



**RADIOLOGY / NUCLEAR MEDICINE V. 5
HL7 MANUAL**

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Table of Contents

Introduction	1
Radiology/Nuclear Medicine HL7 Interface Specifications	2
HL7 Messages, Segments, and Fields Used To Exchange Data	2
Discussion of Vendor-Initiated Messages	7
Sample Clinical Scenario for Vendor-Initiated Messaging	7
Messaging Specifics for Vendor-Initiated Messages.....	7
Discussion of Radiology/Nuclear Medicine-Initiated Messages	10
Clinical Scenarios for Radiology/Nuclear Medicine-Initiated Messages	11
Registration.....	11
Examined/Images Collected.....	11
Cancellation/Deletion	11
Verified/Released Unverified Report	11
Messaging Specifics for Radiology/Nuclear Medicine-Initiated Messages	12
Setup Instructions/Examples for VistA to VistA Same-System, Different Application	
Messages Initiated by Rad/Nuc Med	15
Introduction.....	15
Requirements	15
Setup of HL7 Files For VistA-VistA Radiology Interface	16
Setup Instructions/Examples for HLLP HL7 Interfaces Between Rad/Nuc Med and	
Outside PACS Vendors	26
Introduction.....	26
Requirements	26
Setup of HL7 Files for HLLP Radiology to Outside Vendor Interface.....	27
Startup and Recovery.....	39
Setup Instructions/Examples for TCP/IP HL7 Interfaces Between Rad/Nuc Med and	
COTS Products	40
Introduction.....	40
Requirements	40
Setup of HL7 Files for One Way Radiology to COTS Interface.....	41
Setup of HL7 Files for Two Way Radiology/COTS Interface	53
Message Flow Diagram	58
Scenario 1 - VA Sends Order or Report Messages to the COTS Product Server	58
Scenario 2 - Processing Reports from COTS Product Server	59
Startup and Recovery	60
One-Way TCP/IP Interface	60
Two-Way TCP/IP Interface.....	60
VISTA HL7 Message Files.....	61
File #773: HL7 Message Administration	61
File #772: HL7 Message Text	61

Implementing and Maintaining an Interface Between Radiology and the MedSpeak Voice Reporting Tool.....	62
Introduction.....	62
Requirements	62
Operational Features of the Interface.....	63
IRM and ADPAC Set-up Procedures	65
Setup of HL7 Files	67
Detailed Explanation of Start-up/Recovery Procedure.....	80
Start-up/Recovery Procedure Quick Reference	82
Implementing and maintaining an interface between Radiology and the TalkStation Voice Reporting Tool.....	83
Introduction.....	83
Requirements	83
Operational Features of the Interface.....	84
IRM and ADPAC Set-up Procedures	86
Setup of HL7 Files	88
Detailed Explanation of Start-up/Recovery Procedure.....	101
Start-up/Recovery Procedure Quick Reference	103
Implementing and Maintaining an Interface Between Radiology and the PowerScribe Voice Reporting Tool	104
Introduction.....	104
Requirements	104
Operational Features of the Interface.....	105
IRM and ADPAC Set-up Procedures	107
Setup of HL7 Files	109
Configuring PowerScribe HL7 Protocol Settings.....	120
Detailed Explanation of Start-up/Recovery Procedure.....	121
Start-up/Recovery Procedure Quick Reference	123
VistA Radiology/Nuclear Medicine HL7 Error Message and Troubleshooting Table for MedSpeak, TalkStation & PowerScribe Interfaces	124

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

Segment	Field Seq #	Field Element Name and Values	Where Used
MSA	1	Acknowledgment Code (AA=Accepted, AE=Error, & AR=Rejection)	V246
	2	Message Control ID	V246
	3	Text Message (contains the reason a query or findings report was invalid)	V6
MSH	1	Field Separator (determined by VISTA HL7 package set-up)	V123456 R1234
	2	Encoding Characters (determined by VISTA HL7 package set-up)	V123456 R1234
	3	Sending Application (determined by VISTA HL7 package set-up or vendor)	V123456 R1234
	4	Sending Facility (determined by VISTA HL7 package set-up or vendor)	V123456 R1234
	5	Receiving Application (determined by VISTA HL7 package set-up)	V123456 R1234
	6	Receiving Facility (determined by VISTA HL7 package set-up)	V123456 R1234
	7	Date/Time of Message	V123456 R1234
	8	Security (applicable only to messages incoming to VISTA)	V135
	9	Message Type and Event Code	V123456 R1234
	10	Message Control ID (determined by VISTA HL7 package or vendor)	V123456 R1234
	11	Processing ID (determined by VISTA HL7 package set-up)	V123456 R1234
	12	Version ID (determined by VISTA HL7 package set-up)	V123456 R1234
	17	Country Code (HL7 pkg sends contents of Country Code field on the related entry in file 771)	R1234

