RADIOLOGY / NUCLEAR MEDICINE V. 5
HL7 MANUAL

July 2000

Department of Veterans Affairs
VISTA Technical Services
Introduction

The Radiology/Nuclear Medicine package is a comprehensive software package designed to assist with the functions related to processing patients for imaging examinations.

The package automates a range of Radiology/Nuclear Medicine functions, including order entry of requests for exams by clinical staff, registration of patients for exams, processing of exams, recording reports/results, and verification of reports.

It is necessary for the package to interface with and through the Health Level Seven package for the exchange of this exam and report information.

HL7 (Health Level Seven) is an ANSI messaging transaction standard for healthcare. It is the main strategy used in a variety of healthcare providers and applications vendors to achieve Enterprise Application Integration (EAI) between disparate clinical applications.

Because many vendors support the HL7 standard, it allows Radiology/Nuclear Medicine to exchange key datasets with other VISTA and Commercial Off-The-Shelf (COTS) products.

The Radiology/Nuclear Medicine package, in conjunction with the HL7 package, allows outside sources (both COTS products and other VISTA applications) to query data. Typically, querying for unreported imaging exams, and displaying them to interpreting radiologists for selection. Radiology/Nuclear Medicine also permits report transmission. That is, reports can be transmitted to Radiology/Nuclear Medicine from an outside source and filed as if entered in the Radiology/Nuclear Medicine package.

Radiology/Nuclear Medicine also has the ability to broadcast messages to outside sources. These messages are typically consumed by vendor PACS Systems, VISTA Imaging/Multimedia System, and Voice-Recognition Reporting Systems. Currently Radiology/Nuclear Medicine has the ability to broadcast messages when exams are registered, examined (i.e. when images have been collected), cancelled or reported.

The following sections describe the information that can be manipulated with the Radiology/Nuclear Medicine and HL7 software. It also describes how to set up an HL7 interface to/from Radiology (both TCP/IP and non-TCP) and later describes how to implement/maintain any of the three Voice Reporting System interfaces (MedSpeak, PowerScribe and TalkStation) which have been developed, and are supported by, the Radiology/Nuclear Medicine developers.
Radiology/Nuclear Medicine HL7 Interface Specifications

This section describes interfaces to the Radiology/Nuclear Medicine package based upon HL7 messaging standards. The HL7 messages form the basis for the exchange of health care information between the VISTA Radiology/Nuclear Medicine package and all non-VISTA systems that generate Radiology/Nuclear Medicine results information in the form of reports and impressions, or require data about Radiology/Nuclear Medicine exam registration, exam completion, cancellation, and results reports.

HL7 Messages, Segments, and Fields Used To Exchange Data

The following HL7 messages are used to support the exchange of Radiology/Nuclear Medicine data:

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

The following HL7 segments are used to support the exchange of Radiology/Nuclear Medicine data:

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

The following HL7 fields may be used to support the exchange of Radiology/Nuclear Medicine data for each of the segments listed above. (Not all fields are used in all messages; see indications on the table below and examples that follow.)

Key for field usage:
Vn = Vendor-initiated message, where n can be one or more of the following:
1 - vendor's (or other application's) SSN query
2 - VISTA Rad/Nuc Med Response to SSN query
3 - vendor's (or other application's) Case Number query
4 - VISTA Rad/Nuc Med Response to Case Number query
5 - vendor's (or other application's) findings report
6 - VISTA Rad/Nuc Med Response to findings report (acknowledgment)
Rn = Message initiated ('broadcast') by VISTA Radiology/Nuclear Medicine, where n can be one or more of the following:
1 - VISTA Rad/Nuc Med Exam Registration message
2 - VISTA Rad/Nuc Med Exam Cancellation/Deletion message
3 - VISTA Rad/Nuc Med Examined/Images collected message
4 - VISTA Rad/Nuc Med Report Released or Verified message

<table>
<thead>
<tr>
<th>Segment</th>
<th>Field Seq #</th>
<th>Field Element Name and Values</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSA</td>
<td>1</td>
<td>Acknowledgment Code (AA=Accepted, AE=Error, &amp; AR=Rejection)</td>
<td>V246</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Message Control ID</td>
<td>V246</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Text Message (contains the reason a query or findings report was invalid)</td>
<td>V6</td>
</tr>
<tr>
<td>MSH</td>
<td>1</td>
<td>Field Separator (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Encoding Characters (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Sending Application (determined by VISTA HL7 package set-up or vendor)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Sending Facility (determined by VISTA HL7 package set-up or vendor)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Receiving Application (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Receiving Facility (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Date/Time of Message</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Security (applicable only to messages incoming to VISTA)</td>
<td>V135</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Message Type and Event Code</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Message Control ID (determined by VISTA HL7 package or vendor)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Processing ID (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Version ID (determined by VISTA HL7 package set-up)</td>
<td>V123456 R1234</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Country Code (HL7 pkg sends contents of Country Code field on the related entry in file 771)</td>
<td>R1234</td>
</tr>
<tr>
<td>Segment</td>
<td>Field Seq #</td>
<td>Field Element Name and Values</td>
<td>Where Used</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>OBR</td>
<td>3</td>
<td>Filers Order # (Exam &amp; Case IDs)</td>
<td>R1234</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Universal Service ID (V-Exam &amp; Case IDs)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R-CPT code<del>CPT standard procedure name</del>CPT4<del>Rad/Nuc Med internal ID</del>Rad/Nuc Med procedure name~99RAP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Observation Date/Time (Exam date/time)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Received Date/Time (Date rpt entered)</td>
<td>R4</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Ordering Provider (Requesting Phys. VISTA Internal ID~phys. name)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>Placers Field #1 (Patient loc ward/clinic)</td>
<td>R1234</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Fillers Field #1 (V-Patient loc Ward/Clinic, or R-Imaging Location internal ID and name, Station number and name)</td>
<td>V245 R123</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Fillers Field #2 (Imaging Type of exam - Abbreviated Code and Name)</td>
<td>R123</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>Results Rpt/Status Change Date Time (R123-date/time of exam R4-if report is verified, date/time report was verified, otherwise date/time of this transaction)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Report Status (F=final, R=preliminary, A=addendum)</td>
<td>R4</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>Urgency (S=stat, A=urgent, R=routine)</td>
<td>R123</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>R4-Verifying Physician ID and Name V5-(optional) Primary Interpreting Staff</td>
<td>R4, V5</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>R4-Primary Staff or Resident Physician ID and Name V5-(optional) Primary Interpreting Resident</td>
<td>R4, V5</td>
</tr>
</tbody>
</table>

**Note:**
OBR and OBX (for procedure only) segments will repeat in pairs for print sets (i.e. single report entered for multiple cases).

**Note:**
Note: OBR-3 and OBR-4-V format: ex: 7089898.8453-1~043091-66~L VA exam dt/time internal record number-VA case internal record number-external VA exam dt/time-external VA case number~L.

<p>| OBX     | 2           | Value Type (CE=procedure follows, TX=modifier, clinical history or results text follows, ST=diagnostic code follows) | V245 R1234 |</p>
<table>
<thead>
<tr>
<th>Segment</th>
<th>Field Seq #</th>
<th>Field Element Name and Values</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Observation Identifier</td>
<td>(D<del>DIAGNOSTIC CODE</del>L=diag. code, I<del>IMPRESSION</del>L=impression text, P<del>PROCEDURE</del>L=procedure, M<del>MODIFIER</del>L=modifier, C4<del>CPT MODIFIERS</del>C4=CPT modifier, H<del>HISTORY</del>L=clinical history text, R<del>REPORT</del>L=report text, A<del>ALLERGIES</del>L=allergies)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>V245: Diagnostic code must be from a predefined set contained in VISTA Rad/Nuc Med file #78.3. R1234: If multiple diagnostic codes exist, the primary diagnosis will occur first.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Observation Results</td>
<td></td>
<td>V245 R1234</td>
</tr>
<tr>
<td>11</td>
<td>Observation Result Status</td>
<td>(F=report verified P=Preliminary results released/not verified, C=amended report verified &quot;&quot;=status does not apply)</td>
<td>V2 R1234</td>
</tr>
<tr>
<td>ORC 1</td>
<td>Order Control</td>
<td>(NW=new registration, CA=canceled or deleted exam XO=examined/images captured)</td>
<td>R123</td>
</tr>
<tr>
<td>5</td>
<td>Order Status</td>
<td>(IP=registered, CA=canceled or deleted CM=examined/images captured)</td>
<td>R123</td>
</tr>
<tr>
<td>8</td>
<td>Parent - First component only will be present only if the procedure is part of an exam set (ordered under one procedure name) or printset (ordered under one procedure name and only one report message will be generated since a single report covers entire set of procedures). Format: EXAMSET: parent_procedure_name or PRINTSET: parent_procedure_name</td>
<td>R123</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Under rare circumstances, the parent procedure order will have been purged at the time the message is created. If this is true, the parent_procedure_name will be replaced by the text &quot;ORIGINAL ORDER PURGED&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Date/Time of Transaction (date/time of registration, cancel, or image collection)</td>
<td></td>
<td>R123</td>
</tr>
<tr>
<td>Segment</td>
<td>Field Seq #</td>
<td>Field Element Name and Values</td>
<td>Where Used</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>PID</td>
<td>2</td>
<td>Patient ID (External format, may differ from SSN in some cases. Ex: pseudo-SSN, DOD sharing patient)</td>
<td>R1234</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Patient ID and checksum (3-parts: VISTA internal record number, check digit, check digit scheme)</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Patient Name</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Date of Birth</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Sex</td>
<td>V245 R1234</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>Patient SSN</td>
<td>V245 R1234</td>
</tr>
</tbody>
</table>

**Note:**
Entire PID, OBR, OBX repeat as triples if multiple case data is retrieved for a query based on patient ID rather than case number.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Field Seq #</th>
<th>Field Element Name and Values</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>QRD</td>
<td>1</td>
<td>Query Date/Time</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Query Format Code (R=response in record format)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Query Priority (I=immediate)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Query ID</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Quantity Limited Request (2-parts: maximum number of records to return, RD code indicates records)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Who Subject Filter (V12-long or short case number, V34-patient’s 9-digit ssn or, first letter of last name followed by last 4 digits of ssn or, 9-digit ssn followed by one alpha character to denote pseudo-ssn)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>What Subject Filter (OTH=other)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>What Department Data Code (V12-EXAM, V34-PATIENT)</td>
<td>V1234</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>What Data Code Value Qual. (S)</td>
<td>V1234</td>
</tr>
</tbody>
</table>

If there is a need to uniquely identify a case across facilities, a combination of several fields would be needed: PID-2, PID-7, OBR-3, and the VA station number in the MSH segment. The Health Level Seven software can be configured so that the station number is placed in the MSH segment. See VISTA Health Level Seven documentation for more information.
Discussion of Vendor-Initiated Messages

For vendor-initiated messages, another application (typically a vendor-supplied voice recognition system) may query (QRY) the Radiology/Nuclear Medicine package for an exam list either for a patient or for a specific exam. The Radiology/Nuclear Medicine application will respond (ORF) with the clinical history, allergy, modifier, and procedure information for the unique case selected, or, with up to the maximum requested active, unreported cases if the query was on a patient rather than a specific case.

Once the case to be reported is identified, the vendor system or other application sends the report (ORU) results for a selected exam back to the Radiology/Nuclear Medicine package. The report will be acknowledged (ACK) either positively or negatively with an error message. If the case selected is one of a "printset" (e.g. same report should apply to multiple cases) the Radiology/Nuclear Medicine software will detect this when the report message is received and will use the report for all cases in the set.

Sample Clinical Scenario for Vendor-Initiated Messaging

A patient is registered within the VISTA Rad/Nuc Med system for an exam. The imaging exam is performed and the images for the case are given to a radiologist or nuclear medicine physician. The interpreting physician uses vendor equipment to enter either the specific case number or the patient ID to retrieve related VISTA data on this case or on all active cases for the patient. This triggers the vendor software to create and send a Query (QRY) message, and VISTA Rad/Nuc Med responds with an Observation Report Response (ORF) containing the requested data. The physician uses the vendor equipment to enter findings in a report and performs whatever action is necessary to trigger the vendor software to create and send to VISTA an HL7 ORU message containing the report. VISTA accepts and files the report and sends a positive acknowledgment (ACK) message, or rejects the report and sends an HL7 response (ACK) indicating why it was rejected.

Messaging Specifics for Vendor-Initiated Messages

When an outside application sends a Query (QRY) message to the Radiology/Nuclear Medicine package it consists of the following segments:

- MSH  Message Header
- QRD  Query Definition
The Security field (MSH-8) must contain the user's VISTA Access Code and Electronic Signature code. A query can be used to request one specific exam or a list of active exams (i.e., exams with no findings report entered). To receive a list of active exams, more than one record would be specified as in the example below (10-RD) where up to 10 records may be retrieved. To request a specific exam, the Who Subject Filter field (QRD-8) must specify the exam case number (e.g., 011995-219, or just 219) and the What Department Data Code field (QRD-10) must contain the word EXAM.

Example:

```
MSH^^~`&^VOICERAD^VENDOR^RADIOLOGY^578^199506190652^ACCESS CODE~~ELECTRONIC SIGNATURE^QRY^447^P^2.1
QRD^199506190652^R^I^001^^~10-RD^682816440^OTH^PATIENT^S
```

A query can be rejected due to invalid security codes, invalid or ambiguous patient identifier, invalid exam ID, no exams on file, report already on file, case canceled, lack of proper security classification to enter reports on canceled cases, canceled case is part of an exam set with a single report, or user without the proper security key.

The Radiology/Nuclear Medicine package responds to the query with a list of exams for a patient in an ORF message. The ORF message consists of the following segments, with PID, OBR and OBX repeating in sets for each exam:

- **MSH** Message Header
- **MSA** Message Acknowledgment
- **QRD** Query Definition
- **PID** Patient Identification
- **OBR** Observational Result
- **OBX** Result

In the following example, only one active exam existed for the patient.

Example:

```
MSH~\&^RADIOLOGY^608^RADIOLOGY^NON-VISTA^199104301101^^ORF^54321^P^2.1
MSA^AA^12347
QRD^199104301101^R^I^Q1^^~1-RD^55555^OTH^PATIENT
PID^^^55555~5~M11^^DOE~JOHN~J^^19300101^M^^^^^^^^^^^987654321
OBR^^^^7089898.8453-1-043091-66-L^199104301200^""""^^"^^"^^3232~HARRIS~JACK
^^^^MEDICINE^199104301200
OBX^TX^H-HISTORY-L^A history is not available for this patient.
OBX^TX^P-PROCEDURE-L^CHEST 1 VIEW"""""
OBX^TX^M-MODIFIERS-L^RIGHT, PORTABLE"""""
OBX^TX^A-ALLERGIES-L^BEE STINGS"""""
```

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In the next example, several active exams existed for the patient. Note that the PID, OBR, and OBX repeat for each exam.

Example:

<table>
<thead>
<tr>
<th>MSH</th>
<th>&amp;^RADIOLOGY^578^VOICERAD^VENDOR^19950619120423^ORF^2950619.120423^P^2.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>OOR</td>
<td>&amp;^RADIOLOGY^578^VOICERAD^VENDOR^19950619120423^ORF^2950619.120423^P^2.1</td>
</tr>
<tr>
<td>PID</td>
<td>7049880.8549-1-011995-219-L^199501191450^4507<del>TAYLOR</del>FRANK^X-RAY STOP^199501191450</td>
</tr>
<tr>
<td>OBR</td>
<td>^CE^P-PROCEDURE-L^ANKLE 2 VIEWS^Twisted ankle playing football.</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-M-MODIFIERS-L^RIGHT^</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-HISTORY-L^Twisted ankle playing football.</td>
</tr>
<tr>
<td>PID</td>
<td>7049880.8549-2-011995-220-L^199501191450^4507<del>TAYLOR</del>FRANK^X-RAY STOP^199501191450</td>
</tr>
<tr>
<td>OBR</td>
<td>^CE^P-PROCEDURE-L^FOOT 2 VIEWS^Foot is swollen.</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-M-MODIFIERS-L^RIGHT^</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-HISTORY-L^Foot is swollen.</td>
</tr>
<tr>
<td>PID</td>
<td>7049880.8549-3-011995-221-L^199501191450^4507<del>TAYLOR</del>FRANK^X-RAY STOP^199501191450</td>
</tr>
<tr>
<td>OBR</td>
<td>^CE^P-PROCEDURE-L^NON-INVAS.,LOW EXT. VEIN W/O US^High blood pressure, mod smoker (cigars).</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-M-MODIFIERS-L^LEFT^</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-HISTORY-L^High blood pressure, mod smoker (cigars).</td>
</tr>
<tr>
<td>PID</td>
<td>7049880.8549-4-011995-223-L^199501191450^4507<del>TAYLOR</del>FRANK^X-RAY STOP^199501191450</td>
</tr>
<tr>
<td>OBR</td>
<td>^CE^P-PROCEDURE-L^TOE(S) 2 OR MORE VIEWS^Toes are swollen and discolored.</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-M-MODIFIERS-L^RIGHT^</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-HISTORY-L^Toes are swollen and discolored.</td>
</tr>
<tr>
<td>PID</td>
<td>7049880.8549-5-011995-216-L^199501191448^4507<del>TAYLOR</del>FRANK^X-RAY STOP^199501191448</td>
</tr>
<tr>
<td>OBR</td>
<td>^CE^P-PROCEDURE-L^FOREARM 2 VIEWS^High blood pressure, mod smoker (cigars).</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-M-MODIFIERS-L^RIGHT^</td>
</tr>
<tr>
<td>OBX</td>
<td>^TX-HISTORY-L^High blood pressure, mod smoker (cigars).</td>
</tr>
</tbody>
</table>
When the vendor (or other) application sends report results, they send an Observational Results Unsolicited (ORU) message to the Radiology/Nuclear Medicine package. The ORU message consists of the following segments:

- **MSH** Message Header
- **PID** Patient Identification
- **OBR** Observational Request
- **OBX** Result

**Example:**

```
MSH~\&\&VOICERAD\&VENDOR\&RADIOLOGY\&578\&199104301010\&ACCESS CODE~VERIFY
CODE\&SIGNATURE\&CODE\&ORU\&12346\&P\&2.1
PID\&100\&10\&M11\&JONES\&JOHN\&19421112\&M\&123456789
OBR\&7089898.8543\&1\&043091\&66\&L\&199104301200\&3232\&HARRIS
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.
```

Notes: The Diagnostic Code sent to VISTA must be one of a predefined set in the VISTA Rad/Nuc Med's Diagnostic Codes file (#78.3). These codes are facility specific. Impression is mandatory when ‘Impression required on Reports’ (field .116) is set for the Division (file #79).

The Radiology/Nuclear Medicine package sends back a General Acknowledgment (ACK) message. If the report is rejected, possible reasons are invalid or duplicate diagnostic code, provider not classified as "staff" or "resident" within the Radiology/Nuclear Medicine package, missing or invalid patient identification, attempt to edit a canceled case, or a case where a report is already on file, missing impression text, or missing segment or field from a message.

**Discussion of Radiology/Nuclear Medicine-Initiated Messages**

The Radiology/Nuclear Medicine package will send an HL7 message with exam information to all site specified subscribers, if one or more is defined within the VISTA Health Level Seven package setup, when each exam has been registered, examined (i.e., images have been collected), canceled, and when a report has been put in a status of Verified or Released/Not Verified. Subscribers may choose to subscribe to a subset rather than all of the available messages. Later sections show examples of VISTA file setup that is necessary to accomplish this.
Clinical Scenarios for Radiology/Nuclear Medicine-Initiated Messages

REGISTRATION

A VAMC may register a patient for an imaging exam at the time the patient arrives at the radiology or nuclear medicine reception desk for his/her appointment, or registration may be done up to a week prior to the appointment depending on the policy of that VAMC's imaging services. At this point, the registration message is broadcast and can be sent as an "order" to the PACS/Imaging, Voice Recognition, or other recipient. For exam sets, each procedure will be sent in its own HL7 message.

EXAMINED/IMAGES COLLECTED

The VISTA Rad/Nuc Med software allows the ADPAC to specify an exam status that will trigger this event. If, for example, the "Examined" status is specified, when the radiology tech enters the required data to cause the exam record to reach the "Examined" status, the examined message will be broadcast. This message is intended to signal the recipient that images have been collected. This is especially useful for interfacing with PACS equipment if the VAMC is running the VISTA Imaging/Multi-Media software, which will then expect a message containing image ID's back from the PACS equipment. The Imaging/Multi-Media software then files the image ID's with the Rad/Nuc Med report through an Imaging-Rad/Nuc Med interface.

CANCELLATION/DELETION

If an imaging tech or other VISTA Rad/Nuc Med software user cancels or deletes an exam, this will trigger the cancel message broadcast. An exam is usually canceled before it is done. However, since exam data may have been erroneously entered, or entered for the wrong patient, the VISTA Rad/Nuc Med system allows users to back data out and cancel after an exam is done, and possibly after results reports are entered. So, there is a possibility that an examined message and a report message would have been broadcast prior to a cancellation message.

VERIFIED/RELEASED UNVERIFIED REPORT

The report message is triggered when a VISTA Rad/Nuc Med radiologist or transcriptionist enters data causing the findings report to move to a "Verified" (final) or "Released/Unverified" (preliminary) status. Depending on the policy of the VAMC, the "Released/Unverified" status may or may not be allowed. If the released/unverified report is broadcast on a message, a later message will contain the verified (final) report. It is also possible for a verified report to be retracted ("Unverified"), then re-verified later. If this happens a second report message would be broadcast with the amended, re-verified report, or else an exam cancel/delete message would be broadcast retracting the entire exam.

