statement

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1 Overview

The RamSoft HL7 service (**RHS**) facilitates communication between RamSoft PACS products and external systems (such as a RIS or HIS).

RHS conforms to the HL7 3.2.1 specification. The following message types are supported.

Event	Message type	Event type
Patient update	ADT	A08
Patient merge	ADT	A34
Patient merge	ADT	A39
Patient merge (Account number only)	ADT	A35
Patient delete	ADT	A23
Order update	ORM	O01
Observation update	ORU	R01

2 Communication

RHS communicates via TCP/IP. It can both send and receive messages.

2.1 General Message Format

2.1.1 Syntax

- All our HL7 messages begin with \x0B (ASCII 11) and terminate with \x1C (ASCII 28) and \x0D (ASCII 13).
- Each message segment ends with the carriage return character (\x0D, ASCII 13).
- Field sequences in the message segments are separated by "|" (\xC0, ASCII 124).
- Field sub-components are separated by "^" (\x5E, ASCII 94).
- Field sub-sub-components are separated by "&" (\x26, ASCII 38).
- Repeated fields are separated by "~" (\x7E, ASCII 126).

2.1.2 Message Header Requirements

The MSH segment of each message contains two identification fields.

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- *MSH-5.1* identifies the sending facility. If IssuerOfPatientID is missing from the PID field in the message, the value contained in this field is used.
- *MSH-10.1* contains the message ID. Message ID is used to match messages up with their ACK (acknowledgement) messages. This field is mandatory.

2.2 Send Schema

RHS can be configured to send messages in several ways:

- send to all stations
- send to internal stations only
- send to external stations only

External stations differ from their internal counterparts in that they need to be specifically authorized in the RHS configuration to have messages sent to them. Internal stations are broadcast to without such specification. These configuration details are usually handled during installation by RamSoft.

2.3 Deployment Diagram

The following deployment diagram describes a typical RHS setup in the field. The situation depicted in the diagram shows a very simple deployment case where 1 RIS is sending and receiving HL7 messages to and from the RHS. The HL7 service is normally on the same machine as the PACS server. Many installations also have the database on the same machine however in this diagram it resides on its own dedicated server. Obviously more complicated setups are supported, this one is provided for clarity.