Segment	Field Seq #	Field Element Name and Values	Where Used
OBR	3	Filers Order # (Exam & Case IDs)	R1234
	4	Universal Service ID (V-Exam & Case IDs R-CPT code~CPT standard procedure name~CPT4~Rad/Nuc Med internal ID~Rad/Nuc Med procedure name~99RAP)	V245 R1234
	7	Observation Date/Time (Exam date/time)	V245 R1234
	14	Received Date/Time (Date rpt entered)	R4
	16	Ordering Provider (Requesting Phys. VISTA Internal ID~phys. name)	V245 R1234
	28	Placers Field #1 (Patient loc ward/clinic)	R1234
	20	Fillers Field #1 (V-Patient loc Ward/Clinic, or R-Imaging Location internal ID and name, Station number and name)	V245 R123
	21	Fillers Field #2 (Imaging Type of exam - Abbreviated Code and Name)	R123
	22	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)	V245 R1234
	25	Report Status (F=final, R=preliminary, A=addendum)	R4
	27	Urgency (S=stat, A=urgent, R=routine) Ex: ~~~~~R	R123
	32	R4-Verifying Physician ID and Name V5-(optional) Primary Interpreting Staff	R4,V5
	33	R4-Primary Staff or Resident Physician ID and Name V5-(optional) Primary Interpreting Resident	R4,V5
		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	
OBX	2	Value Type (CE=procedure follows, TX=modifier, clinical history or results text follows, ST=diagnostic code follows)	V245 R1234

Segment	Field Seq #	Field Element Name and Values	Where Used
	3	<p>Observation Identifier (D~DIAGNOSTIC CODE~L=diag. code, I~IMPRESSION~L=impression text, P~PROCEDURE~L=procedure, M~MODIFIER~L=modifier, C4~CPT MODIFIERS~C4=CPT modifier, H~HISTORY~L=clinical history text, R~REPORT~L=report text, A~ALLERGIES~L=allergies) 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.</p>	V245 R1234
	5	Observation Results	V245 R1234
	11	<p>Observation Result Status (F=report verified P=Preliminary results released/not verified, C=amended report verified ""=status does not apply)</p>	V2 R1234
ORC	1	<p>Order Control (NW=new registration, CA=canceled or deleted exam XO=examined/images captured)</p>	R123
	5	<p>Order Status (IP=registered, CA=canceled or deleted CM=examined/images captured)</p>	R123
	8	<p>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 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 "ORIGINAL ORDER PURGED".</p>	R123
	9	Date/Time of Transaction (date/time of registration, cancel, or image collection)	R123

Segment	Field Seq #	Field Element Name and Values	Where Used
PID	2	Patient ID (External format, may differ from SSN in some cases. Ex: pseudo-SSN, DOD sharing patient)	R1234
	3	Patient ID and checksum (3-parts: VISTA internal record number, check digit, check digit scheme)	V245 R1234
	5	Patient Name	V245 R1234
	7	Date of Birth	V245 R1234
	8	Sex	V245 R1234
	19	Patient SSN	V245 R1234
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	V24
QRD	1	Query Date/Time	V1234
	2	Query Format Code (R=response in record format)	V1234
	3	Query Priority (I=immediate)	V1234
	4	Query ID	V1234
	7	Quantity Limited Request (2-parts: maximum number of records to return, RD code indicates records)	V1234
	8	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)	V1234
	9	What Subject Filter (OTH=other)	V1234
	10	What Department Data Code (V12-EXAM, V34-PATIENT)	V1234
	11	What Data Code Value Qual. (S)	V1234

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^^^^^^"
```

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

Example:

```

MSH^^~&^RADIOLOGY^578^VOICERAD^VENDOR^19950619120423^^ORF^2950619.120423^P^2.1
MSA^AA^447
QRD^199506190652^R^I^001^^4~RD^682816440^OTH^PATIENT^S
PID^^^4710~1~M11^^DINGLE~BENJAMIN^^19480325^M^^^^^^^^^^682816440
OBR^^^7049880.8549-1~011995-219~L^^199501191450^"^^"^^"^^4507~TAYLOR~
FRANK^^^X-RAY STOP^^199501191450
OBX^^CE^P~PROCEDURE~L^^ANKLE 2 VIEWS^^^^^^"
OBX^^TX^M~MODIFIERS~L^^RIGHT^^^^^^"
OBX^^TX^H~HISTORY~L^^Twisted ankle playing football.^^^^^^"
PID^^^4710~1~M11^^DINGLE~BENJAMIN^^19480325^M^^^^^^^^^^682816440
OBR^^^7049880.8549-2~011995-220~L^^199501191450^"^^"^^"^^4507~TAY
LOR~
FRANK^^^X-RAY STOP^^199501191450
OBX^^CE^P~PROCEDURE~L^^FOOT 2 VIEWS^^^^^^"
OBX^^TX^M~MODIFIERS~L^^RIGHT^^^^^^"
OBX^^TX^H~HISTORY~L^^Foot is swollen.^^^^^^"
PID^^^4710~1~M11^^DINGLE~BENJAMIN^^19480325^M^^^^^^^^^^682816440
OBR^^^7049880.8549-3~011995-221~L^^199501191450^"^^"^^"^^4507~TAY
LOR~FRANK^^^X-RAY STOP^^199501191450
OBX^^CE^P~PROCEDURE~L^^NON-INVAS.,LOW EXT. VEIN W/O US^^^^^^"
OBX^^TX^M~MODIFIERS~L^^LEFT^^^^^^"
OBX^^TX^H~HISTORY~L^^High blood pressure, mod smoker (cigars).^^^^^^"
PID^^^4710~1~M11^^DINGLE~BENJAMIN^^19480325^M^^^^^^^^^^682816440
OBR^^^7049880.8549-4~011995-223~L^^199501191450^"^^"^^"^^4507~TAY
LOR~FRANK^^^X-RAY STOP^^199501191450
OBX^^CE^P~PROCEDURE~L^^TOE(S) 2 OR MORE VIEWS^^^^^^"
OBX^^TX^M~MODIFIERS~L^^RIGHT^^^^^^"
OBX^^TX^H~HISTORY~L^^Toes are swollen and discolored.^^^^^^"
PID^^^4710~1~M11^^DINGLE~BENJAMIN^^19480325^M^^^^^^^^^^682816440
OBR^^^7049880.8551-1~011995-216~L^^199501191448^"^^"^^"^^4507~TAY
LOR~FRANK^^^X-RAY STOP^^199501191448
OBX^^CE^P~PROCEDURE~L^^FOREARM 2 VIEWS^^^^^^"
OBX^^TX^M~MODIFIERS~L^^RIGHT^^^^^^"
OBX^^TX^H~HISTORY~L^^High blood pressure, mod smoker (cigars).^^^^^^"

```

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~J^^19421112^M^^^^^^^^^^123456789  
OBR^^^^7089898.8543-1~043091-66~L^^^199104301200^"^^"^^"^^"^^3232~HARRIS~  
JACK^^^MEDICINE^^199104301010  
OBX^^TX^I~IMPRESSION~L^^HEART NORMAL SIZE  
OBX^^ST^D~DIAGNOSTIC CODE~L^^NORMAL  
OBX^^TX^R~REPORT~L^^Heart appears to be of normal size.  
OBX^^TX^R~REPORT~L^^No infiltrate or abnormal mass noted.
```