The registration message will always be the first message generated since registration must be done before any of the other events can take place. There is no software setup that can prevent users from entering and verifying a report prior to the tech entering exam information, so there is no guarantee that the "Examined" message will be sent before the "Report" message. However, a facility can choose to enforce the practice of case editing before entering and verifying reports to guarantee that the case gets to the proper "Examined" status before the report is verified.
Messaging Specifics for Radiology/Nuclear Medicine-Initiated Messages

When an exam is **registered**, **examined** or **cancelled** by the Radiology/Nuclear Medicine package, an Order (ORM) message is sent to the site-specified application. The ORM message consists of the following segments:

- **MSH** Message Header
- **PID** Patient Identification
- **ORC** Common Order
- **OBR** Observational Request
- **OBX** Result

Example:

```
MSH^~\&^&RADPACS^578^PACS^HINES^19950412150219^ORM~O01^88^P^2.1
PID^321-44-8277^6552~7~M11^HAMMER,RHONDA^19840515^321448277
ORC^NW^IP^EXAMSET: MAMMO PARENT PROCEDURE^19950412091135
OBR^7049589.8964-1~041095-85~L^76091~MAMMOGRAM, BOTH BREASTS~CPT4~436
~X-RAY ROOM 101-578-HINES VAMC^RAD-GTENAL RADIOLOGY^19950412091135^^^-
OBX^CE^P~PROCEDURE~L^^436~MAMMOGRAM BILAT~L
OBX^TX^M-MODIFIERS-L~LEFT, OBLIQUE^^^-
OBX^CE^C4~CPT MODIFIERS-C4~26-PROFESSIONAL COMPONENT~C4~09926-PROFESSIONAL CO
OBX^TX^H-HISTORY-L~This is the clinical history for the patient's exam. This is
OBX^TX^H-HISTORY-L~~lines in length so we can see what happens when we create the HL7
OBX^TX^H-HISTORY-L~~message.^^-
OBX^TX^H-HISTORY-L~~
OBX^TX^H-HISTORY-L~This is the first line of the second paragraph^^-
OBX^TX^H-HISTORY-L~This is the second line of this paragraph. ^^^-
OBX^TX^A-ALLERGIES-L~PENICILLIN(V), CATS(V), DOGS(V), TOMATO(V), RAGWEED(V),
~RADIOLOGICAL/CONTRAST MEDIA(N), COCAINE(V)^^-
```

Note: The messages broadcast at these three event points (registered, examined and cancelled) are almost identical, with the exception of the Order Control, Order Status, and Mode of Transportation. Differences to note between an HL7 message for registration, image collection (examined) and cancellation are shown here:

<table>
<thead>
<tr>
<th>HL7 ORC Field</th>
<th>Registration</th>
<th>Cancel/Delete</th>
<th>Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Order Control</td>
<td>NW</td>
<td>CA</td>
<td>XO</td>
</tr>
<tr>
<td>5-Order Status</td>
<td>IP</td>
<td>CA</td>
<td>CM</td>
</tr>
</tbody>
</table>

The Mode of Transportation value on the OBR segment (in the example above, ~~~~~~R) is omitted from the cancellation message.

Please also be aware that the OBR segment may exceed 255 characters. This means that other VISTA applications will have to receive those segments in an array. See section Continuation Pointers section of the VISTA HL7 Site Manager & Developer manual for more information about the method for handling segments greater than 255 characters. Outside vendor recipients should not be affected since they receive the message as a data stream.
When a report is **Verified** or **Released/Not Verified** by the Radiology/Nuclear Medicine package, an Observational Results Unsolicited (ORU) message is sent to the site specified application. The ORU message consists of the following segments:

- **MSH** Message Header
- **PID** Patient Identification
- **OBR** Observational Request
- **OBX** Result

**Example: ORU message containing report for single procedure**

```
MSH~\&^RADPACS^578^PACS^HINES^199504121040^ORU~R01^170^P^2.1
PID~714-26-2873^34-3-M11^LIME-HARRY^19080817^W^4507~TAYLOR,FRANK
OBR~7049587.8959-1-041295-334-L^76020-X-RAYS FOR BONE AGE-CTP4-423-BONE
AGE-99RAP~199504121040^19950412150219^4507~TAYLOR,FRANK^1N^1
9504121503^4505-HILLER-CINDY^4532-FLASHCARD-PERGUS
OBX~TX^T-IMPRESSION-L^This is the first line of impression text on the report record.^^^^^^F
OBX~TX^T-IMPRESSION-L^The second line of impression text on the report record.^^^^^^F
OBX~ST^D-DIAGNOSTIC CODE~L^POSSIBLE MALIGNANCY, FOLLOW-UP NEEDED^^^^^^F
OBX~ST^D-DIAGNOSTIC CODE~L^ABNORMALITY, ATTN. NEEDED^^^^^^F
OBX~TX^R-REPORT-L^This is the first line of report text in the report record.^^^^^^F
OBX~TX^R-REPORT-L^The second line of report text.^^^^^^F
OBX~CE^P-PROCEDURE-L^423~BONE AGE-L^"""
OBX~TX^M-MODIFIERS-L^PORTABLE EXAM"""
OBX~CE^C4-CPT MODIFIERS-C4~26-PROFESSIONAL COMPONENT~C4~09926-PROFESSIONAL CO
MPONENT-C4"""
```

**Example: ORU message for "printset", (i.e., multiple procedures and single report):**

```
MSH~\&^RADPACS^578^PACS^HINES^199504121040^ORU~R01^170^P^2.1
PID~149-16-2645^43-7-M11^FICKEN-LEON~P^19100606^M^149162645
OBR~7029871.8488-1-012897-436-L^73600-X-RAY EXAM OF ANKLE-CTP4~
161-ANKLE 2VIEWS-99RAP~199701281511"""""""""""""""""""""19970128155928^4599~
ORDERER-ORVILLE^^EMERGENCY ROOM^199701281600^F""""""""""""""""""""""""""""""""""4505~HELLER-CINDY
OBX~CE^P-PROCEDURE-L^161-ANKLE 2 VIEWS-L^""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""`
If the receiving application is outside of VISTA, it should then send a General Acknowledgment (ACK) message back to the HL7 package. The ACK message consists of the following segments:

- **MSH**  Message Header
- **MSA**  Message Acknowledgment

**Example:**

```
MSH^~\&PACS^HINES^RADIOLOGY^578^199504121041^^ACK^170^P^2.1
MSA^AA^170
```
Setup Instructions/Examples for VistA to VistA Same-System, Different Application Messages Initiated by Rad/Nuc Med

Introduction

This section describes the steps required to setup and maintain a non-TCP/IP VISTA to VISTA same-system, different application HL7 interface from VISTA Radiology/Nuclear Medicine.

VISTA messages can be any one of the following:
1) Registration,
2) Cancellation,
3) Examined (i.e., images collected, usually set up in sites using the VISTA Imaging package and/or a PACS system), and
4) VISTA reports which are Verified or Released/Not Verified. (These reports must be broadcast in order to synchronize VISTA and the receiving system’s databases.)

Requirements

Familiarity with the VISTA HL7 Site Manager & Developer Manual is recommended before proceeding to create non-TCP/IP HL7 interfaces from Radiology/Nuclear Medicine.

All released Radiology, HL7 and Kernel patches must be installed. In particular, patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5*17.
Setup of HL7 Files For VistA-VistA Radiology Interface

1. HL7 APPLICATION PARAMETER FILE #771 SETUP

Two HL7 Applications are required for VISTA to VISTA same system interfaces. One for each side of the interface.

Radiology/Nuclear Medicine v5.0 exports the RA-SERVER-IMG and RA-CLIENT-IMG applications for use in a VISTA to VISTA interface.

Below, is an example of the HL7 Application setup for a VISTA to VISTA interface. Please reference section 7.4 of the VISTA HL7 Site Manager & Developer Manual for an explanation of individual fields. Also shown is a screen shot from the HL7 Main Menu, HL7 Interface Developers Options…. Application Edit option.

NAME: RA-SERVER-IMG    ACTIVE/INACTIVE: ACTIVE
FACILITY NAME: RADIOLOGY INTERFACE    COUNTRY CODE: US

---.

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Press <PFl>H for help    Insert
The HL7 Field Separator will default to ‘^’, and the encoding characters default to ‘~|&’. These are the VISTA HL7 defaults and should not be changed for VISTA to VISTA interfaces.
2. **Protocol File #101 Setup**

Four event driver protocols (RA REG, RA EXAMINED, RA CANCEL, RA RPT) were exported with Radiology/Nuclear Medicine and subsequent patches to send exam or report data from the Radiology/Nuclear Medicine package to another VISTA application such as an imaging system via the HL7 V.1.6 package. It is unlikely that you will be required to create new event driver protocols, but changes may be required to some fields in order to utilize the exported protocols.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Triggering event in VISTA Rad/Nuc Med processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA REG</td>
<td>Rad/Nuc Med case registration</td>
</tr>
<tr>
<td>RA CANCEL</td>
<td>Rad/Nuc Med case cancellation or deletion</td>
</tr>
<tr>
<td>RA EXAMINED</td>
<td>Rad/Nuc Med case reaches a status with file #72, field 8 GENERATE EXAMINED HL7 MESSAGE marked &quot;yes&quot;</td>
</tr>
<tr>
<td>RA RPT</td>
<td>Rad/Nuc Med report status changes to &quot;Released/Not Verified&quot; or &quot;Verified&quot;</td>
</tr>
</tbody>
</table>

Two "subscriber" protocols, RA SEND ORM and RA SEND ORU, are also exported. RA SEND ORM should be entered in the SUBSCRIBERS field of the three ORM event driver protocols (RA REG, RA CANCEL, RA EXAMINED), and RA SEND ORU should be entered in the SUBSCRIBERS field of the ORU event driver protocol (RA RPT). Sites can set up their own equivalent of the subscriber protocols for a single message or various combinations of messages. The RA SEND ORM and RA SEND ORU protocols are only exported for convenience; they can be used as subscribers, or they can serve as an example for creating new subscriber protocols.

Although sample setup for messaging is described below, this should in no way replace or act as a substitute for the instructions in the VISTA HL7 Site Manager & Developers Guide documentation. The descriptions and samples below are subject to change based on new versions or patches to the Health Level Seven package.

Setup involves editing fields on exported records, and, in some cases, adding records depending on the needs of the site. The subscriber protocols should be set as SUBSCRIBERS in the associated event driver protocols. The event driver protocols will also require a valid Sending Application, which points to a record in file #771. Subscriber protocols should have this application entered as Receiving Application. However, if you are using 2 HL7 Applications for the interface, the second HL7 Application should be used as the subscriber Receiving Application.

Note: Once you've entered a sending application for an event driver protocol, File #772 (HL7 MESSAGE TEXT) will start growing. See VISTA HL7 Site Manager & Developer Manual for instructions on purging. If you are not receiving and processing the messages, you may want to remove the sending application name from the event drivers to prevent growth of File 772. **If you experience problems and wish to temporarily disable the interface, just delete the contents of the Sending Application field on whichever event driver protocols are causing the errors.**

For VistA to VistA interfaces, M code will have to be created and specified so that another VISTA application can capture and process the information from the HL7 message. The M code to be executed (for receiving and processing the message) should be specified in the PROCESSING ROUTINE field of the subscriber protocol.

For example,
In the RA SEND ORM protocol, PROCESSING ROUTINE: D EN^OTHERPKG

where EN^OTHERPKG should be replaced by a real line label and routine references. The routine you enter as the PROCESSING ROUTINE should contain M code like the following:

```
EN   N I,J,X
F I=1:1 X HLNEXT Q:HLQUIT'">0  D
.S X(I)=HLNODE,J=0 ; get first segment node
.;get continuation nodes for long segments, if any
.F S J=$0(HLNODE(J)) Q:'J  S X(I,J)=HLNODE(J)
```

This sample code is taken from the VISTA HL7 Site Manager & Developer Manual Section 9.7 How To Parse Message Text. It is used to retrieve each message segment.

Listed below are example subscriber and event driver protocols for an interface to a same system VISTA application. Also shown are screen shots from the HL7 Main Menu, Interface Developers Options…, Edit Protocols option showing how the example was created.

In the examples below, the two Processing routines ^ZZTEST1 and ^ZZTEST2 should be replaced by the routines in the receiving package that will process the data received. Nothing is exported to these fields by Radiology/Nuclear Medicine v5.0 or associated patches.
NAME: RA SEND ORM
ITEM TEXT: Client for Imaging
TYPE: subscriber
PACKAGE: ANYPKG
RECEIVING APPLICATION: RA-CLIENT-IMG
EVENT TYPE: O01
VERSION ID: 2.1
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP
PAGE 1 OF 2

NAME: RA SEND ORM

DESCRIPTION (wp): (empty)

ENTRY ACTION:
EXIT ACTION:

TYPE: subscriber

COMMAND: Press <PF1>H for help Insert

HL7 SUBSCRIBER
PAGE 2 OF 2

NAME: RA SEND ORM

RECEIVING APPLICATION: RA-CLIENT-IMG
RESPONSE MESSAGE TYPE: ACK
EVENT TYPE: O01
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

LOGICAL LINK:

PROCESSING RTN: D ^ZZTEST1 <-- empty when exported
ROUTING LOGIC:

Exit Save Refresh

Enter a command or '^^' followed by a caption to jump to a specific field.

COMMAND: Press <PF1>H for help Insert
NAME: RA SEND ORU
ITEM TEXT: Client for Imaging
TYPE: subscriber
PACKAGE: ANYPKG
RECEIVING APPLICATION: RA-CLIENT-IMG
EVENT TYPE: R01
VERSION ID: 2.1
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP
-----------------------------------------------
NAME: RA SEND ORU
DESCRIPTION (wp): (empty)
ENTRY ACTION:
EXIT ACTION:
TYPE: subscriber

COMMAND: Press <PF1>H for help Insert

HL7 SUBSCRIBER
---------------------------------------------
RA SEND ORU
---------------------------------------------
RECEIVING APPLICATION: RA-CLIENT-IMG
RESPONSE MESSAGE TYPE: ACK
EVENT TYPE: R01
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
LOGICAL LINK:
PROCESSING RTN: D ^ZZTEST2 <-- empty when exported
ROUTING LOGIC:
Exit Save Refresh
Enter a command or '^^' followed by a caption to jump to a specific field.
COMMAND: Press <PF1>H for help Insert
NAME: RA REG  
ITEM TEXT: Rad/Nuc Med exam registered  
TYPE: event driver  
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE  
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.  
SENDING APPLICATION: RA-SERVER-IMG  
TRANSACTION MESSAGE TYPE: ORM  
EVENT TYPE: 001  
VERSION ID: 2.1  
SUBSCRIBERS: RA SEND ORM

---

HL7 INTERFACE SETUP

NAME: RA REG

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

---

COMMAND:
Press <PF1>H for help  
Insert

---

HL7 EVENT DRIVER

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORM  
EVENT TYPE: 001

PROCESSING ID:  
VERSION ID: 2.1

ACCEPT ACK CODE:  
APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORM

---

COMMAND:
Press <PF1>H for Help  
Insert
NAME: RA CANCEL
ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORM

---

NAME: RA CANCEL

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

---

COMMAND: Press <PF1>H for help Insert

---

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORM

EVENT TYPE: 001

PROCESSING ID:

VERSION ID: 2.1

ACCEPT ACK CODE:

APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORM

---

COMMAND: Press <PF1>H for help Insert
NAME: RA EXAMINED  
ITEM TEXT: Rad/Nuc Med examines case  
TYPE: event driver  
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE  
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.  
SENDING APPLICATION: RA-SERVER-IMG  
TRANSACTION MESSAGE TYPE: ORM  
EVENT TYPE: 001  
VERSION ID: 2.1  
SUBSCRIBERS: RA SEND ORM

HL7 INTERFACE SETUP

NAME: RA EXAMINED

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help Insert

HL7 EVENT DRIVER

RA EXAMINED

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
PROCESSING ID: 
VERSION ID: 2.1
ACCEPT ACK CODE: 
APPLICATION ACK TYPE: 

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORM

COMMAND: Press <PF1>H for help Insert
NAME: RA RPT
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver   PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-SERVER-IMG   TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01   VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORU

HL7 INTERFACE SETUP   PAGE 1 OF 2
-----------------------------------------------
NAME: RA RPT
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help   Insert

HL7 EVENT DRIVER   PAGE 2 OF 2
-----------------------------------------------
RA RPT

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORU   EVENT TYPE: R01
PROCESSING ID:   VERSION ID: 2.1
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORU

Exit   Save   Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Press <PF1>H for help   Insert
Setup Instructions/Examples for HLLP HL7 Interfaces Between Rad/Nuc Med and Outside PACS Vendors

Introduction

This section describes the steps required to setup and maintain an HLLP HL7 link between VISTA Rad/Nuc Med and an outside PACS product.

VISTA messages can be any one of the following:
1) Registration,
2) Cancellation,
3) Examined (i.e., images collected, usually set up in sites using the VISTA Imaging package and/or a PACS system), and
4) VISTA reports which are Verified or Released/Not Verified. (These reports must be broadcast in order to synchronize VISTA and the receiving system’s databases).

Requirements

Familiarity with the VISTA HL7 Site Manager & Developer Manual is recommended before proceeding to create HLLP HL7 interfaces from Radiology/Nuclear Medicine.

All released Radiology, HL7 and Kernel patches must be installed. In particular, patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5.0*17

Familiarity with the VISTA device file will also be advantageous at this time.
Setup of HL7 Files for HLLP Radiology to Outside Vendor Interface

1. **DEVICE FILE #3.5 SETUP**

For HLLP links, you need to define a Device file entry so that VISTA HL7 can ‘open’ a serial connection.

The five basic fields which need to be defined are:

- **Name**
- **Type** - set to TERMINAL
- **$I** - so the system knows where the device is located
- **Volume Set(CPU)** – the environment where the application is running
- **Subtype** - while the terminal type is largely bypassed once the device is open, the selected terminal type should not have an open or close execute

Below is an example device setup:

```
NAME: VENDOR DEVICE $I: _LTA884::
SUBTYPE: P-OTHER VOLUME SET (CPU): VER
TYPE: TERMINAL
```

OpenVMS sites should also set the following device protection and characteristics, at the OpenVMS level, on the appropriate node(s), both interactively and in DCL device setup file(s):

```
$ SET PROTECT=W:RWLP /DEVICE LTA884:
$ SET TERM/PERM/NOWRAP/HOSTSYNC/NOECHO/EIGHT/NOBROAD/ALTYPE/PASTHRU LTA884:
```
2. **HL7 Application Parameter File #771 Setup**

Two HL7 Applications will always be required with a VISTA Radiology to outside vendor using HLLP. One to serve as the VISTA Radiology side of the interface; the other will represent the outside vendor.

Several HL7 applications are exported with Radiology/Nuclear Medicine v5.0 and its associated patches, but only 2 are intended for use as HLLP applications. These are:

<table>
<thead>
<tr>
<th>File 771 Entry</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-SERVER-IMG</td>
<td>Exported for use as VISTA Rad/Nuc Med application over HLLP</td>
</tr>
<tr>
<td>RA-CLIENT-IMG</td>
<td>Exported for use as outside vendor application over HLLP</td>
</tr>
</tbody>
</table>

Below is an example of two HL7 applications configured for an HLLP interface. Please reference Section 7.4 of the VISTA HL7 Site Manager & Developer Manual for an explanation of individual fields. Also shown are screen shots from the HL7 Main Menu, Interface Developers Options…, Application Edit option.

Note: The HL7 Field Separator and Encoding Characters are left blank below. This means the default values will be used. The default values are the VISTA HL7 standard, where Field Separator is ‘^’ and the Encoding Characters are ‘~|\&’. This is NOT the HL7 standard, and the outside might request that these values be changed. The HL7 standard is for ‘|’ to be used as the Field Separator, and ‘^~\&’ as Encoding Characters. Be aware, however, that these values may have to be entered manually, as the ScreenMan application does not allow the ‘^’ character to be entered as the first character in a field.
3. **HL LOGICAL LINK FILE # 870 SETUP**

Since this interface is not VISTA to VISTA and messages have to be sent to a dedicated port, we are required to create an entry in the HL Logical Link file. This will define the device to use and its behavior.

An example link is shown below, together with screen shots from the HL7 Main Menu, Interface Developers Options…, Link Edit option.

Setting the AUTOSTART field to enabled ensures that the link will restart when the ‘Restart/Start All Links & Filers’ option is run. The LLP Start Block and LLP End Block values shown below are the default values and represent the ASCII for ‘VT’ and ‘FS’ respectively.

For more detailed information on the field definitions refer to Section 2.3 of the VISTA HL7 Site Manager & Developer Manual.

**NOTE:** Some of the data in this file will be entered automatically by the LLP background job when it is started.