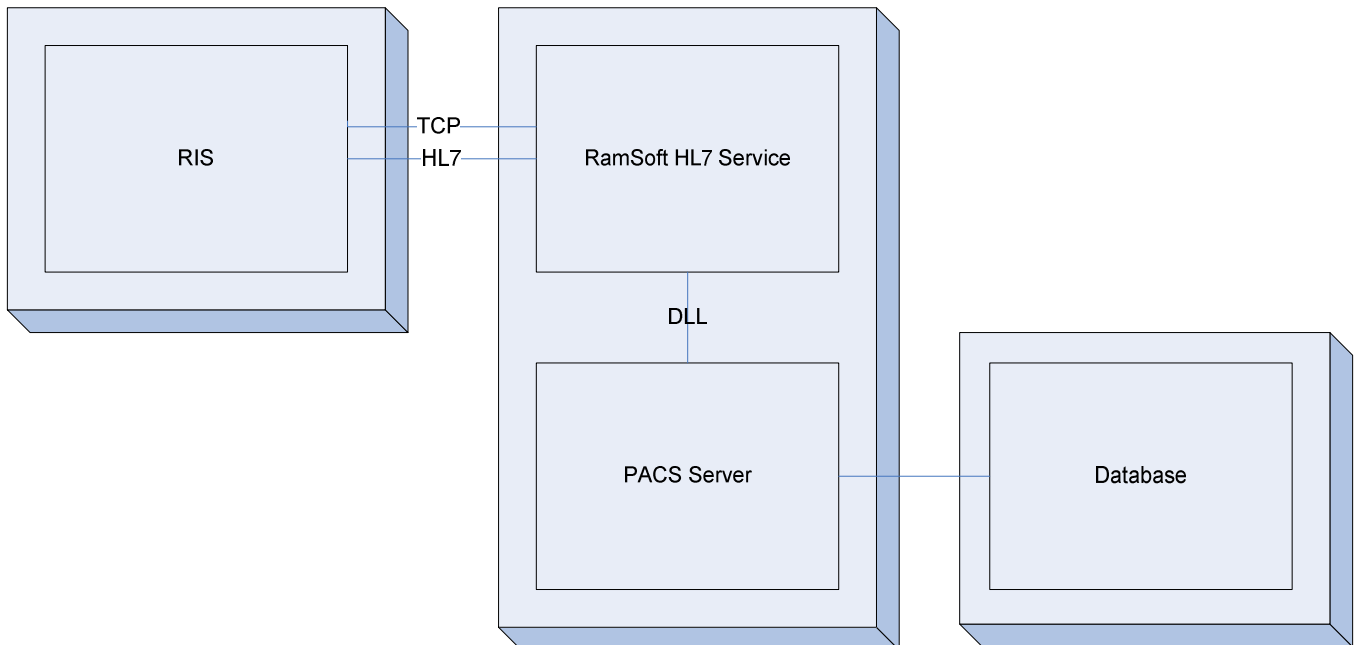


Figure 1: Typical Deployment

2.4 Message Queuing

RHS uses a set of message queues to manage message transmission. These queues allow the RHS to maintain a backlog of messages in the event that the receiving system is unavailable. When the receiving system comes back online, messages within the queue are still in the queue, waiting to be sent. This ensures that messages do not become lost in the event of network or other IT issues.

2.4.1 Message Queue Data Flow

The following is a data-flow diagram depicting the flow of data through our system. Below the diagram is a detailed explanation of what it means.

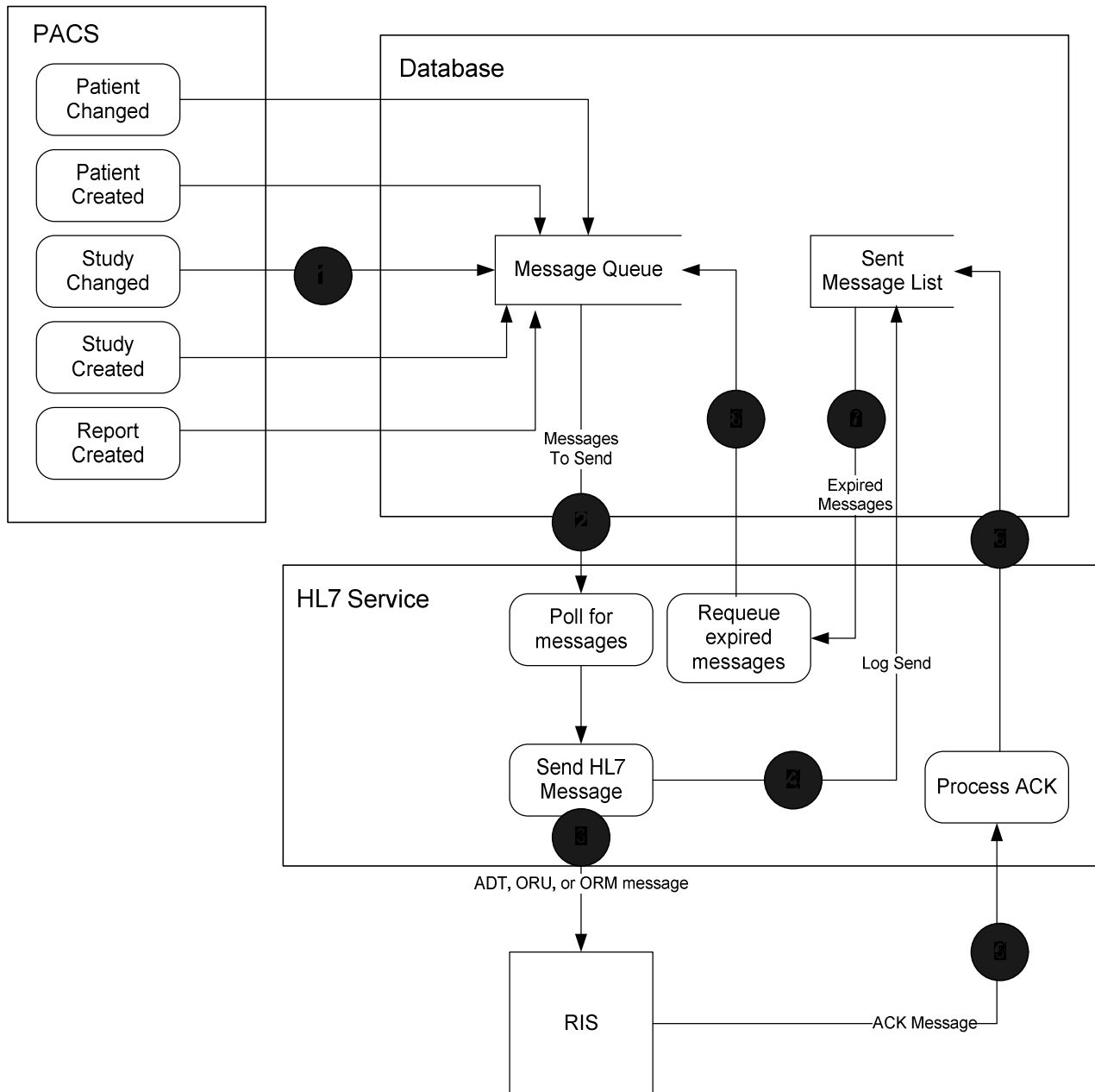


Figure 2: Data Flow Diagram

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1. Events are added to the message queue when they occur.
2. The HL7 service polls the Message Queue at a specified time interval (default: 5 seconds). It passes the list on to the "Send HL7 Message" process.
3. The message queue contents are processed, all data necessary to construct the queued messages is consolidated and HL7 messages are created for each queue entry. These messages are then dispatched to the receiving system.
4. All sent messages have their time of send and *MSA-2 Message Control ID* logged in a "Sent Message List".
5. If everything worked properly, the external system will send an ACK (acknowledgement) or a NACK (negative acknowledgement) HL7 message back to RHS for every message that was sent to it. These ACKs and NACKs should have the same *MSA-2 Message Control ID* as the messages they are replying to.
6. ACKs and NACKs are processed to gather the *MSA-2 Message Control ID* field's contents. This is used to delete any entries corresponding to that ID from the "Sent Message List".
7. The "Sent Message List" is periodically polled for any entries that have send times older than a specified timeout (default: 1 minute). These messages are typically those that have been sent, but for which no ACK was received.
8. The information in the expired message is used to construct a new message in the Message Queue. Next time (2) is run, this message will be picked up and undergo the whole send process again. Hopefully this time it will be received successfully.

3 Messages Definitions

3.1 Acknowledgement ACK

The ACK message is sent whenever another message has been successfully received and processed.

Segment Name	Segment Description
MSH	Message Header
MSA	Message Acknowledgement Segment

3.1.1 Sample Message

```
MSH|^~\&|||20051216152750+0000||ACK|101|||||||  
MSA|AA|101|Received ORMO01|||
```

3.2 Negative Acknowledgement NACK

The NACK message is sent whenever another message has been successfully received but unsuccessfully processed.

Segment Name	Segment Description
MSH	Message Header
MSA	Message Acknowledgement Segment

When RHS receives a NACK it does not try to resend the failed message.

3.2.1 Sample Message

```
MSH|^~\&||||20051216152707+0000||NACK|96||||||||
MSA|AR|96|ADTA39 Failed: No patient to merge to|
```

3.3 Patient Update ADT^A08

The Patient Update message is dispatched whenever a new patient is created or an existing patient's demographic info is changed.

Segment Name	Segment Description
MSH	Message Header
PID	Patient Identification

3.3.1 Sample Message:

```
MSH|^~\&||UNKNOWN||||ADT^A08|130||||||||
PID||17^^^^^UNKNOWN|17^^^^UNKNOWN||LASTNAME^MERGE^MIDDLENAME^L.L.B.^MR.||19330804000000+0000|M||ADDRESS^^CITY^S
T^45678-^US|US|456-789-1234|555-867-5309|||ACCOUNTNUMBER|555-55-5555|
```


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3.5.1 Sample Message

```
MSH|^~\&||UNKNOWN||||ADT^A23|157|||||||  
PID|64^^^^^UNKNOWN|64^^^UNKNOWN||MERGETEST|||||||
```

3.6 Order Update ORM^001

The order update message is used for scheduling and updating studies. RHS does not differentiate between order creation and order modification, so the same message is used to accomplish both tasks.