```
NODE: RAD HLLP
AUTOSTART: Enabled
RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT: 10
LLP START BLOCK: 11
PROTOCOL ID VERSION: 2.1

HLLP DEVICE: VENDOR DEVICE
BLOCK SIZE: 245
ACK TIMEOUT: 10
LLP END BLOCK: 28

---

NODE: RAD HLLP

INSTITUTION:

DOMAIN:

AUTOSTART:

QUEUE SIZE:

LLP TYPE: HLLP

---

COMMAND: Press <PF1>H for help Insert
```
HL7 LOGICAL LINK

HLLP LOWER LEVEL PARAMETERS

RAD HLLP

| HLLP DEVICE: VENDOR DEVICE                           | PROTOCOL ID VERSION: 2.1 |
| READ TIMEOUT: 10                                      | RE-TRANSMISION ATTEMPTS: 3 |
| ACK TIMEOUT: 10                                       | LLP START BLOCK: 11      |
| BLOCK SIZE: 245                                       | LLP END BLOCK: 28        |

LLP TYPE: HLLP

Close Refresh

Enter a command or '"' followed by a caption to jump to a specific field.

COMMAND: Close Press <F1>H for help Insert
4. **Protocol File # 101 Setup**

The protocol setup will be the same as in the previous section describing VISTA to VISTA interfaces, with a couple of exceptions.

Since this is a two application interface, the sending application for the event drivers and the receiving application for the subscribers will be different.

Also, there is no need to create and define any M Processing Routines, since the messages are routed to a dedicated port (i.e., the port to which the vendor equipment is attached) rather than consumed by another M program as in the VISTA to VISTA example.

An example interface setup is shown below, screen shots are taken from the HL7 Main Menu, Interface Developer Options…, Edit Protocols option.

<table>
<thead>
<tr>
<th>NAME: RA SEND ORM</th>
<th>ITEM TEXT: Client for Imaging (ORM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE: subscriber</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION: This protocol receives the HL7 message.</td>
<td></td>
</tr>
<tr>
<td>RECEIVING APPLICATION: RA-CLIENT-IMG</td>
<td>EVENT TYPE: O01</td>
</tr>
<tr>
<td>LOGICAL LINK: RAD HLLP</td>
<td>VERSION: 2.1</td>
</tr>
<tr>
<td>RESPONSE MESSAGE TYPE: ACK</td>
<td>SENDING FACILITY REQUIRED?: NO</td>
</tr>
<tr>
<td>RECEIVING FACILITY REQUIRED?: NO</td>
<td>SECURITY REQUIRED?: NO</td>
</tr>
</tbody>
</table>

<p>| Command: Press &lt;PF1&gt;H for help Insert |</p>
<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA SEND ORM</td>
<td></td>
</tr>
<tr>
<td>RECIPIENT</td>
<td>RA-CLIENT-IMG</td>
</tr>
<tr>
<td>RESPONSE MESSAGE</td>
<td>ACK</td>
</tr>
<tr>
<td>EVENT TYPE</td>
<td>001</td>
</tr>
<tr>
<td>SENDING FACILITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>RECEIVING FACILITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>SECURITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>LOGICAL LINK</td>
<td>RAD HLLP</td>
</tr>
<tr>
<td>PROCESSING RTN:</td>
<td></td>
</tr>
<tr>
<td>ROUTING LOGIC:</td>
<td></td>
</tr>
</tbody>
</table>

**Exit**  **Save**  **Refresh**

Enter a command or '^' followed by a caption to jump to a specific field.

**COMMAND:** Press <PF1>H for help  **Insert**
NAME: RA SEND ORU ITEM TEXT: Client for Imaging (ORU)
TYPE: subscriber
DESCRIPTION: This subscriber requires messages to be sent in a DATASTREAM directly to a dedicated port. This subscriber is a PACS or other vendor.
RECEIVING APPLICATION: RA-CLIENT-IMG EVENT TYPE: R01
LOGICAL LINK: RAD HLLP VERSION ID: 2.1
RESPONSE MESSAGE TYPE: ACK SENDING FACILITY REQUIRED?: NO RECEIVING FACILITY REQUIRED?: NO SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP PAGE 1 OF 2

NAME: RA SEND ORU

DESCRIPTION (wp): [This subscriber requires messages to be sent]

ENTRY ACTION:

EXIT ACTION:

TYPE: subscriber

COMMAND: Press <PF1>H for help Insert

HL7 SUBSCRIBER PAGE 2 OF 2

RA SEND ORU

RECEIVING APPLICATION: RA-CLIENT-IMG

RESPONSE MESSAGE TYPE: ACK EVENT TYPE: R01

SENDING FACILITY REQUIRED?: NO RECEIVING FACILITY REQUIRED?: NO

SECURITY REQUIRED?: NO

LOGICAL LINK: RAD HLLP

PROCESSING RTN:

ROUTING LOGIC:

Exit Save Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Press <PF1>H for help Insert
NAME: RA REG
ITEM TEXT: Rad/Nuc Med exam registered
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORM

---

HL7 INTERFACE SETUP
PAGE 1 OF 2

NAME: RA REG

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

---

COMMAND: Press <PF1>H for help Insert

---

HL7 EVENT DRIVER
PAGE 2 OF 2

RA REG

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1

ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORM

---

COMMAND: Press <PF1>H for Help Insert
NAME: RA CANCEL
ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTIOIN MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORM

HL7 INTERFACE SETUP
NAME: RA CANCEL
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:
TYPE: event driver

HL7 EVENT DRIVER
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:
SUBSCRIBERS
RA SEND ORM

COMMAND: Press <PF1>H for help Insert

COMMAND: Press <PF1>H for help Insert
NAME: RA EXAMINED
ITEM TEXT: Rad/Nuc Med examines case
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORM

<table>
<thead>
<tr>
<th>NAME: RA EXAMINED</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]</td>
</tr>
</tbody>
</table>

| ENTRY ACTION: |
| EXIT ACTION: |

| TYPE: event driver |

| COMMAND: Press <PF1>H for help Insert |

| SENDING APPLICATION: RA-SERVER-IMG |
| TRANSACTION MESSAGE TYPE: ORM |
| EVENT TYPE: 001 |
| PROCESSING ID: |
| VERSION ID: 2.1 |
| ACCEPT ACK CODE: |
| APPLICATION ACK TYPE: |

| RESPONSE PROCESSING RTN: |
| SUBSCRIBERS |
| RA SEND ORM |

| COMMAND: Press <PF1>H for help Insert |
NAME: RA RPT
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver  PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-SERVER-IMG  TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01  VERSION ID: 2.1
SUBSCRIBERS: RA SEND ORU

HL7 INTERFACE SETUP

NAME: RA RPT
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help  Insert

HL7 EVENT DRIVER

SENDING APPLICATION: RA-SERVER-IMG  TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01  VERSION ID: 2.1
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:

RA SEND ORU

COMMAND: Press <PF1>H for help  Insert
**Startup and Recovery**

With a one-way HLLP interface from Radiology, you will require only one link, as described earlier. The link can be stopped and started using the HL7 Main Menu, Filer and Link Management Options…., Start/Stop Links option.

If the AUTOSTART field has been set to enabled for the link, then the link will be started automatically when running the Restart/Start All Links & Filers option.

The link status will be shown on the Systems Link Monitor. Once opened, the link usually toggles between LISTEN and READING. If the link toggles between OPEN and OPENFAIL, then the link has been unable to start. Most likely there is a problem with the device setup.

For more information on Troubleshooting, see section 4 of the VISTA HL7 Site Manager & Developer Manual.
Setup Instructions/Examples for TCP/IP HL7 Interfaces Between Rad/Nuc Med and COTS Products.

Introduction

This section describes the steps required to setup and maintain a TCP/IP HL7 link between VISTA Rad/Nuc Med and a COTS product.

VISTA messages can be any one of the following:
1) Registration,
2) Cancellation,
3) Examined (i.e., images collected, usually set up in sites using the VISTA Imaging package and/or a PACS system), and
4) VISTA reports which are Verified or Released/Not Verified. (These reports must be sent to COTS product in order to synchronize VISTA and COTS product's databases.)

Radiology will currently only accept result messages (i.e. Radiology reports) from a COTS product.

Requirements

Familiarity with the VISTA HL7 Site Manager & Developer Manual is recommended before proceeding to create Radiology TCP/IP HL7 interfaces.

All released Radiology, HL7 and Kernel patches must be installed. In particular, patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5*17.

To run HL7 messages under TCP/IP, Alpha/AXP sites running more than one instance of TaskMan MUST run TaskMan from DCL Context. This is the recommendation of the HL7 developers. Please refer to the SETUP OF HL7 FILES section of this document to determine the impact on the Startup Node field for file 870.

Please consider putting the COTS server on a UPS. Power blips and outages have proven to be a problem in reliable TCP/IP message transmission.

---

1 The term COTS product is used throughout meaning Commercial Off-The-Shelf product
Setup of HL7 Files for One Way Radiology to COTS Interface

1. HL7 APPLICATION PARAMETER FILE #771 SETUP

Two HL7 Applications will always be required with a VISTA Radiology to COTS product TCP/IP HL7 interface. One will serve as the VISTA Radiology side of the interface; the other will represent the COTS system.

Several HL7 applications are exported with Radiology/Nuclear Medicine v5.0 and associated patches, these can be used as exported, or they can serve as an example for creating new HL7 applications:

<table>
<thead>
<tr>
<th>File 771 Entry</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-SERVER-IMG</td>
<td>Exported for use as VISTA Rad/Nuc Med Application (HL7 v2.1)</td>
</tr>
<tr>
<td>RA-CLIENT-TCP</td>
<td>Exported for supported interface to MedSpeak (HL7 v2.1)</td>
</tr>
<tr>
<td>RA-VOICE-SERVER</td>
<td>Exported for use as VISTA Rad/Nuc Med Application (HL7 v2.3)</td>
</tr>
<tr>
<td>RA-TALKLINK-TCP</td>
<td>Exported for supported interface to TalkStation (HL7 v2.3)</td>
</tr>
<tr>
<td>RA-PSCRIBE-TCP</td>
<td>Exported for PowerScribe product (HL7 v2.3)</td>
</tr>
</tbody>
</table>

MedSpeak is a Voice Recognition reporting tool, non-supported with the advent of Y2K. TalkStation has superseded the MedSpeak interface. The ‘Implementing and maintaining an Interface between Radiology and the MedSpeak Voice Reporting Tool’ section has information on the MedSpeak interface.

TalkStation is a Voice Recognition reporting tool from TalkTechnology with a supported interface to VISTA Radiology. See the ‘Implementing and maintaining an Interface between Radiology and the TalkStation Voice Reporting Tool’ section later in this documentation for information.

PowerScribe is another Voice Recognition reporting tool with a supported interface to Radiology. The ‘Implementing and maintaining an Interface between Radiology and the PowerScribe Voice Reporting Tool’ has further details on this implementation.

If you intend to interface with a different COTS Voice Recognition Dictation system vendor, they may find it useful to study the Radiology/Nuclear Medicine V. 5.0 HL7 Interface Specifications for Voice Recognition Systems manual, which defines all data passed by, and accepted by, the Radiology HL7 interface software.

Below is an example of two HL7 applications created for a TCP/IP interface. Please reference Section 7.4 of the VISTA HL7 Site Manager & Developer Manual for an explanation of individual fields. Also shown are screen shots from the HL7 Main Menu, HL7 Interface Developers Options…, Application Edit option:

NAME: RA-RADSERVER      ACTIVE/INACTIVE:ACTIVE
FACILITY NAME: VISTA RADIOLOGY    COUNTRY CODE: US
HL7 ENCODING CHARACTERS: ^~\&   HL7 FIELD SEPARATOR: |
### HL7 APPLICATION EDIT

<table>
<thead>
<tr>
<th>NAME: RA-RADSERVER</th>
<th>ACTIVE/INACTIVE: ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACILITY NAME: VISTA RADIOLOGY</td>
<td>COUNTRY CODE: US</td>
</tr>
<tr>
<td>HL7 FIELD SEPARATOR:</td>
<td></td>
</tr>
<tr>
<td>HL7 ENCODING CHARACTERS:</td>
<td></td>
</tr>
</tbody>
</table>

**MAIL GROUP:**

---

**Exit** | **Save** | **Refresh**
---|---|---

Enter a command or '^^' followed by a caption to jump to a specific field.

**COMMAND:** Press <PF1>H for help Insert

---

<table>
<thead>
<tr>
<th>NAME: RA-COTSCLIENT</th>
<th>ACTIVE/INACTIVE: ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACILITY NAME: COTS EXAMPLE</td>
<td>COUNTRY CODE: US</td>
</tr>
<tr>
<td>HL7 ENCODING CHARACTERS:</td>
<td></td>
</tr>
<tr>
<td>HL7 FIELD SEPARATOR:</td>
<td></td>
</tr>
</tbody>
</table>

**MAIL GROUP:**

---

**Exit** | **Save** | **Refresh**
---|---|---

Enter a command or '^^' followed by a caption to jump to a specific field.

**COMMAND:** Press <PF1>H for help Insert
2. **HL Logical Link File #870 Sender Setup**

Depending on the interface you will either require one or two HL7 Logical Links for message transactions. One sender link is required for VISTA to send order and results messages to a COTS product and to receive acknowledgements to those messages from the COTS product. A listener link would be required if the COTS product is to send results messages to VISTA and to receive acknowledgements to those messages from VISTA. For now, we will discuss sender links only. The additional setup required for listener links follows later in this document.

File #870 contains the links used by the HL7 package to send messages. It is used to identify the TCP/IP address of the COTS product server, as well as the TCP/IP port numbers that will be used.

On systems running more than one instance of TaskMan, the link tasks must be forced to start up on the same CPU (i.e. same TCP/IP address) every time. This is accomplished by entering a “STARTUP NODE”. If this is not done, the COTS product will shut down the links and the interface will probably crash.

**The STARTUP NODE field should ONLY be populated on Alpha/AXP systems that are running more than one instance of TaskMan under DCL context. In this instance the STARTUP NODE should be set to the box-volume pair (e.g.: VAH:532A04). For single TaskMan and UCX listeners leave null.**

This file also stores parameters that define the behavior of the lower level protocols and information that is used with the Systems Link Monitor, which gives the user feedback about the state of each link.

Several sender links are exported with Radiology/Nuclear Medicine and subsequent patches. These are exported for use in specific supported interfaces but can be viewed as examples of sender links:

<table>
<thead>
<tr>
<th>Logical Link</th>
<th>Reason exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA-MED</td>
<td>Radiology-MedSpeak link</td>
</tr>
<tr>
<td>RA-PSCRIBE</td>
<td>Radiology-PowerScribe link</td>
</tr>
<tr>
<td>RA-TALK</td>
<td>Radiology-TalkStation link</td>
</tr>
</tbody>
</table>

Shown below is an example of a newly created sender link which could be used to send order messages (i.e., exam registered, exam cancelled, patient examined, and report verified or released/not verified) from VISTA to a COTS product. This link would also receive the order Acknowledgement from the COTS product.

The following example shows active, run-time data. Some of the fields are populated by the HL7 package when you start up the link and do not need to be entered manually.

It is strongly recommended that you add an ACK timeout for these links. If you do not enter a value then a default of 10 seconds will be used and experience has shown that this is not enough for a busy TCP/IP network. We recommend using between 300 and 600 seconds.
Regardless of the ‘Exceed Re-Transmit Action’ entered, when the ‘Re-Transmission Attempts’ for a message is exceeded, an alert is sent to the mail group defined in the MAIL GROUP FOR ALERTS field in the HL COMMUNICATIONS SERVER PARAMETERS (#869.3) file. This can be edited using the HL7 Main Menu, Site Parameter Edit option.

We have used a Persistent Client in the example below, but you may prefer to define the link as a Non-Persistent Client. The difference being that the link connects only when required rather than remaining open at all times.

See the VISTA HL7 Site Manager and Developer Manual section 2.4 TCP Link Setup for additional field definitions.
NODE: RA-COTS
DEVICE TYPE: Persistent Client
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RE-TRANSMIT ACTION: ignore
TCP/IP PORT: 7077
STARTUP NODE:

TCP/IP ADDRESS: 152.129.1.107
TCP/IP SERVICE TYPE: CLIENT (SENDER)
PERSISTENT: YES

NODE: RA-COTS
INSTITUTION:
DOMAIN:
AUTOSTART: Enabled

QUEU SIZE:
LLP TYPE: TCP

TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: 152.129.1.107
TCP/IP PORT: 7077
ACK TIMEOUT: 300
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RE-TRANSMIT ACTION: ignore

TCP/IP ADDRESS: 152.129.1.107 <- address of COTS server
TCP/IP PORT: 7077 <- port COTS server receives on

ACK TIMEOUT: 300 <- recommended
READ TIMEOUT:
BLOCK SIZE:

STARTUP NODE: <- ONLY set if multiple TaskMan/DCL PERSISTENT: YES
RETENTION: UNI-DIRECTIONAL WAIT:

Close Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close
3. Protocol File #101 Setup

Eight event driver protocols (RA REG, RA REG 2.3, RA EXAMINED, RA EXAMINED 2.3, RA CANCEL, RA CANCEL 2.3, RA RPT and RA RPT 2.3) were exported with VistA Radiology/Nuclear Medicine and subsequent patches to send exam or report data from the Radiology/Nuclear Medicine package to a COTS product via HL7. It is unlikely that you will have to create new event driver protocols, but changes will be required to some fields in order to utilize the exported protocols.

<table>
<thead>
<tr>
<th>Event Driver Protocol</th>
<th>Triggering Event in Rad/Nuc Med</th>
<th>HL7 Version</th>
<th>Message Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA REG</td>
<td>Rad/Nuc Med case registration</td>
<td>2.1</td>
<td>ORM</td>
</tr>
<tr>
<td>RA REG 2.3</td>
<td>As above</td>
<td>2.3</td>
<td>ORM</td>
</tr>
<tr>
<td>RA EXAMINED</td>
<td>Rad/Nuc Med case reaches a status with ‘Generate Examined HL7 Message’ marked ‘yes’</td>
<td>2.1</td>
<td>ORM</td>
</tr>
<tr>
<td>RA EXAMINED 2.3</td>
<td>As above</td>
<td>2.3</td>
<td>ORM</td>
</tr>
<tr>
<td>RA CANCEL</td>
<td>Rad/Nuc Med case cancellation or deletion</td>
<td>2.1</td>
<td>ORM</td>
</tr>
<tr>
<td>RA CANCEL 2.3</td>
<td>As above</td>
<td>2.3</td>
<td>ORM</td>
</tr>
<tr>
<td>RA RPT</td>
<td>Rad/Nuc Med report status changes to ‘Verified’ or ‘Released/Not Verified’</td>
<td>2.1</td>
<td>ORU</td>
</tr>
<tr>
<td>RA RPT 2.3</td>
<td>As above</td>
<td>2.3</td>
<td>ORU</td>
</tr>
</tbody>
</table>

Six subscriber protocols (RA TCP ORM, RA TALKLINK ORM and RA PSCRIBE ORM and RA TCP ORU, RA TALKLINK ORU and RA PSCRIBE ORU) were also exported by Radiology/Nuclear Medicine and subsequent patches. All of these protocols are exported purely for convenience; they can be used as subscribers, or they can serve as examples for creating new subscriber protocols.

<table>
<thead>
<tr>
<th>Subscriber Protocol</th>
<th>Potential SUBSCRIBER to</th>
<th>HL7 Version</th>
<th>Message Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA TCP ORM</td>
<td>RA REG, RA CANCEL, RA EXAMINED</td>
<td>2.1</td>
<td>ORM</td>
</tr>
<tr>
<td>RA TCP ORU</td>
<td>RA RPT</td>
<td>2.1</td>
<td>ORU</td>
</tr>
<tr>
<td>RA TALKLINK ORM</td>
<td>RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3</td>
<td>2.3</td>
<td>ORM</td>
</tr>
<tr>
<td>RA TALKLINK ORU</td>
<td>RA RPT 2.3</td>
<td>2.3</td>
<td>ORU</td>
</tr>
<tr>
<td>RA PSCRIBE ORM</td>
<td>RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3</td>
<td>2.3</td>
<td>ORM</td>
</tr>
<tr>
<td>RA PSCRIBE ORU</td>
<td>RA RPT 2.3</td>
<td>2.3</td>
<td>ORU</td>
</tr>
</tbody>
</table>

The subscriber protocols need to be entered in the SUBSCRIBERS multiple of event driver protocols. Once subscriber protocols are added, messages will be built and will stack up until the interface is started. The ORM protocols are for general order messages and should be used with the ORM event drivers. The ORU protocols are for observation results messages (reports) and should be used with the ORU event drivers.

If ever you need to completely disable an interface and want to stop new messages from being created for this interface, simply remove the subscriber protocols from the event driver protocols.

The TALKLINK protocols are intended for use with the TalkStation interface. The PSCRIBE protocols are intended for use with the PowerScribe interface. The TALKLINK and PSCRIBE protocols are essentially the same but are exported under different names for ease of support.

Listed below are example subscriber and event driver protocols for an interface to a COTS product. Also shown are screen shots from the HL7 Main Menu, Interface Developers Options…, Edit Protocols option showing how the example was created.
NAME: RA COTS ORM  
ITEM TEXT: TCP Client  
TYPE: subscriber  
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE  
RECEIVING APPLICATION: RA-COTSCLIENT  
EVENT TYPE: 001  
LOGICAL LINK: RA-COTS  
VERSION ID: 2.3  
RESPONSE MESSAGE TYPE: ACK  
SENDING FACILITY REQUIRED?: NO  
RECEIVING FACILITY REQUIRED?: NO  
SECURITY REQUIRED?: NO

<table>
<thead>
<tr>
<th>NAME: RA COTS ORM</th>
<th>PAGE 1 OF 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION (wp):</td>
<td>(empty)</td>
</tr>
<tr>
<td>ENTRY ACTION:</td>
<td></td>
</tr>
<tr>
<td>EXIT ACTION:</td>
<td></td>
</tr>
<tr>
<td>TYPE: subscriber</td>
<td></td>
</tr>
</tbody>
</table>

| COMMAND:                     | Press <PF1>H for help  Insert |

<table>
<thead>
<tr>
<th>NAME: RA COTS ORM</th>
<th>PAGE 2 OF 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECEIVING APPLICATION: RA-COTSCLIENT</td>
<td></td>
</tr>
<tr>
<td>RESPONSE MESSAGE TYPE: ACK</td>
<td>EVENT TYPE: 001</td>
</tr>
<tr>
<td>SENDING FACILITY REQUIRED?: NO</td>
<td>RECEIVING FACILITY REQUIRED?: NO</td>
</tr>
<tr>
<td>SECURITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>LOGICAL LINK: RA-COTS</td>
<td></td>
</tr>
<tr>
<td>PROCESSING RTN:</td>
<td></td>
</tr>
<tr>
<td>ROUTING LOGIC:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exit</th>
<th>Save</th>
<th>Refresh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter a command or '^' followed by a caption to jump to a specific field.

| COMMAND:                     | Press <PF1>H for help  Insert |

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<table>
<thead>
<tr>
<th>NAME: RA COTS ORU</th>
<th>ITEM TEXT: TCP Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE: subscriber</td>
<td>PACKAGE: RADIOLOGY/NUCLEAR MEDICINE</td>
</tr>
<tr>
<td>RECEIVING APPLICATION: RA-COTSCLIENT</td>
<td>EVENT TYPE: R01</td>
</tr>
<tr>
<td>LOGICAL LINK: RA-COTS</td>
<td>VERSION ID: 2.3</td>
</tr>
<tr>
<td>RESPONSE MESSAGE TYPE: ACK</td>
<td>SENDING FACILITY REQUIRED?: NO</td>
</tr>
<tr>
<td>RECEIVING FACILITY REQUIRED?: NO</td>
<td>SECURITY REQUIRED?: NO</td>
</tr>
</tbody>
</table>

### HL7 INTERFACE SETUP

**NAME: RA COTS ORU**

**DESCRIPTION (wp):** (empty)

**ENTRY ACTION:**

**EXIT ACTION:**

**TYPE: subscriber**

### HL7 SUBSCRIBER

**RECEIVING APPLICATION: RA-COTSCLIENT**

**RESPONSE MESSAGE TYPE: ACK**

**EVENT TYPE: R01**

**SENDING FACILITY REQUIRED?: NO**

**RECEIVING FACILITY REQUIRED?: NO**

**SECURITY REQUIRED?: NO**

**LOGICAL LINK: RA-COTS**

**PROCESSING RTN:**

**ROUTING LOGIC:**

Exit  Save  Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

**COMMAND:**  Press <PF1>H for help  Insert
NAME: RA REG 2.3
ITEM TEXT: Rad/Nuc Med exam registered for HL7 v2.3 message
TYPE: event driver  PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-RADSERVER  TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001  VERSION ID: 2.3
SUBSCRIBERS: RA COTS ORM

---

HL7 INTERFACE SETUP
PAGE 1 OF 2

NAME: RA REG 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <F1>H for help Insert

---

HL7 EVENT DRIVER
PAGE 2 OF 2
RA REG 2.3

SENDING APPLICATION: RA-RADSERVER
 TRANSACTION MESSAGE TYPE: ORM
 EVENT TYPE: 001
 PROCESSING ID: VERSION ID: 2.3
 ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA COTS ORM

COMMAND: Press <F1>H for Help Insert
NAME: RA CANCEL 2.3
ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.
SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3
SUBSCRIBERS: RA COTS ORM

HL7 INTERFACE SETUP
NAME: RA CANCEL 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:
TYPE: event driver

COMMAND: Press <PF1>H for help Insert

HL7 EVENT DRIVER
SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3
APPLICATION ACK TYPE:
ACCEPT ACK CODE:
PROCESSING ID:
SUBSCRIBERS
RA COTS ORM

COMMAND: Press <PF1>H for help Insert
NAME: RA EXAMINED 2.3
ITEM TEXT: Rad/Nuc Med examines case
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.

SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3

SUBSCRIBERS: RA COTS ORM

HL7 INTERFACE SETUP

NAME: RA EXAMINED 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help   Insert

HL7 EVENT DRIVER

NAME: RA EXAMINED 2.3
SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
PROCESSING ID: VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA COTS ORM

COMMAND: Press <PF1>H for help   Insert
NAME: RA RPT 2.3
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
SUBSCRIBERS: RA COTS ORU

HL7 INTERFACE SETUP

NAME: RA RPT 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help

HL7 EVENT DRIVER

SENDING APPLICATION: RA-RADSERVER
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
PROCESSING ID: VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA COTS ORU

Exit Save Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Press <PF1>H for help
Setup of HL7 Files for Two Way Radiology/COTS Interface

Skip this section if you do not require your interface to allow the COTS product to update Radiology/Nuclear Medicine with results messages.

Having followed the previous section to create a Radiology to COTS HL7 interface, you can now setup a COTS to Radiology HL7 interface. This means creating an additional link and two additional protocols.

1. **HL LOGICAL LINK FILE #870 LISTENER SETUP**

The link that is required to receive reports from a COTS product will be setup as a listener. HL7 developers **strongly recommend** that Single Listeners be used in place of Multiple Listeners. The main benefit being that it is much easier to debug and support a single listener interface because the HL7 Systems Link Monitor provides more meaningful information on the current state of the interface.