Segment Name	Segment Description
MSH	Message Header
PID	Patient Identification
[PV1]	Patient Visit Information
{	
ORC	Common Order Segment
[OBR]	Observation Request Segment
}	
[ZDS]	Study UID Information

An especially attentive reader may notice that the ZDS segment lies outside the repeatable segment group in this message. This infers that all data within the repeatable segment group must pertain to a single study. Because of this there will never be a need to send multiple order updates (ORC, OBR) in a single ORM^001 message although the capability is there for standards compliance purposes.

3.6.1 Sample Message

```
MSH|^~\&|UNKNOW|196|ORM^001|196|
PID||17^UNKNOW|17^UNKNOW|LASTNAME^MERGE^MIDDLENAME^L.L.B.^MR.||19330804000000+0000|M||ADDRESS^CITY^S
T^45678-^US|US|456-789-1234|555-867-5309||ACCOUNTNUMBER|555-55-5555|
PV1||O|18C^ROOM^PI^PATLOCATION^PLOCATION||^NICOARA^NICK^N^JR^DR|^SDSAD^DSASDA^SAD|
ORC|NW||1.2.124.113540.0.0.3.13|30||^NICOARA^NICK^N^PREFIX^JR|
OBR||13|PROCEDURECODE^STUDY
DESCRIPTION||20050708102208+0000||COMMENTS||L^BODYPART^BODYPART^L||13||CT||^20||SUSPECTED
DIAGNOSIS^SYMPTOMS^LL|&READPHY&READPHY&READPHY&B.A.SC.&MISS^READPHY^READPHY^READPHY^MISS^B.A.SC.||&FNAME&GNA
ME&MNAME&SUFFIX&PREFIX^FNAME^GNAME^MNAME^SUFFIX|ADMIN&ADMIN&ADMIN&M.D.&DR.^ADMIN^ADMIN^ADMIN^DR.^M.D.
||PROCEDURECODE^STUDY DESCRIPTION|
ZDS|1.2.124.113540.0.0.3.13|
```

3.7 Report Update ORU^R01

The report update message allows for the transmission of SR reports to and from the PACS. Reports can be sent with a status of "F" (Final) for a Verified report, and "P" (Preliminary) for an unverified report.

Segment Name	Segment Description
MSH	Message Header
PID	Patient Identification
[PV1]	Patient Visit Information
{	
[ORC]	Common Order Segment
OBR	Observation Request Segment
{[OBX]}	Observation Result
}	
[ZDS]	Study UID Information

Report text can be contained within a single OBX segment or multiple consecutive OBX segments. In the latter case each OBX segment corresponds to a single line of text in the report.

Although very unlikely, there is a valid use case for sending multiple reports in a single message. This is accomplished by sending a set of (ORC, OBR, OBX...) segments for each report. The end result is that all the reports are associated with the specified study. The same behaviour can be accomplished by sending multiple ORU messages for each of the reports individually. The latter is our preferred behaviour and the one we use when sending reports, although we maintain the multi-report per message functionality for compatibility purposes.

3.7.1 Sample Message

```
MSH|^~\&|UNKNOWN|ORU^R01|165|
PID||17^UNKNOW|17^UNKNOW|LASTNAME^MERGE^MIDDLENAME^L.L.B.^MR.||19330804000000+0000|M||ADDRESS^CITY^ST^45678-^US|US|456-789-1234|555-867-5309||ACCOUNTNUMBER|555-55-5555|
PV1||O|18C^ROOM^PI^PATLOCATION||^NICOARA^NICK^N^JR^DR|^SDSAD^DSASDA^SAD|
ORC|NW||1.2.124.113540.0.0.3.13|30|
OBR||13|PROCEDURECODE^STUDY
DESCRIPTION||20050708102208+0000||COMMENTS||L^BODYPART^BODYPART^L|^NICOARA^NICK^N^JR^PREFIX||13||CT||^
^20||SUSPECTED
DIAGNOSIS^SYMPTOMS^LL|&ADMIN&ADMIN&ADMIN&M.D.&DR.^ADMIN^ADMIN^ADMIN^DR.^M.D.||&FNAME&GNAME&MNAME&SUFFIX&PRE
FIX^FNAME^GNAME^MNAME^SUFFIX|&ADMIN&ADMIN&ADMIN&M.D.&DR.^ADMIN^ADMIN^ADMIN^DR.^M.D.||PROCEDURECODE^
^STUDY DESCRIPTION|
OBX||||This is a report.\E\nThis is the second line.\E\nE\nThis is the last line, preceded by an empty line.||||P||20051214170613-0500||
ZDS|1.2.124.113540.0.0.3.13|
```

4 Segment Definitions

The following section contains a detailed listing of all segment types used by the RHS for constructing HL7 messages. The sequence number is specified in the left most column and the subfield contents are enumerated in the right column. Some subfields contain even more subfields. In these cases the table cell is split into two columns, the left side indicating the subfield, the right indicating the sub-subfields. In HL7, sub-subfields are separated using & characters.

[subfield1^subsubfield1&subsubfield2&subsubfield3^subfield3]

An example of a segment sequence that contains 3 subfields with the second subfield containing 3 sub-subfields.

Some segment definitions contain a section called "Deprecated Sequences". Sequences denoted under that heading are there to provide backwards compatibility with older versions of our HL7 service. Their use should be avoided if at all possible. The values in a deprecated sequence are only used if the contents of the corresponding non-deprecated sequence are empty.

The OPT column dictates which fields are mandatory and which are optional. Mandatory fields are marked by an "R" for "Required" and non-mandatory ones are marked with "O" for "Optional". Mandatory fields are only required to be in a message IF the sequence they belong to is in the message.

4.1 MSH Segment

The MSH segment stores message control information. This includes the message type, a unique message identifier, etc.

SEQ	OPT	Description	Data Type	Sub Field and DICOM Element (if applicable)
1	R	Field Separators	ST	1 – Field Separators " "
2	O	Encoding Characters	ST	1 – Encoding Characters "^~\&"
4	O	Sending Facility	HD	1 – Facility Name
5	O	Receiving Application	HD	1 – Application Name
7	O	Timestamp	TS	7 – Time Stamp
9	R	Message Identifiers	MSG	1 – Message Type 2 – Trigger Event
10	R	Message Control ID	ST	1 – Message ID

The *MSH-4 field* is used when sending messages. It should contain the facility name from where the message is being sent. This field's value will be used as IssuerOfPatientID if no value for that field is supplied in *PID-3.4*, or *PID2.4*.

The *MSH-5 field* is used in ACK messages to specify the application that sent the message being acknowledged. RHS does not populate this field.

MSH-7 is filled out in ACK messages with the time of acknowledgment.

MSH-9 contains the message type (e.g.: ADT, ORM...) and trigger event (e.g. A08, O01). ACK messages do not have a trigger event.

MSH-10 stores a unique ID identifying a message. The uniqueness of this ID must last until an ACK has been received for the message containing it.

4.2 MSA Segment

The MSA segment is used to store ACK information. The MSA segment is only used in ACK and NACK messages.

SEQ	OPT	Description	Data Type	Sub Field and DICOM Element (if applicable)
1	R	Acknowledgement Code	ST	1 – Acknowledgment Code (AA or AR)
2	R	Message Control ID	ST	1 – Message Control ID
3	O	Description	ST	1 – Message Description

The *MSA-1 field* will contain either "AA" if the message containing it is an ACK or "AR" if the message is a NACK.

MSA-2 contains the *MSH-10* value (message ID) of the message which is being acknowledged.

4.3 PID Segment

The PID segment is used to communicate patient demographic information. It is present in all messages supported by the RHS.