When creating a listener link you will not be required to enter a TCP/IP address; unless you are running under Cache. The same rules regarding multiple instances of TaskMan apply.

Three listener links are exported with Radiology/Nuclear Medicine and subsequent patches. These are exported for use in specific supported interfaces but can be viewed as examples of Logical Links:

<table>
<thead>
<tr>
<th>Logical Link</th>
<th>Reason exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>MED-RA</td>
<td>MedSpeak-Radiology link</td>
</tr>
<tr>
<td>PSCRIBE-RA</td>
<td>PowerScribe-Radiology link</td>
</tr>
<tr>
<td>TALK-RA</td>
<td>TalkStation-Radiology link</td>
</tr>
</tbody>
</table>

Shown below is an example of a newly created single listener link, which could be used to have a COTS product send reports to VISTA. This link would also send the report acknowledgement from VISTA back to the COTS product. The screen shots are taken from the HL7 Main Menu, Interface Developers Options…, Edit Link option.

Again, the example shows active, run-time data. Some of these fields are populated automatically by the HL7 package when the link is started and need not be entered manually.

You may choose to automatically start your HL7 links and Inbound/Outbound Filers when TaskMan is restarted. To do this, run the TaskMan, Schedule/Unschedule Option, select Restart All Links and Filers, and place a ‘S’ in the SPECIAL QUEUEING field. Then remember to set AUTOSTART to ‘1’ (Enabled) for each link.

See the VISTA HL7 Site Manager & Developer Manual for additional field definitions.
2. **Protocol File #101 Setup**

Two protocols will be required for Radiology to receive reports from a COTS product. An ORU message type subscriber protocol, and an event-driver.

Three event driver protocols (RA VOICE TCP SERVER RPT, RA TALKLINK TCP SERVER RPT and RA PSCRIBE TCP SERVER RPT) were exported with VISTA Radiology/Nuclear Medicine and subsequent patches.

<table>
<thead>
<tr>
<th>Event Driver Protocol</th>
<th>Reason Exported</th>
<th>HL7 Version</th>
<th>Message Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA VOICE TCP SERVER RPT</td>
<td>Event driver for MedSpeak rpts</td>
<td>2.1</td>
<td>ORU</td>
</tr>
<tr>
<td>RA TALKLINK TCP SERVER RPT</td>
<td>Event driver for TalkStation rpts</td>
<td>2.3</td>
<td>ORU</td>
</tr>
<tr>
<td>RA PSCRIBE TCP SERVER RPT</td>
<td>Event driver for PowerScribe rpts</td>
<td>2.3</td>
<td>ORU</td>
</tr>
</tbody>
</table>

Three subscriber protocols (RA VOICE TCP REPORT, RA TALKLINK TCP REPORT, RA PSCRIBE REPORT) were also exported and were added to the SUBSCRIBERS multiple of their respective event driver protocols.

<table>
<thead>
<tr>
<th>Subscriber Protocol</th>
<th>Reason Exported</th>
<th>HL7 Version</th>
<th>Message Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA VOICE TCP REPORT</td>
<td>MedSpeak subscriber protocol</td>
<td>2.1</td>
<td>ORU</td>
</tr>
<tr>
<td>RA TALKLINK TCP REPORT</td>
<td>TalkStation subscriber protocol</td>
<td>2.3</td>
<td>ORU</td>
</tr>
<tr>
<td>RA PSCRIBE TCP REPORT</td>
<td>PowerScribe subscriber protocol</td>
<td>2.3</td>
<td>ORU</td>
</tr>
</tbody>
</table>

These event driver and subscriber protocols can be used but are best viewed as examples of COTS-Radiology subscribers. When creating new protocols, the subscriber protocol must be entered in the SUBSCRIBERS multiple of the event driver protocol.

The subscriber protocol requires a Processing Routine to be defined. This will be the name of an M routine which processes the inbound report message and updates VISTA Radiology accordingly. If an acknowledgement needs to be returned to the sending COTS product, the code should call GENACK^HLMA1. Radiology/Nuclear Medicine exports one Processing Routine, RAHLTCPB, which can be used as an example. This Processing Routine is used for the MedSpeak, PowerScribe and TalkStation interfaces and is therefore generic by design.
NAME: RA COTS TCP REPORT  ITEM TEXT: Client for COTS TCP rpt
TYPE: subscriber  PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: Subscriber protocol for sending report to VISTA
Radiology/Nuclear Medicine. This protocol is used by the HL7 package to
process messages sent to VISTA from a COTS unit using TCP/IP for message flow.
RECEIVING APPLICATION: RA-RADSERVER  EVENT TYPE: R01
LOGICAL LINK: COTS-RA  VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK  PROCESSING ROUTINE: D REP^ZZRAHL7
SENDING FACILITY REQUIRED?: NO  RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

<table>
<thead>
<tr>
<th>HL7 INTERFACE SETUP</th>
<th>PAGE 1 OF 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME: RA COTS TCP REPORT</td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION (wp): [Subscriber protocol for sending report to VISTA]</td>
<td></td>
</tr>
<tr>
<td>ENTRY ACTION:</td>
<td></td>
</tr>
<tr>
<td>EXIT ACTION:</td>
<td></td>
</tr>
<tr>
<td>TYPE: subscriber</td>
<td></td>
</tr>
</tbody>
</table>

| COMMAND: | Press <PF1>H for help Insert |

<table>
<thead>
<tr>
<th>HL7 SUBSCRIBER</th>
<th>PAGE 2 OF 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA COTS TCP REPORT</td>
<td></td>
</tr>
<tr>
<td>RECEIVING APPLICATION: RA-RADSERVER</td>
<td></td>
</tr>
<tr>
<td>RESPONSE MESSAGE TYPE: ACK  EVENT TYPE: R01</td>
<td></td>
</tr>
<tr>
<td>SENDING FACILITY REQUIRED?: NO  RECEIVING FACILITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>SECURITY REQUIRED?: NO</td>
<td></td>
</tr>
<tr>
<td>LOGICAL LINK: COTS-RA</td>
<td></td>
</tr>
<tr>
<td>PROCESSING RTN: D RPT^ZZHL7RA</td>
<td></td>
</tr>
<tr>
<td>ROUTING LOGIC:</td>
<td></td>
</tr>
</tbody>
</table>

| COMMAND: | Press <PF1>H for help Insert |
NAME: RA COTS TCP REPORT SERVER
ITEM TEXT: COTS product sends report to VistA
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
SENDING APPLICATION: RA-COTSCLIENT
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
SUBSCRIBERS: RA COTS TCP REPORT

HL7 INTERFACE SETUP
PAGE 1 OF 2
NAME: RA COTS TCP REPORT SERVER
DESCRIPTION (wp): (empty)
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help Insert

HL7 EVENT DRIVER
PAGE 2 OF 2
RA COTS TCP REPORT SERVER
SENDING APPLICATION: RA-COTSCLIENT
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA COTS TCP REPORT

COMMAND: Press <PF1>H for help Insert

Exit Save Refresh
Enter a command or '^' followed by a caption to jump to a specific field.
Message Flow Diagram

The following chart shows the message flow for each of the 4 event point messages generated by VISTA Rad/Nuc Med, and also for the report message generated by COTS product. Two HL7 links are required for this interface:

- One to send new orders, (i.e., registration data, cancels, examined messages, and reports) to COTS product, and to receive ACK’s from COTS product for these orders, and
- A second to receive reports from COTS product and send ACK’s to COTS product.

Since the Rad/Nuc Med report messages are broadcast messages, even the reports that originate from a COTS product are sent back out to all broadcast recipients, including the same COTS product.

**SCENARIO 1 - VA SENDS ORDER OR REPORT MESSAGES TO THE COTS PRODUCT SERVER**

**1A. VA RAD/NUC MED SENDS ORDER MESSAGE (ORM) TO COTS PRODUCT SERVER**

There are 3 varieties of this message – a) new registration, b) cancelled exam, and c) exam images collected.

File #771 (server application) RA-RADSERVER

File #101 (protocol) RA REG 2.3, RA CANCEL 2.3, or RA EXAMINED 2.3 (item) RA COTS ORM

(File #771 client subscriber) RA-COTSCLIENT
(File #870 logical link) RA-COTS
(tcp/ip address) 152.129.2.9 (tcp/ip port) 7077 (vendor’s ORDER_PORT)

**1B. VA RAD/NUC MED SENDS VERIFIED OR PRELIMINARY (RELEASED/NOT VERIFIED) REPORT ORDER MESSAGE (ORU) TO COTS PRODUCT SERVER**

This is similar to order message above, but HL7 requires different protocol setup because the message type is ORU rather than ORM.

File #771 (server application) RA-RADSERVER

File #101 (protocol) RA RPT 2.3 (item) RA COTS ORU

(File #771 client subscriber) RA-COTSCLIENT
(File #870 logical link) RA-COTS
(tcp/ip address) 152.129.2.9 (tcp/ip port) 7078 (vendor’s ORDER_PORT)
1C. COTS PRODUCT SERVER SENDS ACKNOWLEDGEMENT FOR ORDER MESSAGE OR REPORT MESSAGE TO VA

(File #870 logical link) RA-COTS
(tcp/ip address) 152.129.2.9
(tcp/ip port) 7077 (vendor’s ORDER_PORT)

SCENARIO 2 - PROCESSING REPORTS FROM COTS PRODUCT SERVER

2A. COTS PRODUCT SERVER SENDS REPORT MESSAGE (ORU) TO VA

(File #870 logical link) COTS-RA
(tcp/ip port) 7078 (vendor’s REPORT_PORT)

2B. VA SENDS REPORT ACKNOWLEDGEMENT TO COTS PRODUCT SERVER

(server application)
RA-COTSCLIENT

(protocol) RA COTS TCP REPORT SERVER
(subscriber) RA COTS TCP REPORT

(File #101 client subscriber) RA-RADSERVER
(File #870 logical link) COTS-RA
(tcp/ip port) 7078 (vendor’s REPORT_PORT)

Note: VISTA orders are sent to the COTS server’s TCP/IP address, 152.129.2.9. Acknowledgements of those orders are sent back on the same link.

Reports are sent to the VISTA TCP/IP address of our listener link. VISTA sends acknowledgements of those reports back over the same link.
Startup and Recovery

**ONE-WAY TCP/IP INTERFACE**

With a one-way interface from Radiology you will only have one link, similar to the RA-COTS link described earlier. The link can be stopped and started using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option.

The link status will be shown on the Systems Link Monitor. Once opened the link usually toggles between LISTEN and READING. If the link status toggles between OPEN and OPENFAIL then the link has been unable to start. Most likely the COTS product service is not available for connection on the defined TPC/IP address and port.

**TWO-WAY TCP/IP INTERFACE**

If you are using a two-way TCP/IP interface with two links; a listener link, like the COTS-RA link described earlier; and a sender link, like the RA-COTS link described earlier; you need to stop and start the links following the guidelines below:

**Single Listener System (OpenVMS or Cache):**
1. Stop both VISTA HL7 links in any order using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option.
2. Start both VISTA HL7 links in any order using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option.

The status of both links will be shown on the Systems Link Monitor. Once opened the links usually toggles between LISTEN and READING. If the sender link status toggles between OPEN and OPENFAIL then the link has been unable to start. Most likely the COTS product service is not available for connection on the defined TPC/IP address and port.

**UCX Multi-Threaded Listener System (not recommended):**
1. Stop ONLY the VISTA HL7 sender link using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option. You DO NOT need to shut down the UCX listener link because generic UCX tools control this service.
2. Start ONLY the VISTA HL7 sender link using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option. The UCX listener link is a UCX service and will be started by UCX when Open VMS is brought up.

**Cache Multi-threaded Listener System:**
1. Stop both VISTA HL7 links in any order using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option.
2. Start both VISTA HL7 links in any order using the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links option.
VISTA HL7 Message Files

At times, you may find it necessary to look at the actual HL7 messages stored on file to find out more information on an order or report message.

HL7 Message Headers are stored on File #773, the HL7 Message Administration file, and the associated message text is stored in File #772, the HL7 Message Text file.

For a much more detailed discussion on VISTA HL7 message files and interface debugging see the VistA HL7 Site Manager & Developer Manual.

Below is an example of an Examined message, which was created by the COTS example interface described above. Messages can be selected by Date/Time Entered.

FILE #773: HL7 MESSAGE ADMINISTRATION

| NUMBER: 68438 | DATE/TIME ENTERED: APR 11, 2000@11:47:32 |
| MESSAGE ID: 49968438 | TRANSMISSION TYPE: OUTGOING |
| PRIORITY: DEFERRED | INITIAL MESSAGE: APR 11, 2000@11:47:32 |
| LOGICAL LINK: RA-COTS | SUBSCRIBER PROTOCOL: RA COTS ORM |
| SENDING APPLICATION: RA-RADSERVER | RECEIVING APPLICATION: RA-COTSCLIENT |
| MESSAGE TYPE: ORM | EVENT TYPE: O01 |
| MSH: MSH|^~\&|RA-RADSERVER|VISTA RADIOLOGY|RA-COTSCLIENT|COTS EXAMPLE|20000411114732-0600|ORM^O01|49968438|P|2.3|||US |
| STATUS: SUCCESSFULLY COMPLETED |
| STATUS UPDATE DATE/TIME: APR 21, 2000@09:56:21 |
| RETRANSMISSIONS: 1 |
| DATE/TIME PROCESSED: APR 21, 2000@09:56:21 |

FILE #772: HL7 MESSAGE TEXT

| DATE/TIME ENTERED: APR 11, 2000@11:47:32 |
| SERVER APPLICATION: RA-RADSERVER | TRANSMISSION TYPE: OUTGOING |
| MESSAGE ID: 49980527 | PARENT MESSAGE: APR 11, 2000@11:47:32 |
| PRIORITY: DEFERRED | RELATED EVENT PROTOCOL: RA EXAMINED 2.3 |
| MESSAGE TYPE: SINGLE MESSAGE |
| MESSAGE TEXT: |
| PID|345-67-0987^^|24^0^M10||LANDO^JOSEPH||19570105|M|||345670987| |
| ORC|XO|||CM|||20000411114732| |
| OBR|041000-802|6999589.8799-1^041000-802^L|74020^X-RAY EXAM OF |ABDOMEN^C4^174^ABDOMEN 3 OR MORE VIEWS^99RAP||20000411114732||| |
| OBX||CE|P^PROCEDURE^L||174^ABDOMEN 3 OR MORE VIEWS^L|||X |
| OBX||TX|M^MODIFIERS^L||LEFT|||X |
| OBX||CE|C4^CPT MODIFIERS^C4||26^PROFESSIONAL COMPONENT^C4^09926^PROFESSIONAL COMPONENT^C4|||X |
| OBX||TX|H^HISTORY^L|test for multiexam for one visit |||X |
| STATUS: SUCCESSFULLY COMPLETED |
| DATE/TIME PROCESSED: APR 11, 2000@11:47:33 |
| NO. OF CHARACTERS IN MESSAGE: 509 | NO. OF EVENTS IN MESSAGE: 1 |
Implementing and Maintaining an Interface Between Radiology and the MedSpeak Voice Reporting Tool

Introduction

This section describes the steps required to setup and maintain a link between VistA Radiology/Nuclear Medicine and the MedSpeak COTS Voice Recognition System.

NOTE: Support for the MedSpeak product has been withdrawn following Y2K but the information remains here for sites who are still using the software. TalkStation is the natural successor to MedSpeak since it uses the same speech engine.

Requirements

All released Radiology, HL7 and Kernel patches should be installed. In particular, HL7 patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5*17.

A MedSpeak server should be installed on the network with a permanent TCP/IP address which is reachable from VISTA.

Please consider putting the MedSpeak PC on a UPS. Power blips and outages have proven to be a problem in reliable message transmission.
Operational Features of the Interface

1. When an exam is registered, it should be retrievable in the MedSpeak database, and you should be able to enter a report for it.

2. When an exam is cancelled or deleted, it should be removed from the MedSpeak database, and you should not be able to enter a report for it.

3. If a verified report exists on the VISTA Rad/Nuc Med system for an exam, you should no longer be able to enter a report on MedSpeak. However, you should be able to enter addenda on MedSpeak.

4. An addendum entered on MedSpeak should cause the report on VISTA to be automatically unverified, updated, and re-verified. The contents of the re-verified report should be viewable through VISTA’s options: Supervisor menu, then Access Uncorrected Reports. (Although MedSpeak does not receive a message when the report is unverified, MedSpeak will receive a message when the report is re-verified.)

5. If a MedSpeak report is rejected by VISTA Rad/Nuc Med software, the report should NOT be filed in the Rad/Nuc Med Report database.

6. If a diagnostic code that is entered via MedSpeak is not an entry in File #78.3, DIAGNOSTIC CODES, the report should be rejected with an appropriate error message.

7. If an unauthorized user attempts to enter a report on the MedSpeak unit, the report should be rejected with an appropriate error message. An unauthorized user is someone who either (1) doesn’t have a Rad/Nuc Med staff or resident classification or (2) has a classification inactive date that is prior to the report date.

8. If a resident or staff interpreting physician without the RA VERIFY key enters a report on MedSpeak, the report should be filed, but should be in a ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

9. If the division where the exam was performed does not allow residents to verify reports, reports entered on MedSpeak by residents should go into ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

10. If the division where the exam was performed requires impression text, and the MedSpeak report does not include impression text, the report should be rejected with an appropriate error message.

11. If the impression text or the report text consists of a single character or any number of special (non-alphanumeric) characters, the report should be rejected with an appropriate error message.

12. If a MedSpeak report is transmitted at the same time a user is entering a report for the same case through VISTA Rad/Nuc Med in the Report Entry/Edit option, the MedSpeak report should be rejected with an appropriate error message.

13. If a MedSpeak report is transmitted at the same time a user is case editing a case that is a member of the same printset, the MedSpeak report should be rejected with an appropriate error message.

14. If a MedSpeak report is transmitted at the same time a user is status tracking a case that is a member of the same printset, the MedSpeak report should be rejected with an appropriate error message.
15. If the MedSpeak user does not have security privileges to verify a report, the report should be rejected with an appropriate error message. Requirements include the RA VERIFY key, no INACTIVE DATE in File #200, Field #53.4 (e.g., the verifier must be an active provider), Rad/Nuc Med staff or resident classification if site parameters allow residents to verify, or staff classification if site parameters don’t allow residents to verify.

16. Reports entered through MedSpeak should be viewable, printable, etc. through VISTA Rad/Nuc Med, Health Summary, mail messages, and alerts in a way identical to that of reports entered through VISTA Rad/Nuc Med. All options operating on reports should behave the same whether the source of the report was VISTA or MedSpeak.

17. Since MedSpeak reports do not include an electronic signature, when they appear in VISTA they should not contain an electronic signature. If the MedSpeak user has report verification privileges, however, and the report from MedSpeak meets all the site criteria for verification, the report should go to a ‘VERIFIED’ status.

18. When a MedSpeak report for a printset is transmitted and results in an accepted, verified report on VISTA, all members of the printset on VISTA should now include the same report when retrieved through patient profiles, View Exam by Case No., etc. Also, the report content should include the procedures for all members of the set.

19. If the site has the GENERATE EXAMINED HL7 MESSAGE field set to ‘yes’ on one or more statuses in File #72, the “examined” messages generated should have no effect on MedSpeak.

20. MedSpeak users are not allowed to group sets of exams together and mark them for a single report through MedSpeak. That process is handled through VISTA. MedSpeak users should be able to select a single exam in a printset and enter a report on it. After the report is transmitted to VISTA, it should apply to all printset members on VISTA, and the MedSpeak database should be automatically updated to mark the other printset members so that they can no longer be selected for report entry.

21. If a report is entered in MedSpeak as ‘preliminary’, when it reaches VISTA, it should be set to ‘DRAFT’ or, if the site parameters allow, ‘RELEASED/NOT VERIFIED’.

22. MedSpeak reports may include an electronic signature. This will be visible when the report is displayed or printed in VISTA. Electronic signatures will only appear on the VISTA report if the Rad/Nuc Med Division (file #79) parameter ALLOW E-SIG ON COTS HL7 RPTS is set.
IRM and ADPAC Set-up Procedures

Most of the VISTA HL7 file setup will be done by the installation of RA*5.0*17, but some must be manually completed by IRM. See a sample of the VISTA setup in Setup of HL7 Files, later in this section.

1. You must provide the TCP/IP address for the MedSpeak unit and TCP/IP port numbers for both VISTA and MedSpeak. See a sample of the VISTA setup in Setup of HL7 Files, later in this appendix. (Note: depending on your operating system, you may or may not have to input a TCP/IP Address for the listener.)

2. The Rad/Nuc Med coordinator who supports the MedSpeak unit must follow the MedSpeak documentation/instructions for proper user definition. The Physician ID field in the MedSpeak user set-up must be identical to the corresponding username in the .01 field of the VISTA New Person file #200. This is the name that will be entered as the verifying physician for medical/legal purposes. Reports will be rejected if the MedSpeak user is not identical to the New Person NAME field.

3. Although MedSpeak does not require an electronic signature to be entered when verifying a report, VISTA can store an electronic signature with the report if desired. The Radiology/Nuclear Medicine coordinator must initialize the ‘ALLOW E-SIG ON COTS RPTS’ parameter in the RAD/NUC MED DIVISION file (#79) to switch on this feature. All reports with an HL7 status of Final, or Addendum, will be filed in the Rad/Nuc Med Reports file #74 with the electronic signature block printed name defined in file #200 of the verifying physician who finalized the report on the MedSpeak unit. Before a report can be filed in VISTA with an electronic signature, it must pass all validation processes outlined in the Operational Features section. See the Rad/Nuc Med Technical Manual section on security for further electronic signature information.

4. The Rad/Nuc Med coordinator who supports the MedSpeak unit must follow the MedSpeak documentation/instructions for defining Rad/Nuc Med diagnostic codes. Diagnostic Codes on the MedSpeak unit must be identical to the active diagnostic codes in VISTA File #78.3. Diagnostic codes or code numbers may be used during dictation. Since it will be quicker for them to enter the code numbers, interpreting physicians may want to have a printed list of code numbers and text (VISTA Diagnostic Codes file #78.3, fields .001 and .01) next to the MedSpeak machine as they dictate.

5. If the MedSpeak interface is moved from a test account to the production account, update the TCP/IP port numbers on both sides, and delete the MedSpeak database (using SQL commands) to prevent cross-over of test data to the live account. (The change of port numbers ensures a unique socket connection. But the TCP/IP address of the MedSpeak remains the same.)

6. Make sure all other MedSpeak setup is correct and complete according to MedSpeak documentation.

7. It is very helpful to synchronize the MedSpeak PC clock to closely agree with the VISTA system clock.

8. Responsibility for starting, stopping, and monitoring the links can belong to IRM, or IRM can delegate this to the Rad/Nuc Med coordinator with the understanding that if problems occur, IRM may have to provide support.

9. MedSpeak users and IRM should learn how to find and interpret error messages for rejected reports. If VISTA Rad/Nuc Med rejects a report sent by MedSpeak, an error message is sent back to MedSpeak. If the error is returned by Radiology, rather than the HL7 software, then it will be logged in the HL7
Message Exceptions file #79.3 and can be viewed using the Rad/Nuc Med HL7 Voice Reporting Errors option [RA HL7 VOICE REPORTING ERRORS]

10. This interface requires link tasks to always start up on the same node. So, if your site is an Alpha/AXP site running more than one instance of TaskMan, you **must** start up TaskMan in DCL context. Consult the Kernel System Manual for instructions on running TaskMan in DCL context.
Setup of HL7 Files

All of the setup, except for site-specific fields, was done automatically by the Rad/Nuc Med patch RA*5*17. However, the site is responsible for entering the TCP/IP address, TCP/IP port numbers, Startup Node and other fields that are site-specific (these items are shown in bold).

A sample setup follows. **IRM should only populate the fields in bold print. Your responses should be specific to your site, and not necessarily what you see below.** The VISTA screen shots are taken from the HL7 Main Menu, Interface Developers Option. Also listed are the associated lines from agentapp.ini; a file on the MedSpeak machine which defines interface behavior.

1. **HL7 APPLICATION PARAMETER FILE #771 SETUP**

   NAME: RA-CLIENT-TCP  
   ACTIVE/INACTIVE: ACTIVE
   FACILITY NAME: MEDSPEAK  
   COUNTRY CODE: US

   HL7 APPLICATION EDIT
   -----------------------------------------------
   NAME: RA-CLIENT-TCP  
   ACTIVE/INACTIVE: ACTIVE
   FACILITY NAME: MEDSPEAK  
   COUNTRY CODE: US

   HL7 FIELD SEPARATOR:  
   HL7 ENCODING CHARACTERS:  
   MAIL GROUP: 

   Exit  Save  Refresh

   Enter a command or '^' followed by a caption to jump to a specific field.

   COMMAND: Press <PF1>H for help  Insert
Notes: See vendor documentation for more information on MedSpeak setup. The following items are a subset that correlate to VISTA setup.

The MedSpeak agentapp.ini file should have the same application names as the HL7 Application Parameter file. This is used by HL7 to determine who the senders and receivers are in the message header, and to route incoming messages properly. In this example, the agentapp.ini file on the MedSpeak machine would contain the following:

```
SendingApplication = RA-CLIENT-TCP
SendingFacility = MEDSPEAK
ReceivingApplication = RA-SERVER-IMG
ReceivingFacility = VISTA RADIOLOGY
```

Whilst it is unimportant as to the values of the Sending Facility and Receiving Facility, they must match in MedSpeak’s agentapp.ini file and VISTA HL7 Application Parameter file #771.

Also, the Domain name of the MedSpeak unit on your LAN must be known to the MedSpeak unit (see instructions from vendor).
The MedSpeak agentapp.ini file should contain a line defining the OBX-3 format used by VISTA Rad/Nuc Med for clinical history, allergies, and modifiers. Usually, the line that should appear in agentapp.ini is:

```
OBXIDFilter = /H~HISTORY~L/A~ALLERGIES~L/M~MODIFIERS~L/C4~CPT MODIFIERS~C4/
```

The Trigger Event in the agentapp.ini file on the MedSpeak machine should normally be set as follows to indicate the event code of a report message:

```
TriggerEvent = R01
```

In order to tell MedSpeak that the VA observation value for final results on report messages is an ‘F’, the agentapp.ini file should contain the following line:

```
OBRObservationValue = F
```
2. **HL LOGICAL LINK FILE #870 SETUP**

This file contains the links used by the HL7 package to send messages. It is used to identify the TCP/IP address of the MedSpeak unit, as well as the TCP/IP port numbers that will be used. These addresses are all site-specific and must be entered by IRM before the links are started.

On systems running more than one instance of TaskMan, the link tasks must be forced to start up on the same CPU (i.e. same TCP/IP address) every time. This is accomplished by entering a “STARTUP NODE”. If this is not done, MedSpeak will shut down the links and the interface will crash.

**The STARTUP NODE field should ONLY be populated on Alpha/AXP systems that are running more than one instance of TaskMan under DCL context. In this instance the STARTUP NODE should be set to the box-volume pair (eg:VAH:532A04). For single TaskMan and UCX listeners leave null.**

This file also stores parameters that define the behavior of the lower level protocols and information that is used with the Systems Link Monitor, which gives the user feedback about the state of each link. When a message is received, the link moves from an IDLE state to a READING state. In this sample the links are used for the following messages:

- RA-MED is used to send order messages (i.e., exam registered, exam cancelled, patient examined, and report verified or released/not verified) from VISTA to MedSpeak. This link also receives the order Acknowledgement from MedSpeak.

- MED-RA is used to send reports created on the MedSpeak unit to VISTA. It is also used to send report Acknowledgement messages from VISTA to MedSpeak.

This sample shows active, run-time data. Some of the fields are populated by the Rad/Nuc Med patch RA*5*17. The remainder of the fields are populated by the HL7 package when you start up the links.

Although it is not exported, it is strongly recommended that you add an ACK timeout for the sender link. If you do not enter a value then a default of 10 seconds will be used and experience has shown that this is not enough for a busy TCP/IP network. We recommend using between 300 and 600 seconds.

Regardless of the ‘Exceed Re-Transmit Action’ entered, when the ‘Re-Transmission Attempts’ for a message is exceeded, an alert is sent to the mail group defined in the MAIL GROUP FOR ALERTS field in the HL COMMUNICATIONS SERVER PARAMETERS (#869.3) file. This can be edited using the HL7 Main Menu, Site Parameter Edit option.

You may choose to automatically start all HL7 Logical Links and Inbound/Outbound Filers when TaskMan is restarted. To do this, run the TaskMan, Schedule/Unschedule Options, select Restart All Links and Filers, and place an ‘S’ in the SPECIAL QUEUEING field. Then remember to set AUTOSTART to ‘1’ (Enabled) for each link.

The RA-MED link is exported as a Persistent Client. This could be changed to be Non-Persistent but it is not recommended for the MedSpeak interface. Changing this value would mean that reports may appear tardy in being filed on VISTA because the MED-RA link relies on the RA-MED link being open and connected. The advantage of Non-Persistent clients is that the link only connects when required, rather than leaving the process open at all times.
See the VISTA HL7 Site Manager & Developer Manual section 2.4 TCP Link Setup for additional field definitions. The values shown below have been proven to work in the past.

Note: The MedSpeak agentapp.ini does not contain TCP/IP addresses, but it does have to be configured for TCP/IP PORT numbers. For this example, the MedSpeak agentapp.ini file would have the following **port configuration entries**:

```
Order_Port = 5010
Report_Port = 5012
```
NODE: MED-RA
LLP TYPE: TCP
DEVICE TYPE: Single-threaded Server
TCP/IP PORT: 5012
STARTUP NODE:

TCP/IP SERVICE TYPE: SINGLE LISTENER

AUTOSTART: Enabled
TCP/IP ADDRESS: <-- address of listener only needed for Cache/NT
TCP/IP PORT: 5012 <-- port MedSpeak sends to

ACK TIMEOUT:
RE-TRANSMISSION ATTEMPTS:
READ TIMEOUT:
EXCEED RE-TRANSMIT ACTION:
BLOCK SIZE:
STARTUP NODE: <-- ONLY set if multiple TaskMan/DCL PERSISTENT:
RETENTION:
UNI-DIRECTIONAL WAIT:

Close  Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close  Press <PF1>H for help  Insert
3. **Protocol File #101 Setup**

The event driver entries (RA REG, RA EXAMINED, RA CANCEL, RA RPT and RA VOICE TCP SERVER RPT) were exported with the Rad/Nuc Med VISTA patch RA*5.0*17 for use with this interface. They are also event driver protocols for the messages broadcasted to PACS/Imaging and other subscribers.

Also exported are the subscriber protocols (RA TCP ORM, RA TCP ORU and RA VOICE TCP REPORT).

(Please refer to the ‘Radiology/Nuclear Medicine HL7 Interface Specifications’ section of this document for information about messages initiated by Radiology/Nuclear Medicine.)

In order to associate the event driver protocols with the Radiology-MedSpeak interface and thereby initiate messages, the MedSpeak subscriber protocols need to be added to the associated event driver SUBSCRIBERS multiple.

Once the subscriber protocols are added, messages will be built and will stack up until the links are started.

If ever you need to completely disable the interface and want to stop new messages from being created for this interface, simply remove the MedSpeak subscriber protocols from the event driver protocols.

Listed below are examples of the event driver protocols with the subscriber protocols that require addition shown in bold. You may see other subscribers listed on your system, these should not be removed.

Also below are screen shots from the HL7 Main Menu, Interface Developers Options…, Protocol Edit highlighting the steps required to add the subscriber protocols.

The protocols shown without screen shots are part of the Radiology-MedSpeak interface but do not require amendment.
NAME: RA REG
ITEM TEXT: Rad/Nuc Med exam registered

TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE

DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: O01
VERSION ID: 2.1

SUBSCRIBERS: RA TCP ORM

---

HL7 INTERFACE SETUP

NAME: RA REG

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver <-- hit <return> here to edit event driver details

---

HL7 EVENT DRIVER

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: O01

PROCESSING ID:
VERSION ID: 2.1

ACCEPT ACK CODE:
APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA TCP ORM <-- add this subscriber

---

COMMAND: Press <PF1>H for help Insert
**NAME:** RA CANCEL  
**ITEM TEXT:** Rad/Nuc Med exam cancellation  

**TYPE:** event driver  
**PACKAGE:** RADIOLOGY/NUCLEAR MEDICINE  

**DESCRIPTION:** This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM message consisting of PID, ORC, OBR and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.

**SENDING APPLICATION:** RA-SERVER-IMG  
** TRANSACTION MESSAGE TYPE:** ORM  
** EVENT TYPE:** 001  
** VERSION ID:** 2.1  

**SUBSCRIBERS:** RA TCP ORM  

---

**HL7 INTERFACE SETUP**

<table>
<thead>
<tr>
<th>NAME: RA CANCEL</th>
</tr>
</thead>
</table>

| DESCRIPTION (wp): | [This protocol is triggered whenever a Radiology] |

<table>
<thead>
<tr>
<th>ENTRY ACTION:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EXIT ACTION:</th>
</tr>
</thead>
</table>

| TYPE: event driver | <-- hit <return> here to edit event driver details |

---

**HL7 EVENT DRIVER**

<table>
<thead>
<tr>
<th>RA CANCEL</th>
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</table>

<table>
<thead>
<tr>
<th>SENDING APPLICATION: RA-SERVER-IMG</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TRANSACTION MESSAGE TYPE: ORM</th>
<th>EVENT TYPE: 001</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PROCESSING ID:</th>
<th>VERSION ID: 2.1</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ACCEPT ACK CODE:</th>
<th>APPLICATION ACK TYPE:</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>RESPONSE PROCESSING RTN:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SUBSCRIBERS</th>
</tr>
</thead>
</table>

| RA TCP ORM | <-- add this subscriber |

---

**COMMAND:** Press <PF1>H for help Insert
NAME: RA EXAMINED
ITEM TEXT: Rad/Nuc Med examined case
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.1
SUBSCRIBERS: RA TCP ORM

NAME: RA EXAMINED
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver <-- hit <return> here to edit event driver details

COMMAND: Press <PF1>H for help Insert

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
PROCESSING ID: VERSION ID: 2.1
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA TCP ORM <-- add this subscriber

COMMAND: Press <PF1>H for help Insert
NAME: RA RPT
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.1
SUBSCRIBERS: RA TCP ORU

---

HL7 INTERFACE SETUP

NAME: RA RPT
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver <-- hit <return> here to edit event driver details

---

COMMAND: Press <PF1>H for help Insert

---

HL7 EVENT DRIVER

SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.1
ACCEPT ACK CODE:
APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA TCP ORU <-- add this subscriber

---

COMMAND: Press <PF1>H for help Insert
NAME: RA TCP ORM
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA REG, RA EXAMINED, and RA CANCEL event protocols. It is used by the VISTA HL7 package to send ORM messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of those event point protocols if this type of messaging scenario is used at a facility. This is part of the file set-up to enable HL7 message flow when exams are registered, cancelled, and when they reach the status flagged as 'examined' by the site.
RECEIVING APPLICATION: RA-CLIENT-TCP
EVENT TYPE: 001
LOGICAL LINK: RA-MED
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO

NAME: RA TCP ORU
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA RPT event point protocol. The HL7 package uses this protocol to send rad/nuc med report (ORU) messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of the RA RPT protocol if this messaging scenario is used in a facility. This is part of the file set-up to enable message flow when a rad/nuc med report is verified.
RECEIVING APPLICATION: RA-CLIENT-TCP
EVENT TYPE: R01
LOGICAL LINK: RA-MED
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO

NAME: RA VOICE TCP SERVER RPT
ITEM TEXT: Voice TCP sends report to VISTA
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: Driver protocol for sending report to VISTA Radiology/Nuclear Medicine. This protocol is used by the HL7 package to process radiology/nuclear med reports coming into VISTA from commercial voice recognition units using TCP/IP for message flow.
SENDING APPLICATION: RA-CLIENT-TCP
EVENT TYPE: R01
TRANSACTION MESSAGE TYPE: ORU
VERSION ID: 2.1
SUBSCRIBERS: RA VOICE TCP REPORT

NAME: RA VOICE TCP REPORT
ITEM TEXT: Client for Voice TCP rpt
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: Subscriber protocol for sending report to VISTA Radiology/Nuclear Medicine. This protocol is used by the HL7 package to process messages sent to VISTA from a COTS voice recognition unit using TCP/IP for message flow. This protocol should be entered in the SUBSCRIBERS multiple of the RA VOICE TCP SERVER RPT protocol.
RECEIVING APPLICATION: RA-SERVER-IMG
EVENT TYPE: R01
LOGICAL LINK: MED-RA
RESPONSE MESSAGE TYPE: ACK
PROCESSING ROUTINE: D ^RAHLTCPB
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
Detailed Explanation of Start-up/Recovery Procedure

1. Stop the appropriate links from the HL7 Main Menu, Filer and Link Management Options…,
Start/Stop Links:

   **Single Listener System (OpenVMS or Cache)**: Stop both VISTA HL7 links (RA-MED and MED-RA) in any order.

   **UCX Multi-Threaded Listener System**: Stop only the RA-MED link. (You do NOT need to shut down the UCX listener. Generic UCX tools control UCX services.)

   **Cache Multi-Threaded Listener System**: Stop both VISTA HL7 links (RA-MED and MED-RA) in any order.

2. If necessary, boot or reboot the MedSpeak unit (i.e., reboot only if an application error occurred on the MedSpeak unit, or a previous attempt at recovery has failed). Rebooting can be done using the Start button and selecting ‘Shut Down’. To gain more control over the VA Proxy and RIS Interface agent on the MedSpeak machine, you can set up these service to start manually rather than auto-start. If they are set up to auto-start, they should both start automatically during reboot.

3. If VA Proxy is not setup to start automatically, on the MedSpeak unit, use the Start button, Settings, Control Panel, Services, then select VA Proxy to get a pop-up box and click on ‘start’. The status of the VA Proxy should change from null to ‘started’.

4. If RIS Interface Agent is not setup to start automatically, within Services (see previous mention in this Appendix), select RIS Interface Agent click on ‘start’. The status of the RIS Interface Agent should change from null to ‘started’.

5. On Open-M/Cache systems only, it is a good idea to kill off the logical link listener job (%ZISTCP) before restarting the links. This step is optional, but will prevent an extinct job from unnecessarily using up CPU time. Use the system status utility to find these jobs. They appear as running the %ZISTCP routine using port numbers that you entered as TCP/IP PORT in the setup (i.e., File #870, Field #400.02 TCP/IP PORT, for entries RA-MED and MED-RA). This step may be unnecessary after additional HL7 package patches.
6. Start the “listener link” MED-RA:

**Single Listener System (OpenVMS or Cache):** From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links, enter MED-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

**UCX Multi-Threaded Listener System:** No action is needed. The listener is an OpenVMS UCX service and UCX starts running when OpenVMS is brought up.

**Cache Multi-Threaded Listener System:** From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links, enter MED-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

7. Verify that the listener link is up and running:

**Single Listener System (OpenVMS and Cache):** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually changes between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

**UCX Multi-Threaded Listener System:** The OpenVMS UCX service should be enabled. The columns indicating message totals for the MED-RA HL7 link are accurately reflected in the System Link Monitor. Disregard the information presented in the Device Type and State columns for the MED-RA HL7 link.

**Cache Multi-Threaded Listener System:** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually changes between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

8. Start the “sender” link RA-MED: From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links.

**All Single and Multi-Threaded Listener Systems:** Enter RA-MED at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

9. Use the Systems Link Monitor option again to verify that all links are up and running. If the VA Proxy and RIS Interface Agent services are not running on the MedSpeak server, then the RA-MED link will toggle between an Open and OpenFail state.
# Start-up/Recovery Procedure Quick Reference

## Radiology-MedSpeak Interface

<table>
<thead>
<tr>
<th>Step</th>
<th>Machine</th>
<th>Action</th>
<th>Mandatory, Optional, or Conditional</th>
</tr>
</thead>
</table>
| 1    | VISTA   | Single Listener System (OpenVMS or Cache): Shut down logical links (in any order)  
UCX Multi-Threaded Listener System: Shut down the RA-MED link.  
Cache Multi-Threaded Listener System: Shut down logical links (in any order) | Mandatory |
| 2    | MedSpeak | Reboot | Only if MedSpeak application error occurred or MedSpeak PC suffered power loss, etc. |
| 3    | MedSpeak | Start up VA Proxy service (if applicable) | Only if down and not set to auto-start |
| 4    | MedSpeak | Start up RIS Interface Agent service (if applicable) | Only if down and not set to auto-start |
| 5    | VISTA (Open-M/ Cache only) | Kill the old logical link listener job (%ZISTCP with port matching TCP/IP PORT no. used by the MED-RA link) | Optional |
| 6    | VISTA   | Single Listener System (OpenVMS or Cache): start the MED-RA listener logical link  
UCX Multi-Threaded Listener System: enable the OpenVMS UCX Service (if disabled)  
Cache Multi-Threaded Listener System: start the MED-RA listener logical link | Mandatory |
| 7    | VISTA   | Start the sender logical link: RA-MED | Mandatory |

**Note:** If the MedSpeak VA Proxy or the RIS Interface Agent services go down, the recovery process is necessary.

**Single Listener System (OpenVMS or Cache):** Shutdown both RA-MED and MED-RA links.  
**UCX Multi-Threaded Listener System:** Shut down the RA-MED link.  
**Cache Multi-Threaded Listener System:** Shutdown both RA-MED and MED-RA links.

If the VISTA machine is going to be shutdown:  
**Single Listener System (OpenVMS or Cache):** Shut down both HL7 links.  
**UCX Multi-Threaded Listener System:** Shut down the RA-MED link.  
**Cache Multi-Threaded Listener System:** Shut down both HL7 links.
Implementing and maintaining an interface between Radiology and the TalkStation Voice Reporting Tool

Introduction

This section describes the steps required to setup and maintain a link between VISTA Radiology/Nuclear Medicine and the TalkStation COTS Voice Recognition System. TalkStation supersedes the MedSpeak product but, since MedSpeak is an integral part of the TalkStation system, the systems are closely linked.

This is a two-way TCP/IP HL7 interface using two links for message transactions. The sender link, RA-TALK, has been exported by Radiology/Nuclear Medicine and subsequent patches to send order messages to TalkStation. The listener link, TALK-RA, has been exported by Radiology/Nuclear Medicine to receive reports from TalkStation. Message acknowledgements are sent across the same link as the originating message.

On the TalkStation server, the TalkStation Link service must be running to complete the links and allow message flow to begin.

Requirements

All released Radiology, HL7 and Kernel patches should be installed. In particular, HL7 patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5*17.

A TalkStation server should also be installed on the network with a permanent TCP/IP address which is reachable from VISTA.

Please consider putting the TalkStation server PC on a UPS. Power blips and outages have proven to be a problem in reliable message transmission.
Operational Features of the Interface

1. When an exam is registered, it should be retrievable in the TalkStation database, and you should be able to enter a report for it.

2. When an exam is cancelled or deleted, it should be removed from the TalkStation database, and you should not be able to enter a report for it.

3. If a verified report exists on the VISTA Rad/Nuc Med system for an exam, you should no longer be able to enter a report on TalkStation. However, you should be able to enter addenda on TalkStation.

4. An addendum entered on TalkStation should cause the report on VISTA to be automatically unverified, updated, and re-verified. The contents of the re-verified report should be viewable through VISTA’S options: Supervisor menu, then Access Uncorrected Reports. (Although TalkStation does not receive a message when the report is unverified, TalkStation will receive a message when the report is re-verified.)

5. If a TalkStation report is rejected by VISTA Rad/Nuc Med software, the report should NOT be filed in the Rad/Nuc Med Report database. The rejected report will remain available on TalkStation, in Preliminary status, for correction.

6. If a diagnostic code that is entered via TalkStation is not an entry in File #78.3, DIAGNOSTIC CODES, the report should be rejected with an appropriate error message.

7. If an unauthorized user attempts to enter a report on the TalkStation unit, the report should be rejected with an appropriate error message. An unauthorized user is someone who either (1) doesn't have a Rad/Nuc Med staff or resident classification or (2) has a classification inactive date that is prior to the report date.

8. If a resident or staff interpreting physician without the RA VERIFY key enters a report on TalkStation, the report should be filed, but should be in a ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

9. If the division where the exam was performed does not allow residents to verify reports, reports entered on TalkStation by residents should go into ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

10. If the division where the exam was performed requires impression text, and the TalkStation report does not include impression text, the report should be rejected with an appropriate error message.

11. If the impression text or the report text consists of a single character or any number of special (non-alphanumeric) characters, the report should be rejected with an appropriate error message.

12. If a TalkStation report is transmitted at the same time a user is entering a report for the same case through VISTA Rad/Nuc Med in the Report Entry/Edit option, the TalkStation report should be rejected with an appropriate error message.

13. If a TalkStation report is transmitted at the same time a user is case editing a case that is a member of the same printset, the TalkStation report should be rejected with an appropriate error message.
14. If a TalkStation report is transmitted at the same time a user is status tracking a case that is a member of the same printset, the TalkStation report should be rejected with an appropriate error message.

15. If the TalkStation user does not have security privileges to verify a report, the report should be rejected with an appropriate error message. Requirements include the RA VERIFY key, no INACTIVE DATE in File #200, Field #53.4 (e.g., the verifier must be an active provider), Rad/Nuc Med staff or resident classification if site parameters allow residents to verify, or staff classification if site parameters don’t allow residents to verify.

16. Reports entered through TalkStation should be viewable, printable, etc. through VISTA Rad/Nuc Med, Health Summary, mail messages, and alerts in a way identical to that of reports entered through VISTA Rad/Nuc Med. All options operating on reports should behave the same whether the source of the report was VISTA or TalkStation.

17. TalkStation reports may include an electronic signature. This will be visible when the report is displayed or printed on VISTA. Electronic signatures will only appear on the VISTA report if the Rad/Nuc Med Division (file #79) parameter ALLOW E-SIG ON COTS HL7 RPTS is set.

18. When a TalkStation report for a printset is transmitted and results in an accepted, verified report on VISTA, all members of the printset on VISTA should now include the same report when retrieved through patient profiles, View Exam by Case No., etc. Also, the report content should include the procedures for all members of the set.

19. If the site has the GENERATE EXAMINED HL7 MESSAGE field set to ‘yes’ on one or more statuses in File #72, the “examined” messages generated should have no effect on TalkStation.

20. TalkStation users are not allowed to group sets of exams together and mark them for a single report through TalkStation. That process is handled through VISTA. TalkStation users should be able to select a single exam in a printset and enter a report on it. After the report is transmitted to VISTA, it should apply to all printset members on VISTA, and the TalkStation database should be automatically updated to mark the other printset members so that they can no longer be selected for report entry.

21. If a report is entered in TalkStation as ‘preliminary’, when it reaches VISTA, it should be set to ‘DRAFT’ or, if the site parameters allow, ‘RELEASED/NOT VERIFIED’.
IRM and ADPAC Set-up Procedures

Most of the VISTA HL7 file setup has been done by the installation of RA*5.0*17, but some must be manually completed by IRM. See a sample of the VISTA setup in Setup of HL7 Files, later in this section.

1. You must provide the TCP/IP address for the TalkStation unit and TCP/IP port numbers for both VISTA and TalkStation. See a sample of the VISTA setup in Setup of HL7 Files, later in this appendix. (Note: you will only be required to input a TCP/IP Address for the listener on Cache for NT sites.)

2. The Rad/Nuc Med coordinator who supports the TalkStation unit must follow the TalkStation documentation/instructions for proper user definition. The Physician ID field in the TalkStation user set-up must be identical to the corresponding internal entry number of the VISTA New Person file #200. This ensures that the correct name will be entered as the verifying physician for medical/legal purposes. Reports will be rejected if the TalkStation user is not identical to the entry in the New Person file.

3. If electronic signature is to be allowed across the interface, the Rad/Nuc Med coordinator must initialize the parameters in the RAD/NUC MED DIVISION file #79 to allow this feature. Set field #.1.127 ‘ALLOW E-SIG ON COTS HL7 RPTS’ to yes. All reports with an HL7 status of Final, or Addendum, will be filed in the Rad/Nuc Med Reports file #74 with the electronic signature block printed name defined in file #200 of the verifying physician who signed the report on the TalkStation unit. Before a report can be filed in VISTA with an electronic signature, it must pass all validation processes outlined in the section on Operational Features later in this appendix.

   Warning:
   - If the MedSpeak interface is being used within the same division, this feature may not be desired due to the signing process involved on the MedSpeak unit. Refer to the MedSpeak documentation for more information on the procedures for signing reports.
   - See the Rad/Nuc Med Technical Manual section on Security for further electronic signature information.

4. The Rad/Nuc Med coordinator who supports the TalkStation unit must follow the TalkStation documentation/instructions for defining Rad/Nuc Med Diagnostic Codes. However TalkStation is pre-loaded to use ICD9 codes; these will have to be removed before entering VISTA Diagnostic Codes. An SQL command, run on the TalkStation server, of ‘delete from icd9’ should accomplish this. Diagnostic Codes entered on the TalkStation unit must be identical to the active diagnostic codes in VISTA File #78.3. Use the TalkRIS ICD9 option documented in the TalkRIS User Guide Chapter 9.
5. Make sure all other TalkStation setup is correct and complete according to TalkStation documentation.

6. If the TalkStation interface is moved from a test account to the production account, update the TCP/IP port numbers on both sides, and delete the TalkStation database (using SQL commands) to prevent cross-over of test data to the live account. (The change of port numbers ensures a unique socket connection. But the TCP/IP address of the TalkStation remains the same.)

7. It is very helpful to synchronize the TalkStation PC clock to closely agree with the VISTA system clock.

8. Responsibility for starting, stopping, and monitoring the links can belong to IRM, or IRM can delegate this to the Rad/Nuc Med coordinator with the understanding that if problems occur, IRM may have to provide support.

9. TalkStation users and IRM should learn how to find and interpret error messages for rejected reports. If VISTA Rad/Nuc Med rejects a report sent by TalkStation, an error message is sent back to TalkStation. If the error is returned by Radiology, rather than the HL7 software, then it will be logged in the HL7 Message Exceptions file #79.3 and can be viewed using the Rad/Nuc Med HL7 Voice Reporting Errors option.

10. This interface requires link tasks to always start up on the same node. So, if your site is an Alpha/AXP site running more than one instance of TaskMan, you must start up TaskMan in DCL context. Consult the Kernel System Manual for instructions on running TaskMan in DCL context.
Setup of HL7 Files

All of the setup, except for site-specific fields, was done automatically by the Rad/Nuc Med patch RA*5.0*17. However, the site is responsible for entering the TCP/IP address, TCP/IP port numbers, Startup Node and other fields that are site-specific (these items are shown in bold).

A sample setup follows. **IRM should only populate the fields in bold print. Your responses should be specific to your site, and not necessarily what you see below.** The VISTA screen shots are taken from the HL7 Main Menu, Interface Developers Option. Windows style screen shots are taken from the TalkStation/Link utility.

1. **HL7 APPLICATION PARAMETER FILE #771 SETUP**