SEQ	OPT	Description	Data Type	Sub Field and DICOM Element (if applicable)
3	R	Patient Identifier List	CX	1 – Patient ID (0010,0020) 4 – IssuerOfPatientID (0010,0021)
5	R	Patient Name	XPN	1 – Family Name (0010,0010) 2 – Given Name (0010,0010) 3 – Middle Name (0010,0010) 4 – Suffix (0010,0010) 5 – Prefix (0010,0010)
7	O	Date of Birth	TS	1 – Date of Birth (0010,0030)
8	O	Sex	IS	1 – Sex (0010,0040)
11	O	Address	XAD	1 – Street Address (0010,1040) 3 – City (0010,1040) 4 – State/Province (0010,1040) 5 – Zip/Postal Code (0010,1040) 6 – Country (0010,2150)
13	O	Home Phone	XTN	1 – Phone Number xxx-xxx-xxxx (0010,2154)
14	O	Business Phone	XTN	1 – Phone Number xxx-xxx-xxxx (0010,2154)
15	O	Language	CE	1 – Language (0010,0101)
16	O	Marital Status	CE	1 – Marital Status
18	O	Patient Account Number	CX	1 – Account Number (0010, 0050)
19	O	SSN	ST	1 – SSN (0010,1000)
Deprecated Sequences				
2	C	Patient ID	CX	1 - Patient ID (0010,0020) 4 – IssuerOfPatientID (0010,0021)
12	O	Country	IS	1 – Country Code (0010,2150)

Phone numbers should be sent in the form ddd-ddd-dddd, where d corresponds to a digit. If you plan on sending them in some other format be sure to let your RamSoft integration contact know. Different formats are available but need to be configured.

4.4 MRG Segment

The MRG segment is used to specify a patient that is to be merged into another. It only occurs in the ADT^A39 (Patient Merge) message in combination with a PID segment.

SEQ	OPT	Description	Data Type	Sub Field and DICOM Element (if applicable)
1	R	Prior Patient Identifier List	CX	1 – Patient ID (0010,0020) 4 – IssuerOfPatientID (0010,0021)

4.5 PV1 Segment

The PV1 segment communicates patient visit information, so it is not needed in any of the ADT messages which only deal with patient demographic info.

SEQ	OPT	Description	Data Type	Sub Field and DICOM Element (if applicable)	
2	O	Patient Class	IS	1 – Patient Class	
3	O	Patient Location	PL	1 – Room Code 2 – Room Description	
				4 Facility	1 – Facility Description 2 – Facility Code
				6 – Patient Location Code 9 – Patient Location Description (0038,0300)	
8	O	Referring Physician	XCN	1 – ID Number 2 – Family Name (0008,0090) 3 – Given Name (0008,0090) 4 – Middle Name (0008,0090) 5 – Suffix (0008,0090) 6 – Prefix (0008,0090)	
9	O	Consulting Doctors	XCN	1 – ID Number 2 – Family Name 3 – Given Name 4 – Middle Name 5 – Suffix 6 – Prefix	
Deprecated Sequences					
3	O	Facility Code	PL	3 – Facility Code	

PV1-9 can contain up to 3 consulting physicians:

|^Doctor1^Doctor1^Doctor1^Dr^MD~^Doctor1^Doctor1^Doctor1^Dr^MD|
A PV1-9 field specifying 2 consulting physicians.

4.6 ORC Segment

The ORC segment contains Order Control and status information.

SEQ	OPT	Description	Data Type
1	R	Order Control Code	1 – Order Control Code
5	R	Order Status	1 – Order Status
Deprecated Sequences			
4	O	Study UID	1 – Study Instance UID (0020,000D)
12	O	Referring Physician	1 – ID Number 2 – Family Name (0008,0090) 3 – Given Name (0008,0090) 4 – Middle Name (0008,0090) 5 – Suffix (0008,0090) 6 – Prefix (0008,0090)

ORC-1 is always set to XO. We accept any value for incoming messages but internally we always perform an order update. We provide this field for compatibility and for future functionality extensions.

4.7 OBR Segment

The OBR segment contains most of the data necessary to construct an order.