```
NAME: RA-TALKLINK-TCP        ACTIVE/INACTIVE: ACTIVE
FACILITY NAME: TALKSTATION    COUNTRY CODE: US
HL7 ENCODING CHARACTERS: ^~\&  HL7 FIELD SEPARATOR: |
```

Enter a command or '^' followed by a caption to jump to a specific field.

**COMMAND:** Press <PF1>H for help  Insert
NAME: RA-VOICE-SERVER  ACTIVE/INACTIVE:ACTIVE
FACILITY NAME: VISTA RADIOLOGY  COUNTRY CODE: US
HL7 ENCODING CHARACTERS: ^~\&  HL7 FIELD SEPARATOR: |

Hl7 Application Edit

Name: RA-VOICE-SERVER  Active/Inactive: ACTIVE

Facility Name: VISTA RADIOLOGY  < Enter name  Country Code: US

HL7 Field Separator: |  HL7 Encoding Characters: ^~\&

Mail Group:

Exit  Save  Refresh

Enter a command or ‘^’ followed by a caption to jump to a specific field.

Command: Press <Pf1>H for help  Insert

Notes: See vendor documentation for more information on TalkStation setup. The following items are a subset that correlate to VISTA setup.

TalkStation settings can be altered using the TalkStation/Link application (Start Button, Settings, Control Panel, TalkStation Link). Click the RisHL7 tab and enter the same application names as the HL7 Application Parameter file. In this example the following values would be entered:

Sending App: RA-TALKLINK-TCP
Sending Fac.: TALKSTATION
Receiving App: RA-VOICE-SERVER
Receiving Fac.: VISTA RADIOLOGY

Whilst it is unimportant as to the values of Sending Facility and Receiving Facility, they must match in TalkStation/Link and VISTA HL7 Application Parameter file #771.

TalkStation/Link includes a box to define the OBX-3 format used by VISTA Rad/Nuc Med for clinical history, allergies, and modifiers. The line that should appear in this box is:

OBX Filter for order notes: (“/” delimited)
/H^HISTORY^L/A^ALLERGIES^L/M^MODIFIERS^L/C4^CPT MODIFIERS^C4/
The Trigger Event needs to be defined in the RisHL7 tab of the TalkStation/Link Application:

   Trigger Event:       R01

For TalkStation, within the TalkStation/Link application and RisHL7 tab, the RIS Type needs to be specified as VA. Set the following:

   RIS Type:           VA

To ensure that TalkStation functions correctly the Report and Order modules must be defined. Within the TalkLink Service tab of the TalkStation/Link application choose the following values:

   Report Module:   TalkReport
   Order Module:    RisHL7

If you would like to be able to edit reports that VistA has rejected on TalkStation, then check the ‘Set rejected reports to preliminary’ box in the TalkReport tab. (Recommended).

TalkStation will recognize the Observation Value and several other VISTA specifics if, in the TalkStation System Preferences, the ‘Use VA (Veteran’s Administration) settings’ option is checked within the Workflow tab; and the ‘Use TalkLink’ option within the Local Machine tab is checked.

In TalkStation/Link, within the TalkReport tab, ‘Allow combined reports’ should not be set. Similarly, in the TalkStation System Preferences Workflow tab, ‘Break up combined results’ should not be set. If either option is checked then printsets will not be handled correctly by the interface.
2. **HL LOGICAL LINK FILE #870 SETUP**

This file contains the links used by the HL7 package to send messages. It is used to identify the TCP/IP address of the TalkStation unit, as well as the TCP/IP port numbers that will be used. These addresses are all site-specific and must be entered by IRM before the links are started.

On systems running more than one instance of TaskMan, the link tasks must be forced to start up on the same CPU (i.e. same TCP/IP address) every time. This is accomplished by entering a “STARTUP NODE”. If this is not done, TalkStation will shut down the links and the interface will crash.

The **STARTUP NODE field should ONLY be populated on Alpha/AXP systems that are running more than one instance of TaskMan under DCL context. In this instance the STARTUP NODE should be set to the box-volume pair (e.g.: VAH:532A04). For single TaskMan and UCX listeners leave null.**

This file also stores parameters that define the behavior of the lower level protocols and information that is used with the Systems Link Monitor, which gives the user feedback about the state of each link. When a message is received, the link moves from an IDLE state to a READING state. In this sample the links are used for the following messages:

- **RA-TALK** is used to send order messages (i.e., exam registered, exam cancelled, patient examined, and report verified or released/not verified) from VISTA to TalkStation. This link also receives the order Acknowledgement from TalkStation.

- **TALK-RA** is used to send reports created on the TalkStation unit to VISTA. It is also used to send report Acknowledgement messages from VISTA to TalkStation.

This sample shows active, run-time data. Some of the fields are populated by Rad/Nuc Med patch RA*5*17. The remainder of the fields are populated by the HL7 package when you start up the links.

Although not exported, it is strongly recommended that you add an ACK timeout for the sender link. If you do not enter a value then a default of 10 seconds will be used and experience has shown that this is not enough for a busy TCP/IP network. We recommend using between 300 and 600 seconds.

You may choose to automatically start all HL7 Logical Links and Inbound/Outbound Filers when TaskMan is restarted. To do this, run the TaskMan, Schedule/Unschedule options, select Restart All Links and Filers, and place an ‘S’ in the SPECIAL QUEUEING field. Then, remember to set AUTOSTART to ‘1’ (Enabled) for each link.

Regardless of the ‘Exceed Re-Transmit Action’ entered, when the ‘Re-Transmission Attempts’ for a message is exceeded, an alert is sent to the mail group defined in the MAIL GROUP FOR ALERTS field in the HL COMMUNICATION SERVER PARAMETERS (#869.3) file. This can be edited using the HL7 Main Menu, Site Parameter Edit option.

The RA-TALK sender link is exported as a Persistent Client, but with TalkStation v2.0 or greater it will be possible to change it to a Non-Persistent Client. The advantage of Non-Persistent clients is that the link only connects when required, rather than leaving the process open at all times.

See the VISTA HL7 Site Manager & Developer Manual section 2.4 TCP Link Setup for additional field definitions. The values shown below have been proven to work in the past.

**NODE: RA-TALK**  **LLP TYPE: TCP**

---

Radiology/Nuclear Medicine V. 5.0 HL7 Manual

July 2000
DEVICE TYPE: Persistent Client  AUTOSTART: Enabled
RE-TRANSMISSION ATTEMPTS: 3  ACK TIMEOUT: 300
EXCEED RE-TRANSMIT ACTION: ignore  TCP/IP ADDRESS: 152.129.1.107
TCP/IP PORT: 7077  TCP/IP SERVICE TYPE: CLIENT (SENDER)
PERSISTENT: YES  STARTUP NODE:

---

TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: 152.129.1.107  <- address of TalkStation server
TCP/IP PORT: 7077  <- port TalkStation receives on

ACK TIMEOUT: 300  <- recommended
RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT:  
BLOCK SIZE:  
STARTUP NODE:  <- ONLY set if multiple TaskMan/DCL  PERSISTENT: YES
RETENTION:  UNI-DIRECTIONAL WAIT:

---

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close  Press <PF1>H for help  Insert
3. **Protocol File #101 Setup**

The event driver entries (RA REG 2.3, RA EXAMINED 2.3, RA CANCEL 2.3, RA RPT 2.3 and RA TALKLINK TCP SERVER RPT) are exported with the Rad/Nuc Med VISTA patch RA*5.0*17 for use with this interface.

Also exported are the subscriber protocols (RA TALKLINK ORM, RA TALKLINK ORU and RA TALKLINK TCP REPORT)

(Please refer to the ‘Radiology/Nuclear Medicine HL7 Interface Specifications’ section of this document for information about messages initiated by Radiology/Nuclear Medicine.)

In order to associate the event driver protocols with the Radiology-TalkStation interface and thereby initiate messages, the TalkStation subscriber protocols need to be added to the associated event driver SUBSCRIBERS multiple.

Once the subscriber protocols are added, messages will be built and will stack up until the links are started.

If ever you need to completely disable the interface and want to stop new messages from being created for this interface, simply remove the TalkStation subscriber protocols from the event driver protocols.

Listed below are examples of the event driver protocols with the subscriber protocols that require addition shown in bold. You may see other subscribers listed on your system, these should not be removed.

Also below are screen shots from the HL7 Main Menu, Interface Developer Options …, Protocol Edit highlighting the steps required to add the subscriber protocols.

The protocols shown without screen shots are part of the Radiology-TalkStation interface but do not require amendment.
NAME: RA REG 2.3
ITEM TEXT: Rad/Nuc Med exam registered for HL7 v2.3 message
TYPE: event driver PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history. SENDING APPLICATION: RA-VOICE-SERVER TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001 VERSION ID: 2.3
SUBSCRIBERS: RA TALKLINK ORM

HL7 INTERFACE SETUP

NAME: RA REG 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver ← hit <return> here to edit event driver details
COMMAND: Press <PF1>H for help Insert

HL7 EVENT DRIVER

SENDING APPLICATION: RA-VOICE-SERVER TRANSACTION MESSAGE TYPE: ORM EVENT TYPE: 001
PROCESSING ID: VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA TALKLINK ORM ← add this subscriber
COMMAND: Press <PF1>H for Help Insert
NAME: RA CANCEL 2.3 ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.
SENDING APPLICATION: RA-VOICE-SERVER TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001 VERSION ID: 2.3
SUBSCRIBERS: RA TALKLINK ORM

HL7 INTERFACE SETUP PAGE 1 OF 2

NAME: RA CANCEL 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver <- hit <return> here to edit event driver details

COMMAND: Press <PF1>H for help Insert

HL7 EVENT DRIVER PAGE 2 OF 2

RA CANCEL 2.3

SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM EVENT TYPE: 001
PROCESSING ID: VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA TALKLINK ORM <- add this subscriber

COMMAND: Press <PF1>H for help Insert
NAME: RA EXAMINED 2.3
ITEM TEXT: Rad/Nuc Med examines case
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3
SUBSCRIBERS: RA TALKLINK ORM

---

NAME: RA EXAMINED 2.3

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

---

COMMAND: Press <PF1>H for help

---

SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
PROCESSING ID:
ACCEPT ACK CODE:
APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA TALKLINK ORM

---

COMMAND: Press <PF1>H for help
NAME: RA RPT 2.3
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver  PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-VOICE-SERVER  TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01  VERSION ID: 2.3
SUBSCRIBERS: RA TALKLINK ORU

SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORU EVENT TYPE: R01
PROCESSING ID: VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:
SUBSCRIBERS
RA TALKLINK ORU <- add this subscriber
NAME: RA TALKLINK ORM
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA REG 2.3, RA EXAMINED 2.3, and RA CANCEL 2.3 event protocols. It is used by the VISTA HL7 package to send ORM messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of those event point protocols if this type of messaging scenario is used at a facility. This is part of the file set-up to enable HL7 message flow when exams are registered, cancelled, and when they reach the status flagged as ‘examined’ by the site.

RECEIVING APPLICATION: RA-TALKLINK-TCP
EVENT TYPE: O01
LOGICAL LINK: RA-TALK
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

NAME: RA TALKLINK ORM
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA REG 2.3, RA EXAMINED 2.3, and RA CANCEL 2.3 event protocols. It is used by the VISTA HL7 package to send ORM messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of those event point protocols if this type of messaging scenario is used at a facility. This is part of the file set-up to enable HL7 message flow when exams are registered, cancelled, and when they reach the status flagged as ‘examined’ by the site.

RECEIVING APPLICATION: RA-TALKLINK-TCP
EVENT TYPE: O01
LOGICAL LINK: RA-TALK
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

NAME: RA TALKLINK ORU
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA RPT 2.3 event point protocol. The HL7 package uses this protocol to send rad/nuc med report (ORU) messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of the RA RPT protocol if this messaging scenario is used in a facility. This is part of the file set-up to enable message flow when a rad/nuc med report is verified.

RECEIVING APPLICATION: RA-TALKLINK-TCP
EVENT TYPE: R01
LOGICAL LINK: RA-TALK
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

NAME: RA TALKLINK TCP SERVER RPT
ITEM TEXT: TalkStation TCP sends report to VistA
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
SENDING APPLICATION: RA-TALKLINK-TCP
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
SUBSCRIBERS: RA TALKLINK TCP REPORT

NAME: RA TALKLINK TCP REPORT
ITEM TEXT: Client for TalkStation TCP rpt
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
RECEIVING APPLICATION: RA-VOICE-SERVER
EVENT TYPE: R01
LOGICAL LINK: TALK-RA
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
PROCESSING ROUTINE: D ^RAHLTCPB
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
Detailed Explanation of Start-up/Recovery Procedure

1. Stop the appropriate links from the HL7 Main Menu, Filer and Link Management Options..., Start/Stop Links:

   **Single Listener System (OpenVMS or Cache):** Stop both VISTA HL7 links (RA-TALK and TALK-RA) in any order.

   **UCX Multi-Threaded Listener System:** Stop only the RA-TALK link. (You do NOT need to shut down the UCX listener. Generic UCX tools control UCX services.)

   **Cache Multi-threaded Listener System:** Stop both VISTA HL7 links (RA-TALK and TALK-RA) in any order.

2. If necessary, boot or reboot the TalkStation unit (i.e., reboot only if an application error occurred on the TalkStation unit, or a previous attempt at recovery has failed). Rebooting can be done using the Start button and selecting ‘Shut Down’. To gain more control over the TalkStation Link service on the TalkStation machine, you can set up these service to start manually rather than auto-start. If set up to auto-start, it should start automatically during reboot.

3. If TalkStation Link is not setup to start automatically on the TalkStation server, or has failed to restart automatically, use the Start button, Settings, Control Panel, Services, then select TalkStation Link to get a pop-up box and click on ‘start’. The status of TalkStation Link should change from null to ‘started’. The status should change to running.

4. On Open-M/Cache systems only, it is a good idea to kill off the logical link listener job (%ZISTCP) before restarting the links. This step is optional, but will prevent an extinct job from unnecessarily using up CPU time. Use the system status utility to find these jobs. They appear as running the %ZISTCP routine using port numbers that you entered as TCP/IP PORT in the setup (i.e., File #870, Field #400.02 TCP/IP PORT, for entries RA-TALK and TALK-RA). This step may be unnecessary after additional HL7 package patches.

5. Start the “listener link” TALK-RA:

   **Single Listener System (OpenVMS or Cache):** From the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links, enter TALK-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver:’ prompt.

   **UCX Multi-Threaded Listener System:** No action is needed. The listener is an OpenVMS UCX service and UCX starts running when OpenVMS is brought up.

   **Cache Multi-Threaded Listener System:** From the HL7 Main Menu, Filer and Link Management Options.... Start/Stop Links, enter TALK-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver’ prompt.
6. Verify that the listener link is up and running:

**Single Listener System (OpenVMS or Cache):** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually toggles between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

**UCX Multi-Threaded Listener System:** The OpenVMS UCX service should be enabled. The columns indicating message totals for the TALK-RA HL7 link are accurately reflected in the System Link Monitor. Disregard the information presented in the Device Type and State columns for the TALK-RA HL7 link.

**Cache Multi-Threaded Listener System:** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually toggles between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

7. Start the “sender” link RA-TALK: From the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links.

**All Single and Multi-Threaded Listener Systems:** Enter RA-TALK at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

8. Use the Systems Link Monitor option again to verify that both links are up and running. If the TalkStation Link service is not running on the TalkStation server then the RA-TALK link will toggle between an Open and OpenFail state.
## Start-up/Recovery Procedure Quick Reference

### Radiology-TalkStation Interface

<table>
<thead>
<tr>
<th>Step</th>
<th>Machine</th>
<th>Action</th>
<th>Mandatory, Optional, or Conditional</th>
</tr>
</thead>
</table>
| 1    | VistA   | Single Listener System (OpenVMS or Cache): Shut down logical links (in any order)  
                     | UCX Multi-Threaded Listener System: Shut down the RA-TALK link.  
                     | Cache Multi-Threaded Listener System: Shut down logical links (in any order) | Mandatory |
| 2    | TalkStation | Reboot                                                                | Only if TalkStation application error occurred or TalkStation PC suffered power loss, etc. |
| 3    | TalkStation | Start up TalkStation Link service (if applicable)                     | Only if down and not set to auto-start |
| 5    | VISTA (Open-M / Cache only) | Kill the old logical link listener job (%ZISTCP with port matching TCP/IP PORT no. used by the TALK-RA link) | Optional |
| 6    | VISTA   | Single Listener System (OpenVMS or Cache): start the TALK-RA listener logical link  
                     | UCX Multi-Threaded Listener System: enable the OpenVMS UCX Service (if disabled)  
                     | Cache Multi-Threaded Listener System: start the TALK-RA listener logical link | Mandatory |
| 7    | VISTA   | Start the sender logical link: RA-TALK                                | Mandatory |

**Note:** If the TalkStation TalkStation Link service goes down, the recovery process is necessary.

- **Single Listener System (OpenVMS or Cache):** Shutdown both RA-TALK and TALK-RA links
- **UCX Multi-Threaded Listener System:** Shutdown the RA-TALK link
- **Cache Multi-Threaded Listener System:** Shutdown both RA-TALK and TALK-RA links

If the VISTA machine is going to be shutdown:

- **Single Listener System (OpenVMS or Cache):** Shut down both HL7 links.
- **UCX Multi-Threaded Listener System:** Shut down the RA-TALK link.
- **Cache Multi-Threaded Listener System:** Shut down both HL7 links.
Implementing and Maintaining an Interface Between Radiology and the PowerScribe Voice Reporting Tool

Introduction

This section describes the steps required to setup and maintain a link between VISTA Radiology/Nuclear Medicine and the PowerScribe COTS Voice Recognition System.

This is a two-way TCP/IP HL7 interface using two links for message transactions. The sender link, RA-PSQUIRE, has been exported by Radiology/Nuclear Medicine and subsequent patches to send order messages to PowerScribe. The listener link, PSCRIBE-RA, has been exported by Radiology/Nuclear Medicine to receive reports from PowerScribe. Message acknowledgements are sent across the same link as the originating message.

On the PowerScribe server, the HL7CLIENT and HL7CLIENT executables must be running to complete the links and allow message flow to begin.

Requirements

All released Radiology, HL7 and Kernel patches should be installed. In particular, HL7 patch HL*1.6*57, and Radiology/Nuclear Medicine patch RA*5*17.

A PowerScribe server should also be installed on the network with a permanent TCP/IP address which is reachable from VISTA.

Please consider putting the PowerScribe PC on a UPS. Power blips and outages have proven to be a problem in reliable message transmission.
Operational Features of the Interface

1. When an exam is registered, it should be retrievable in the PowerScribe database, and you should be able to enter a report for it.

2. When an exam is cancelled or deleted, it should be removed from the PowerScribe database, and you should not be able to enter a report for it.

3. If a verified report exists on the VISTA Rad/Nuc Med system for an exam, you should no longer be able to enter a report on PowerScribe.

4. If a PowerScribe report is rejected by VISTA Rad/Nuc Med software, the report should NOT be filed in the Rad/Nuc Med Report database.

5. If a diagnostic code that is entered via PowerScribe is not an entry in File #78.3, DIAGNOSTIC CODES, the report should be rejected with an appropriate error message.

6. If an unauthorized user attempts to enter a report on the PowerScribe unit, the report should be rejected with an appropriate error message. An unauthorized user is someone who either (1) doesn't have a Rad/Nuc Med staff or resident classification or (2) has a classification inactive date that is prior to the report date.

7. If a resident or staff interpreting physician without the RA VERIFY key enters a report on PowerScribe, the report should be filed, but should be in a ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

8. If the division where the exam was performed does not allow residents to verify reports, reports entered on PowerScribe by residents should go into ‘DRAFT’ status (or a ‘RELEASED/NOT VERIFIED’ status if site parameters allow it).

9. If the division where the exam was performed requires impression text, and the PowerScribe report does not include impression text, the report should be rejected with an appropriate error message.

10. If the impression text or the report text consists of a single character or any number of special (non-alphanumeric) characters, the report should be rejected with an appropriate error message.

11. If a PowerScribe report is transmitted at the same time a user is entering a report for the same case through VISTA Rad/Nuc Med in the Report Entry/Edit option, the PowerScribe report should be rejected with an appropriate error message.

12. If a PowerScribe report is transmitted at the same time a user is case editing a case that is a member of the same printset, the PowerScribe report should be rejected with an appropriate error message.

13. If a PowerScribe report is transmitted at the same time a user is status tracking a case that is a member of the same printset, the PowerScribe report should be rejected with an appropriate error message.

14. If the PowerScribe user does not have security privileges to verify a report, the report should be rejected with an appropriate error message. Requirements include the RA VERIFY key, no INACTIVE DATE in File #200, Field #53.4 (e.g., the verifier must be an active provider), Rad/Nuc...
Med staff or resident classification if site parameters allow residents to verify, or staff classification if site parameters don’t allow residents to verify.

15. Reports entered through PowerScribe should be viewable, printable, etc. through VISTA Rad/Nuc Med, Health Summary, mail messages, and alerts in a way identical to that of reports entered through VISTA Rad/Nuc Med. All options operating on reports should behave the same whether the source of the report was VISTA or PowerScribe.

16. If the PowerScribe report has a status of Final or Addendum, it may include an electronic signature in the VISTA Rad/Nuc Med report. To include an electronic signature in the VISTA Rad/Nuc Med report, the field (#.127) “ALLOW E-SIG ON COTS HL7 RPTS:” in the RAD/NUC MED DIVISION file #79 must be set to YES.

17. When a PowerScribe report for a printset is transmitted and results in an accepted, verified report on VISTA, all members of the printset on VISTA should now include the same report when retrieved through patient profiles, View Exam by Case No., etc. Also, the report content should include the procedures for all members of the set.

18. If the site has the GENERATE EXAMINED HL7 MESSAGE field set to ‘yes’ on one or more statuses in File #72, the “examined” messages generated should have no effect on PowerScribe.

19. PowerScribe users are not allowed to group sets of exams together and mark them for a single report through PowerScribe. That process is handled through VISTA. PowerScribe users should be able to select a single exam in a printset and enter a report on it. After the report is transmitted to VISTA, it should apply to all printset members on VISTA, and the PowerScribe database should be automatically updated to mark the other printset members so that they can no longer be selected for report entry.

20. If a report is entered in PowerScribe as ‘preliminary’, when it reaches VISTA, it should be set to ‘DRAFT’ or, if the site parameters allow, ‘RELEASED/NOT VERIFIED’.
IRM and ADPAC Set-up Procedures

Most of the VISTA HL7 file setup will be done by the installation of RA*5.0*17, but some must be manually completed by IRM. See a sample of the VISTA setup in Setup of HL7 Files, later in this section.

1. You must provide the TCP/IP address for the PowerScribe unit and TCP/IP port numbers for both VISTA and PowerScribe. See a sample of the VISTA setup in Setup of HL7 Files, later in this appendix. (Note: depending on your operating system, you may or may not have to input a TCP/IP Address for the listener.)

2. The Rad/Nuc Med coordinator who supports the PowerScribe unit must follow the PowerScribe documentation/instructions for proper user definition. The Physician ID field in the PowerScribe user set-up must be identical to the corresponding internal entry number of the VISTA New Person file #200. This ensures that the correct name will be entered as the verifying physician for medical/legal purposes. Reports will be rejected if the PowerScribe user is not identical to the entry in the New Person file.

3. If electronic signature is to be allowed across the interface, the Rad/Nuc Med coordinator must initialize the parameters in the RAD/NUC MED DIVISION file #79 to allow this feature. Set field #.127 ‘ALLOW E-SIG ON COTS HL7 RPTS’ to YES. All reports with an HL7 status of Final, or Addendum, will be filed in the Rad/Nuc Med Reports file #74 with the electronic signature block printed name defined in file #200 of the verifying physician who signed the report on the PowerScribe unit. Before a report can be filed in VISTA with an electronic signature, it must pass all validation processes outlined in the section on Operational Features earlier in this section.

Warning:
- If the MedSpeak interface is being used within the same division, this feature may not be desired due to the signing process involved on the MedSpeak unit. Refer to the MedSpeak documentation for more information on the procedures for signing reports.
- See also the Rad/Nuc Med Technical Manual section on Security for further electronic signature information.

4. The Rad/Nuc Med coordinator who supports the PowerScribe unit must define Rad/Nuc Med diagnostic codes on the PowerScribe unit. Vista Diagnosis codes from file 78.3 need to be added using the Coding Manager in PowerScribe and they need to be associated with CPT4 Procedure Codes used by Radiology. Follow the steps below to configure PowerScribe with the diagnostic codes used in the DIAGNOSTIC CODES file (#78.3) in FileMan. The list below is an example of some of common diagnosis codes that may be defined in file 78.3, however, this file is configurable and could be different for each site.

   1 NORMAL
   2 MINOR ABNORMALITY
   3 MAJOR ABNORMALITY, NO ATTN. NEEDED
   4 ABNORMALITY, ATTN. NEEDED
   5 MAJOR ABNORMALITY, PHYSICIAN AWARE
   6 UNDICTATED FILMS NOT RETURNED, 3 DAYS
   7 UNSATISFACTORY/INCOMPLETE EXAM
   8 POSSIBLE MALIGNANCY, FOLLOW-UP NEEDED

From the PowerScribe – Coding Manager toolbar, choose View and select Diagnosis Codes. This will bring up a window with all of the valid ICD9 codes. Click on the New button and type 1 in the box beneath “Diagnosis Code:”. This number should match the Internal Entry Number (IEN) of the
diagnosis code in file 78.3. Next type **NORMAL** in the box beneath “Diagnosis Description:”. Select **OK** and follow the same procedure for the other codes.

5. Make sure all other PowerScribe setup is correct and complete according to PowerScribe documentation.

6. If the PowerScribe interface is moved from a test account to the production account, update the TCP/IP port numbers on both sides, and delete the PowerScribe database (using SQL commands) to prevent cross-over of test data to the live account. (The change of port numbers ensures a unique socket connection. But the TCP/IP address of the PowerScribe remains the same.)

7. It is very helpful to synchronize the PowerScribe PC clock to closely agree with the VISTA system clock.

8. Responsibility for starting, stopping, and monitoring the links can belong to IRM, or IRM can delegate this to the Rad/Nuc Med coordinator with the understanding that if problems occur, IRM may have to provide support.

9. PowerScribe users and IRM should learn how to find and interpret error messages for rejected reports. See the section for VistA Radiology/Nuclear Medicine HL7 Error Message and Troubleshooting Table For MedSpeak, TalkStation & PowerScribe Interfaces later in this manual for a detailed procedure for finding and interpreting error messages. If the error is returned by Radiology, rather than the HL7 software, then it will be logged in the HL7 Message Exceptions file #79.3 and can be viewed using the Rad/Nuc Med HL7 Voice Reporting Errors option.

10. This interface requires link tasks to always start up on the same node. So, if your site is an Alpha/AXP site running more than one instance of TaskMan, you **must** start up TaskMan in DCL context. Consult the Kernel System Manual for instructions on running TaskMan in DCL context.
Setup of HL7 Files

All of this setup, except for site-specific fields, is done automatically by the Rad/Nuc Med patch RA*5*17. However, the site is responsible for entering the TCP/IP address, TCP/IP port numbers, Startup Node and other fields that are site-specific (these items are shown in bold).

A sample setup follows. **IRM should only populate the fields in bold print. Your responses should be specific to your site, and not necessarily what you see below.** The VISTA screen shots are taken from the HL7 Main Menu, Interface Developers Option. Details are also provided on configuring PowerScribe using the PowerScribe Administrator.

1. **HL7 APPLICATION PARAMETER FILE #771 SETUP**