SEQ	OPT	Description	Data Type
7	R	Study Date Time	1 – Study Date Time <ul style="list-style-type: none"> • Date (0008,0020) • Time (0008,0030)
13	O	Comments	1 – Comments (0032,4000)
15	O	Body Part/Laterality	4 – Body Part (0018,0015) 5 – Laterality (0020,0060)
18	R	Accession Number	1 – Accession Number (0008,0050)
24	R	Modality	1 – Scheduled Modality (0008,0060)
27	O	Priority	6 – Priority (0040,1003) and (0040,1003)
31	O	Reason For Study	1 – Suspected Diagnosis 2 – Symptom 3 – Clinical Notes
32	O	Reading Physician	1 – Name 1 – ID Number 2 – Family Name (0008,1060) 3 – Given Name (0008,1060) 4 – Middle Name (0008,1060) 5 – Suffix (0008,1060) 6 – Prefix (0008,1060)
34	O	Technician	1 – Name 1 – ID Number 2 – Family Name (0008,1070) 3 – Given Name (0008,1070) 4 – Middle Name (0008,1070)

SEQ	OPT	Description	Data Type
			5 – Suffix (0008,1070) 6 – Prefix (0008,1070)
35	O	Transcriptionist	1 - Name 1 – ID Number 2 – Family Name (4008,010a) 3 – Given Name (4008,010a) 4 – Middle Name (4008,010a) 5 – Suffix (4008,010a) 6 – Prefix (4008,010a)
44	O	Procedure Code	1 – Procedure Code ID Sequence (0008,1032) > Code Value (0008,0100) 5 – Study Description (0008,1030)
Deprecated Sequences			
2	O	Accession Number	1 – Accession Number
4	O	Procedure Code	1 – Procedure Code 2 – Study Description
15	O	Body Part/Laterality	1 – Laterality 3 – Body Part
32	O	Reading Physician	1 – ID Number 2 – Family Name (0008,1060) 3 – Given Name (0008,1060) 4 – Middle Name (0008,1060) 5 – Suffix (0008,1060) 6 – Prefix (0008,1060)
34	O	Technologist	1 – ID Number 2 – Family Name (0008,1060) 3 – Given Name (0008,1060) 4 – Middle Name (0008,1060) 5 – Suffix (0008,1060) 6 – Prefix (0008,1060)
35	O	Transcriptionist	1 – ID Number 2 – Family Name (0008,1060) 3 – Given Name (0008,1060) 4 – Middle Name (0008,1060) 5 – Suffix (0008,1060) 6 – Prefix (0008,1060)

Fields **OBR-27.6** affects two DICOM fields: *Requested Procedure Priority (0040,1003)* and *Study Priority ID (0040,1003)*.

4.8 ZDS Segment

ZDS is a custom segment mandated by IHE to store the Study Instance UID being referred to in an order message. In a PACS/RIS setting messages sent from the RIS will typically not have a Study Instance UID. In these cases this segment should be omitted.

SEQ	OPT	Description	Data Type
1	R	Study Instance UID	1 – Study Instance UID (0020,000D) 3 – "Application" 4 – "DICOM"

Fields **ZDS-1.3 & ZDS1.4** are always assigned the string values "Application" and "DICOM" respectively.

4.9 OBX Segment

The OBX segment contains report data. This segment is normally used when transmitting an SR report created by a reading physician. Some systems like to use multiple consecutive OBX segments to represent a report with each segment corresponding to a line of text. Others just put all the text into a single segment and denote line breaks using a \E\n\E escape sequence. Either method is fine. We use the latter when sending messages.

SEQ	OPT	Description	Data Type
3	R	Observation ID	1 – Observation ID (0020,0014)
5	O	Observation Value	1 – Report Text (0040, a160)
11	O	Observation Result Status	1 – Result Status ("F" value assigned "VERIFIED" to (0040, a493))
14	O	Date/Time of Observation	1 – Date/Time of Observation (0008,002A)
16	O	Observer ID (PN)	1 – ID Number (0040, a088) Sequence > (0008, 0100) Code Value 2 – Family Name (0040, a075) 3 – Given Name (0040, a075) 4 – Middle Name (0040, a075) 5 – Suffix (0040, a075) 6 – Prefix (0040, a075)

Field **OBX-3** should be unique for every report contained in a study. It does not need to be globally unique. Typically the IDs are numbers 1..n where n is the number of reports contained within the study.

Field **OBX-11** specifies whether or not the report has been verified by a reading physician. Send "P" (short for Preliminary) if that is not the case, and "F" (short for Final) if it has been verified.

Field **OBX-16** should only be filled out for verified reports. Non-verified reports will simply discard the observer data.

5 Configuration

The RamSoft HL7 Service provides a number of configuration options. They can be accessed via the Settings->System Administration menu in PowerReader if you are an admin user.

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HL7 Delete Empty Cancelled Studies: When true, if the HL7 service receives a message telling it to set a study's status to CANCELLED, and the study in question has no objects then it will delete the study. If it has objects then it just sets the status to CANCELLED.

HL7 Delete Institution Name if Empty Received: If set to true this option will remove a previously assigned Institution Name value if the Institution Name field is empty in an inbound HL7 message. This option is rarely used and should only be enabled if a particular workflow requires this functionality.

HL7 Convert Word Reports to Text: If set to true this option will convert Microsoft Word documents to plain text for transmission in outbound ORU^R01 messages.

HL7 Delete PerTech if Empty Received: If set to false then if a blank performing technologist is received via HL7, and a study exists that has a performing technologist, then the study's tech will not be deleted. If set to true, then the study is updated to have no tech.

HL7 Delete ReadPhy if Empty Received: Same as above.

HL7 Delete Trans if Empty Received: Same as above.

HL7 Delete RefPhy if Empty Received: Same as above.

HL7 Log Messages: If set to true, then the text contents of every message received can be saved to log files.

HL7 Receive Log: Path and filename of the log file to save received messages to.

HL7 Send Log: Same as above, but for sent messages, and ACKs received.

HL7 Send ORU for verified reports only: If this entry is set to False, then we will send out two report creation messages for each study. One at the time of original report creation, and another at the time the report is verified. If it's set to true, only one message will go out. It will be sent at the time when the report is verified. Default value is False.

HL7 Merge Procedures Under The Same AccessionNumber: Only use this in special cases where you will be receiving multiple procedure orders for a single study. This typically happens when a site is organizing their procedures such that a procedure can encompass multiple imaging procedures from different modalities (say for example a certain type of mammogram required a CR and an MRI. Then the study would have one accession number, but an order for both a CR and an MRI.) One of our sites had a RIS that would send a single accession number for multiple procedures. When this feature is set to true, when new procedures are received for an existing accession number, rather than overwriting the procedure code and study description with whatever is received from the message, it appends it to the study description and procedure code, separated by some delimiter.

HL7 Merge Procedure Delimiter Char: If HL7 Merge Procedures Under The Same AccessionNumber is turned on, then this entry defines what character is used to delimit the study descriptions.

For example if this value is set to '/' and we received a message for acc # 12345, desc: XRAY BREAST, a study would be created in our database with those values. If later we received a message for acc# 12345, desc: MRI BREAST then:

- If HL7 Merge Procedures Under The Same AccessionNumber=False: Study 12345 would have a description of MRI BREAST.
- If HL7 Merge Procedures Under The Same AccessionNumber=True: Study 12345 would have a description of XRAY BREAST/MRI BREAST

Note: When the above entries are enabled, workflow considerations must be made to take into account that the PACS cannot automatically determine when the imaging procedure is done. Normally studies are advanced to completed status when images are received using station list settings. A composite study consisting of multiple procedures would not work for this. If the automatic status advance was enabled then the study would be advanced to COMPLETED and disappear from the modality worklist before the second procedure takes place. As a result, when HL7 Merge Procedures Under The Same AccessionNumber is enabled, the site technologists must *manually* advance study statuses to COMPLETED when they finish all the necessary procedures.

6 Normative References

- Health Level Seven, Version 2.3.1, 1999.
- Integrating the Healthcare Enterprise (IHE) Volumes 1 & 2 Rev. 6, 2005.
- NEMA Digital Imaging and Communications in Medicine (DICOM), Version3 Volumes 1 – 17, 2004.