```plaintext
NAME: RA-PSCRIBE-TCP  ACTIVE/INACTIVE: ACTIVE
FACILITY NAME: POWERSCRIBE  COUNTRY CODE: US
HL7 ENCODING CHARACTERS: ^~&  HL7 FIELD SEPARATOR: |
```

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Press <PF1>H for help Insert
Note: See vendor documentation for more information on PowerScribe setup. The following items are a subset that correlate to VISTA setup.

PowerScribe settings can be altered using PowerScribe Administrator application (Start button, Programs, PowerScribe Radiology, PowerScribe Administrator). See CONFIGURING POWERSCRIBE HL7 PROTOCOL SETTINGS later in this section for a detailed explanation on defining settings on PowerScribe.

Sending App: RA-PSCRIBE-TCP

Receiving App: RA-VOICE-SERVER
2. **HL LOGICAL LINK FILE #870 SETUP**

This file contains the links used by the HL7 package to send messages. It is used to identify the TCP/IP address of the PowerScribe unit, as well as the TCP/IP port numbers that will be used. These addresses are all site-specific and must be entered by IRM before the links are started.

On systems running more than one instance of TaskMan, the links must be forced to start up on the same CPU (i.e. same TCP/IP address) every time. This is accomplished by entering a “STARTUP NODE”. If this is not done, PowerScribe will shut down the links and the interface will crash.

The **STARTUP NODE field should ONLY be populated on Alpha/AXP systems that are running more than one instance of TaskMan under DCL context. In this instance the STARTUP NODE should be set to the box-volume pair (eg: VAH:532A04). For single TaskMan and UCX listeners leave null.**

This file also stores parameters that define the behavior of the lower level protocols and information that is used with the Systems Link Monitor, which gives the user feedback about the state of each link. When a message is received, the link moves from an IDLE state to a READING state. In this sample the links are used for the following messages:

- RA-PSCRIBE is used to send order messages (i.e., exam registered, exam cancelled, patient examined, and report verified or released/not verified) from VISTA to PowerScribe. This link also receives the order Acknowledgement from PowerScribe.

- PSCRIBE-RA is used to send reports created on the PowerScribe unit to VISTA. It is also used to send report Acknowledgement messages from VISTA to PowerScribe.

This sample shows active, run-time data. Some of the fields are populated by the Rad/Nuc Med patch RA*5*17. The remainder of the fields are populated by the HL7 package when you start up the links.

Although not exported, it is strongly recommended that you add an ACK timeout for the sender link. If you do not enter a value then a default of 10 seconds will be used and experience has shown that this is not enough for a busy TCP/IP network. We recommend using between 300 and 600 seconds.

You may choose to automatically start all HL7 Logical Links and Inbound/Outbound Filers when TaskMan is restarted. To do this, run the TaskMan, Schedule/Unschedule options, select Restart All Links and Filers, and place an ‘S’ in the SPECIAL QUEUEING field. Then, remember to set AUTOSTART to ‘1’ (Enabled) for each link.

Regardless of the ‘Exceed Re-Transmit Action’ entered, when the ‘Re-Transmission Attempts’ for a message is exceeded, an alert is sent to the mail group defined in the MAIL GROUP FOR ALERTS field in the HL COMMUNICATION SERVER PARAMETERS (#869.3) file. This can be edited using the HL7 Main Menu, Site Parameter Edit option.

The RA-PSCRIBE sender link is exported as a Persistent Client, but it is possible to change it to a Non-Persistent Client. The advantage of Non-Persistent clients is that the link only connects when required, rather than leaving the process open at all times.

See the VISTA HL7 Site Manager & Developer Manual section 2.4 TCP Link Setup for additional field definitions. The values shown below have been proven to work in the past.

**NODE:** RA-PSCRIBE  
**LLP TYPE:** TCP
DEVICE TYPE: Persistent Client
AUTOSTART: Enabled
RE-TRANSMISSION ATTEMPTS: 3
ACK TIMEOUT: 300
EXCEED RE-TRANSMIT ACTION: ignore
TCP/IP ADDRESS: 152.132.126.222
TCP/IP PORT: 8410
TCP/IP SERVICE TYPE: CLIENT (SENDER)
PERSISTENT: YES
STARTUP NODE:

---

TCP LOWER LEVEL PARAMETERS

RA-PSCRIBE

TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: 152.132.126.222
TCP/IP PORT: 8410

ACK TIMEOUT: 300
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RE-TRANSMIT ACTION: ignore

STARTUP NODE: <-- ONLY set if multiple TaskMan/DCL PERSISTENT: YES
RETENTION: UNI-DIRECTIONAL WAIT:

Close Refresh
Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close
NODE: PSCRIBE-RA
DEVICE TYPE: Single-threaded Server
TCP/IP PORT: 8400
STARTUP NODE:

TCP/IP SERVICE TYPE: SINGLE LISTENER

--- TCP LOWER LEVEL PARAMETERS ---

TCP/IP SERVICE TYPE: SINGLE LISTENER <-- MULTIPLE LISTENER under UCX
TCP/IP ADDRESS: <-- address of listener only needed for Cache/NT
TCP/IP PORT: 8400 <-- port PowerScribe sends to

ACK TIMEOUT:
READ TIMEOUT:
BLOCK SIZE:

STARTUP NODE: <-- ONLY set if multiple TaskMan/DCL PERSISTENT:
RETENTION:
UNI-DIRECTIONAL WAIT:

--- HL7 LOGICAL LINK ---

NODE: PSCRIBE-RA
INSTITUTION:
DOMAIN:

AUTOSTART: Enabled <-- set to Enabled if autostart of link required

QUEUE SIZE:

LLP TYPE: TCP <-- hit <return> here to edit LLP parameters

--- COMMAND ---

Press <PF1>H for help
3. **Protocol File #101 Setup**

The event driver entries (RA REG 2.3, RA EXAMINED 2.3, RA CANCEL 2.3, RA RPT 2.3 and RA PSCRIBE TCP SERVER RPT) are exported with the Rad/Nuc Med Vista patch RA*5.0*17 for use with this interface.

Also exported are the subscriber protocols (RA PSCRIBE ORM, RA PSCRIBE ORU and RA PSCRIBE TCP REPORT).

(Please refer to the ‘Radiology/Nuclear Medicine HL7 Interface Specifications’ section of this manual for information about messages initiated by Radiology/Nuclear Medicine.)

In order to associate the event driver protocols with the Radiology-PowerScribe interface and thereby initiate messages, the PowerScribe subscriber protocols need to be added to the associated event driver SUBSCRIBERS multiple.

Once the subscriber protocols are added, messages will be built and will stack up until the links are started.

If ever you need to completely disable the interface and want to stop new messages from being created for this interface, simply remove the PowerScribe subscriber protocols from the event driver protocols.

Listed below are examples of the event driver protocols with the subscriber protocols that require addition shown in bold. You may see other subscribers listed on your system, these should not be removed.

Also below are screen shots from the HL7 Main Menu, Interface Developer Options …, Protocol Edit highlighting the steps required to add the subscriber protocols.

The protocols shown without screen shots are part of the Radiology-PowerScribe interface but do not require amendment.
NAME: RA REG 2.3
ITEM TEXT: Rad/Nuc Med exam registered for HL7 v2.3 message
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is registered. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: O01
VERSION ID: 2.3
SUBSCRIBERS: RA PSCRIBE ORM

HL7 INTERFACE SETUP

NAME: RA REG 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver ← hit <return> here to edit event driver details

COMMAND:

Press <PF1>H for help Insert

HL7 EVENT DRIVER

SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: O01
PROCESSING ID:
VERSION ID: 2.3
ACCEPT ACK CODE:
APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA PSCRIBE ORM ← add this subscriber

COMMAND:

Press <PF1>H for Help Insert
NAME: RA CANCEL 2.3
ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine exam is cancelled. It executes code that creates an HL7 ORM version 2.3 message consisting of PID, ORC, OBR, and OBX segments. The message contains all relevant information about the exam, including procedure, time of cancellation, procedure modifiers, patient allergies and clinical history.
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3

SUBSCRIBERS: RA PSCRIBE ORM

---

HL7 INTERFACE SETUP
NAME: RA CANCEL 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver

---

COMMAND: Press <PF1>H for help Insert

---

HL7 EVENT DRIVER
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3

SUBSCRIBERS
RA PSCRIBE ORM

---

COMMAND: Press <PF1>H for help Insert
NAME: RA EXAMINED 2.3
ITEM TEXT: Rad/Nuc Med examines case
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicien exam has reached a status where GENERATE EXAMINED HL7 MSG is Y at that (or at a lower) status. This message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM
EVENT TYPE: 001
VERSION ID: 2.3
SUBSCRIBERS: RA PSCRIBE ORM

---

NAME: RA EXAMINED 2.3

DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver  <- hit <return> here to edit event driver details

COMMAND: Press <PF1>H for help  Insert

---

SENDING APPLICATION: RA-VOICE-SERVER

TRANSACTION MESSAGE TYPE: ORM

EVENT TYPE: 001

VERSION ID: 2.3

ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA PSCRIBE ORM  <- add this subscriber

COMMAND: Press <PF1>H for help  Insert
NAME: RA RPT 2.3
ITEM TEXT: Rad/Nuc Med report released/verified
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
SUBSCRIBERS: RA PSCRIBE ORU

HL7 INTERFACE SETUP
NAME: RA RPT 2.3
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]
ENTRY ACTION:
EXIT ACTION:

TYPE: event driver <- hit <return> here to edit driver details

COMMAND:

Press <PF1>H for help Insert

HL7 EVENT DRIVER
SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
ACCEPT ACK CODE: APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS
RA PSCRIBE ORU <- add this subscriber

Exit Save Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:

Press <PF1>H for help Insert
NAME: RA PSCRIBE ORM
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA REG 2.3, RA EXAMINED 2.3, and RA CANCEL 2.3 event protocols. It is used by the VISTA HL7 package to send ORM messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of those event point protocols if this type of messaging scenario is used at a facility. This is part of the file set-up to enable HL7 message flow when exams are registered, cancelled, and when they reach the status flagged as ‘examined’ by the site.
RECEIVING APPLICATION: RA-PSCRIBE-TCP
EVENT TYPE: 001
LOGICAL LINK: RA-PSCRIBE
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

NAME: RA PSCRIBE ORU
ITEM TEXT: TCP Client
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA RPT 2.3 event point protocol. The HL7 package uses this protocol to send rad/nuc med report (ORU) messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of the RA RPT protocol if this messaging scenario is used in a facility. This is part of the file set-up to enable message flow when a rad/nuc med report is verified.
RECEIVING APPLICATION: RA-PSCRIBE-TCP
EVENT TYPE: R01
LOGICAL LINK: RA-PSCRIBE
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

NAME: RA PSCRIBE TCP SERVER RPT
ITEM TEXT: PowerScribe TCP sends report to VistA
TYPE: event driver
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
SENDING APPLICATION: RA-PSCRIBE-TCP
TRANSACTION MESSAGE TYPE: ORU
EVENT TYPE: R01
VERSION ID: 2.3
SUBSCRIBER: RA PSCRIBE TCP REPORT

NAME: RA PSCRIBE TCP REPORT
ITEM TEXT: Client for PowerScribe TCP rpt
TYPE: subscriber
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: Subscriber protocol for sending report to VISTA Radiology/Nuclear Medicine. This protocol is used by the HL7 package to process messages sent to VISTA from a COTS voice recognition unit using TCP/IP for message flow. This protocol should be entered in the SUBSCRIBERS multiple of the RA PSCRIBE TCP SEREVR RPT protocol.
RECEIVING APPLICATION: RA-VOICE-SERVER
EVENT TYPE: R01
LOGICAL LINK: PSCRIBE-RA
VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK
PROCESSING ROUTINE: D ^RAHLTCPB
SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
Configuring PowerScribe HL7 Protocol Settings

In the example listed above, HL7 Logical Link settings for RA-PSCRIBE show that 152.132.126.222 is the PowerScribe TCP/IP address on the LAN. The PowerScribe system sends the report back to the TCP/IP address that has been defined in the PowerScribe Administrator under the Interface tab and the HL7 Protocol Settings button. On systems running more than one instance of TaskMan, the link tasks must be forced to start up on the same CPU (i.e. same TCP/IP address) every time. This is accomplished by entering a “STARTUP NODE”. If this is not done, PowerScribe will not be able to establish a link to the VISTA Listener. PowerScribe also needs to have TCP/IP PORT numbers defined. For this example, the PowerScribe Administrator HL7 Protocol Settings would show the following port and TCP/IP configuration entries:

![HL7 Protocol Setting](image_url)
Detailed Explanation of Start-up/Recovery Procedure

1. Stop the appropriate links from the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links:

   **Single Listener System (OpenVMS or Cache):** Stop both VISTA HL7 links (RA-PSCRIBE and PSCRIBE-RA) in any order.

   **UCX Multi-Threaded Listener System:** Stop only the RA-PSCRIBE link. (You do NOT need to shut down the UCX listener. Generic UCX tools control UCX services.)

   **Cache Multi-Threaded Listener System:** Stop both VISTA HL7 links (RA-PSCRIBE and PSCRIBE-RA) in any order.

2. If necessary, boot or reboot the PowerScribe unit (i.e., reboot only if an application error occurred on the PowerScribe unit, or a previous attempt at recovery has failed). Rebooting can be done using the Start button and selecting ‘Shut Down’.

3. The PowerScribe HL7Server.exe and HL7Client.exe icons should be located on the desktop of the PowerScribe unit. Double click on the icons to start the links. If the icons are not located on the desktop you can create a shortcut to the executable located in C:\PowerScribe, or simply start the executable from this directory.

4. On Open-M/Cache systems only, it is a good idea to kill off the logical link listener job (%ZISTCP) before restarting the links. This step is optional, but will prevent an extinct job from unnecessarily using up CPU time. Use the system status utility to find these jobs. They appear as running the %ZISTCP routine using port numbers that you entered as TCP/IP PORT in the setup (i.e., File #870, Field #400.02 TCP/IP PORT, for entries RA-PSCRIBE and PSCRIBE-RA). This step may be unnecessary after additional HL7 package patches.

5. Start the “listener link” PSCRIBE-RA:

   **Single Listener System (Open VMS or Cache):** From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links, enter PSCRIBE-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

   **UCX Multi-Threaded Listener System:** No action is needed. The listener is an OpenVMS UCX service and UCX starts running when OpenVMS is brought up.

   **Cache Multi-Threaded Listener System:** From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links, enter PSCRIBE-RA at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.
6. Verify that the listener link is up and running:

**Single Listener System (OpenVMS or Cache):** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually toggles between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

**UCX Multi-Threaded Listener System:** The OpenVMS UCX service should be enabled. The columns indicating message totals for the PSCRIBE-RA HL7 link are accurately reflected in the System Link Monitor. Disregard the information presented in the Device Type and State columns for the PSCRIBE-RA HL7 link.

**Cache Multi-Threaded Listener System:** From the HL7 Main Menu, use the Systems Link Monitor option to display the Messaging Monitor and verify that the link you just started is up and running. (When a link is up and running, its state usually toggles between LISTEN and READING.) Sometimes it takes 10 seconds or more for a link to start. It will depend on the response time and how quickly TaskMan handles the jobs.

Start the “sender” link RA-PSCRIBE: From the HL7 Main Menu, Filer and Link Management Options…, Start/Stop Links.

**All Single and Multi-Threaded Listener Systems:** Enter RA-PSCRIBE at the ‘Select HL LOGICAL LINK NODE:’ prompt, then press enter to accept the default of ‘BACKGROUND’ at the ‘Method for running the receiver;’ prompt.

7. Use the Systems Link Monitor option again to verify that all links are up and running. If the HL7Server and HL7Client processes are not running on the PowerScribe server then the RA-PSCRIBE link will toggled between an Open and OpenFail state.
# Start-up/Recovery Procedure Quick Reference

## Radiology-PowerScribe Interface

<table>
<thead>
<tr>
<th>Step</th>
<th>Machine</th>
<th>Action</th>
<th>Mandatory, Optional, or Conditional</th>
</tr>
</thead>
</table>
| 1    | VISTA      | Single Listener System (OpenVMS or Cache): Shut down logical links (in any order)  
                                    UCX Multi-Threaded Listener System: Shut down the RA-PSCRIBE link.  
                                    Cache Multi-Threaded Listener System: Shut down logical links (in any order) | Mandatory |
| 2    | PowerScribe| Reboot                                                                | Only if PowerScribe application error occurred or PowerScribe PC suffered power loss, etc. |
| 3    | PowerScribe| Start up HL7Server.exe and HL7Client.exe                               | Only if down and not connected |
| 5    | VISTA      | Kill the old logical link listener job (%ZISTCP with port matching TCP/IP PORT no. used by the PSCRIBE-RA link) | Optional |
| 6    | VISTA      | Single Listener System (OpenVMS or Cache): start the PSCRIBE-RA listener logical link  
                                    UCX Multi-Threaded Listener System: enable the OpenVMS UCX Service (if disabled)  
                                    Cache Multi-Threaded Listener System: start the PSCRIBE-RA listener logical link | Mandatory |
| 7    | VISTA      | Start the sender logical link: RA-PSCRIBE                              | Mandatory |

**Note:** If the PowerScribe HL7Server goes down or loses the link, the recovery process is necessary.  
- **Single Listener System (OpenVMS or Cache):** Shutdown both RA-PSCRIBE and PSCRIBE-RA links  
- **UCX Multi-Threaded Listener System:** Shutdown the RA-PSCRIBE link  
- **Cache Multi-Threaded Listener System:** Shutdown both RA-PSCRIBE and PSCRIBE-RA links

If the VISTA machine is going to be shutdown:  
- **Single Listener System (OpenVMS or Cache):** Shut down both HL7 links.  
- **UCX Multi-Threaded Listener System:** Shut down the RA-PSCRIBE link.  
- **Cache Multi-Threaded Listener System:** Shut down both HL7 links.
VistA Radiology/Nuclear Medicine HL7 Error Message and Troubleshooting Table for MedSpeak, TalkStation & PowerScribe Interfaces

Since the MedSpeak, PowerScribe and TalkStation interfaces all currently use the same Processing Routine, the errors reported will be the same.

There follows a list of the possible errors that might be returned by Radiology when a report message is passed from one of the COTS products. The errors are stored on the HL7 Exceptions File #79.3, and can be viewed using the Rad/Nuc Med HL7 Voice Reporting Errors option.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Cause/Solution</th>
</tr>
</thead>
</table>
| Missing Case Number  
Internal Patient ID Missing  
Missing Exam Date | HL7 message from vendor does not contain adequate information to determine case number, or patient, or exam date. (These errors should not happen in a debugged, operational interface.) |
| Missing Exam Date and/or  
Case Number | |
| Missing Patient ID  
Missing report date  
Missing Internal Patient ID  
Invalid Report Date | |
| Internal patient identifier and SSN don’t match | Could happen if patient SSN in VISTA was changed/corrected after an exam was registered in VISTA, but before a report was created on COTS product. May require IRM to manually change the COTS product data to match the corrected VISTA SSN. Before making changes, verify that the patient report applies to the right patient. |
| Invalid Exam Date and/or  
Case Number | Unlikely, but could happen if an exam is deleted or cancelled from Rad/Nuc Med at a time when the cancel message cannot reach COTS product, or if a pre-existing COTS product report that was once rejected is re-sent after the exam is deleted or cancelled. A failure to deliver the cancel message to COTS product would have had to happen to create this scenario. May need to clean this exam out of the COTS product database manually. |
| Report for CANCELLED case not permitted | |
| Please use VISTA to edit CANCELLED printset cases. | |
| Can’t add addendum, no report  
Can’t add addendum to an unverified report | Unlikely, but could happen if a report is deleted or unverified in Rad/Nuc Med, then an addendum is sent from COTS product. May need to clean this exam out of the COTS product database manually and use VISTA Rad/Nuc Med to make corrections. |
<table>
<thead>
<tr>
<th>Error Message</th>
<th>Cause/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report already on file</td>
<td>Would happen if there was a failure to send COTS product a message containing a report entered on VISTA Rad/Nuc Med. Or if a message was resent by a COTS product having already been filed by VISTA Rad/Nuc Med</td>
</tr>
<tr>
<td>Missing addendum report/impression text</td>
<td>Unlikely because COTS product software will not allow a blank report to be sent. Re-edit and re-send report from COTS product.</td>
</tr>
<tr>
<td>Missing Impression Text</td>
<td>The division where this exam was registered has its Rad/Nuc Med Division file #79 parameter ‘Impression Req’d on Rpts’ set to ‘Yes’, but the COTS product user did not include an impression when s/he entered the report. Re-edit to add impression text and re-send report from COTS product.</td>
</tr>
<tr>
<td>Impression Text missing for current record</td>
<td></td>
</tr>
<tr>
<td>No Imaging Type for Location where exam was performed</td>
<td>VISTA Rad/Nuc Med Patient file has a partial, corrupted record for this exam. IRM and Radiology Service should investigate and determine whether to delete the record or attempt to enter missing data.</td>
</tr>
<tr>
<td>Provider not classified as resident or staff</td>
<td>COTS product user does not have Rad/Nuc Med Personnel classification. Use Rad/Nuc Med Personnel Classification option to enter ‘resident’ or ‘staff’ status if appropriate. Re-transmit report.</td>
</tr>
<tr>
<td>Residents are not permitted to verify reports</td>
<td>The division where this exam was performed does not allow residents to verify reports. (See Rad/Nuc Med Division file #79 parameter ‘ALLOW VERIFYING BY RESIDENTS’). This is a facility-determined practice.</td>
</tr>
<tr>
<td>Provider does not meet security requirements to verify report</td>
<td>COTS product user does not have the ‘RA VERIFY’ key. IRM can give this key to the user if it is appropriate, then the report can be re-sent.</td>
</tr>
<tr>
<td>Inactive Rad/Nuc Med Classification for Interpreting Physician</td>
<td>The COTS product user has been inactivated under the Rad/Nuc Med Personnel Classification option.</td>
</tr>
<tr>
<td>Staff review required to verify report</td>
<td>The COTS product user has a ‘resident’ classification, and the division where the exam was performed requires staff review before report verification.</td>
</tr>
<tr>
<td>Invalid Impression Text</td>
<td>Report or Impression text does not meet VISTA Rad/Nuc Med requirements – possibly too few</td>
</tr>
<tr>
<td>Invalid Report Text</td>
<td></td>
</tr>
<tr>
<td><strong>Error Message</strong></td>
<td><strong>Cause/Solution</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Missing Diagnostic Code</td>
<td>Unlikely. A null diagnostic code was entered. Re-edit diagnostic code and re-send report.</td>
</tr>
<tr>
<td>Invalid Diagnostic Code</td>
<td>Unlikely to happen in a debugged operational system. No exact match for diagnostic code found in the Diagnostic Code file #78.3. Check COTS product Diagnostic Code table for spelling and typographical errors.</td>
</tr>
<tr>
<td>ANOTHER USER IS CURRENTLY EDITING THIS PRINTSET. TRY LATER</td>
<td>Likely to happen in high-volume imaging services. This may happen if another radiology/nuclear medicine employee is editing the same report for a single case, or editing one of the cases or report for a parent/descendant printset when the COTS product report is transmitted. Re-send the report later.</td>
</tr>
<tr>
<td>This report is being edited by another user</td>
<td></td>
</tr>
<tr>
<td>An &lt;UNDEFINED&gt; error in the HL7 routine HLTP01 is logged in the error trap</td>
<td>Probable cause: a protocol entered as an item on an event driver protocol is not completely set up. This is likely if there is more than one protocol entered in the ‘ITEM’ multiple of the event driver protocols RA REG 2.3, RA RPT 2.3, RA CANCEL 2.3, RA EXAMINED 2.3. The RA TALKLINK ORU protocol must be an item under RA RPT 2.3, and the RA TALKLINK ORM protocol must be an item under the rest of the event drivers.</td>
</tr>
<tr>
<td>Messages not always reaching VISTA machine</td>
<td>Make sure that the COTS product knows its own domain name on your LAN. (See instructions from vendor.)</td>
</tr>
<tr>
<td>Open-M/Cache systems only -- some %ZISTCP processes continue to run when all links are shut down.</td>
<td>Since Open-M/Cache does not kill off these jobs like DSM, you must manually kill these jobs when all links are down.</td>
</tr>
<tr>
<td>Site wants to activate only one or two of the three ORM messages (RA REG 2.3, RA EXAMINED 2.3, RA CANCEL 2.3), but none of the messages go across if any of them is inactivated.</td>
<td>The inactivated messages may be causing the problem. Delete the data in the Server Application field and the Item multiple field of the event point protocols that are de-activated.</td>
</tr>
<tr>
<td>COTS product rejects an ACK message after sending a report. The ACK message generated by VISTA has an incorrect mix of field separators.</td>
<td>The RA TALKLINK TCP SERVER protocol may have been accidentally renamed. This protocol must not be renamed because it is used to initialize variables, and its name is hard-coded in the Rad/Nuc Med “bridge” program.</td>
</tr>
<tr>
<td>On a clustered system running more than one</td>
<td>Clustered Alpha systems running more than one</td>
</tr>
<tr>
<td><strong>Error Message</strong></td>
<td><strong>Cause/Solution</strong></td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TaskMan, links will not stay up.</td>
<td>TaskMan need to run TaskMan in DCL context, and use the link startup parameters in file 870, so that the links always start up on the same node. COTS product requires persistent connections for links on the same TCP/IP address.</td>
</tr>
<tr>
<td>Link statuses indicate that the links are up and running, but no messages are being sent or received.</td>
<td>If the VISTA system crashed or was shut down without first stopping the LLP links, the status looks normal, but the link jobs are no longer running. Shut down the links and start them backup in the recommended order.</td>
</tr>
</tbody>
</table>