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~001^88^P^2.1
PID^^321-44-8277^6552~7~M11^^HAMMER,RHONDA^^19840515^F^^^^^^^^^^321448277
ORC^NW^^^^IP^^EXAMSET: MAMMO PARENT PROCEDURE^19950412091135
OBR^^7049589.8964-1~041095-85~L^76091~MAMMOGRAM, BOTH BREASTS~CPT4~436
~MAMMOGRAM BILAT~99RAP^^^19950412091135^"^^"^^"^^4505~HILLER,CINDY^^1N^^
2~X~RAY ROOM 101~578~HINES VAMC^RAD~GENERAL RADIOLOGY^19950412091135^^^^^
~~~~R
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
MPONET~C4^^^^^^"
OBX^^TX^H~HISTORY~L^^This is the clinical history for the patient's exam. This is
going to be several^^^^^^"
OBX^^TX^H~HISTORY~L^^lines in length so we can see what happens when we create the HL7
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:

HL7 ORC Field	Registration	Cancel/Delete	Examined
1-Order Control	NW	CA	XO
5-Order Status	IP	CA	CM

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^^714-26-2873^374~3~M11^^LIME~HARRY^^19080817^M^^^^^^^^^^^^714262873
OBR^^7049587.8959-1~041295-334~L^76020~X-RAYS FOR BONE AGE~CPT4~423~BONE
AGE~99RAP^^^199504121040^^"^^"^^^19950412150219^^4507~TAYLOR,FRANK^^1N^^^1
99504121503^^^F^^^^^^4505~HILLER~CINDY^4532~FLASHCARD~FERGUS
OBX^TX^I~IMPRESSION~L^^This is the first line of impression text on the report
record.^^^^^^F
OBX^TX^I~IMPRESSION~L^^The second line of impression text on the report
record.^^^^^^F
OBX^TX^I~IMPRESSION~L^^The third 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^TX^R~REPORT~L^^The third 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~CPT4~
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^^^^^^"
OBR^^7029871.8488-2~012897-439~L^73620~X-RAY EXAM OF FOOT~CPT4~165~FOOT 2
VIEWS~99RAP^^^199701281511^^"^^"^^^19970128155928^^4599~ORDERER~ORVILLE^^^
^EMERGENCY ROOM^^199701281600^^F^^^^^^4505~HELLER~CINDY
OBX^CE^P~PROCEDURE~L^^165~FOOT 2 VIEWS~L^^^^^^"
OBR^^7029871.8488-3~012897-440~L^73660~X-RAY EXAM OF TOE(S)~CPT4~168~
TOE(S) 2 OR MORE VIEWS~99RAP^^^199701281511^^"^^"^^^19970128155928^^4599~
ORDERER~ORVILLE^^^EMERGENCY ROOM^^199701281600^^F^^^^^^4505~HELLER~CINDY^
4515~SPOCK~DOCTOR
OBX^CE^P~PROCEDURE~L^^168~TOE(S) 2 OR MORE VIEWS~L^^^^^^"
OBX^TX^I~IMPRESSION~L^^TOE FRACTURES.^^^^^^F
OBX^ST^D~DIAGNOSTIC CODE~L^^ABNORMALITY, ATTN. NEEDED^^^^^^F
OBX^TX^R~REPORT~L^^FOUND EVIDENCE OF SEVERAL FRACTURES IN R. FOOT, IN ALL 5
TOES.^^^^^^F
OBX^TX^M~MODIFIERS~L^^PORTABLE EXAM^^^^^^"
OBX^CE^C4~CPT MODIFIERS~C4^^26~PROFESSIONAL COMPONENT~C4~09926~PROFESSIONAL CO
MPONENT~C4^^^^^^"

```

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.

NAME: RA-CLIENT-IMG
FACILITY NAME: IMAGING INTERFACE

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US

```
HL7 APPLICATION EDIT
-----
                NAME: RA-CLIENT-IMG                ACTIVE/INACTIVE: ACTIVE
                FACILITY NAME: IMAGING INTERFACE        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
```

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.

<u>Protocol</u>	<u>Triggering event in VISTA Rad/Nuc Med processing</u>
RA REG	Rad/Nuc Med case registration
RA CANCEL	Rad/Nuc Med case cancellation or deletion
RA EXAMINED	Rad/Nuc Med case reaches a status with file #72, field 8 GENERATE EXAMINED HL7 MESSAGE marked "yes"
RA RPT	Rad/Nuc Med report status changes to "Released/Not Verified" or "Verified"

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=$O(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
TYPE: subscriber
RECEIVING APPLICATION: RA-CLIENT-IMG
VERSION ID: 2.1
PROCESSING ROUTINE: D ^ZZTEST1
RECEIVING FACILITY REQUIRED?: NO

ITEM TEXT: Client for Imaging
PACKAGE: ANYPKG
EVENT TYPE: 001
RESPONSE MESSAGE TYPE: ACK
SENDING 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
RA SEND ORM	

RECEIVING APPLICATION: RA-CLIENT-IMG	
RESPONSE MESSAGE TYPE: ACK	EVENT TYPE: 001
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
TYPE: subscriber
RECEIVING APPLICATION: RA-CLIENT-IMG
VERSION ID: 2.1
PROCESSING ROUTINE: D ^ZZTEST2
RECEIVING FACILITY REQUIRED?: NO

ITEM TEXT: Client for Imaging
PACKAGE: ANYPKG
EVENT TYPE: R01
RESPONSE MESSAGE TYPE: ACK
SENDING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA SEND ORU	
DESCRIPTION (wp): (empty)	
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:	
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

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:

<u>File 771 Entry</u>	<u>Explanation</u>
RA-SERVER-IMG	Exported for use as VISTA Rad/Nuc Med application over HLLP
RA-CLIENT-IMG	Exported for use as outside vendor application over HLLP

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.

NAME: RA-SERVER-IMG
FACILITY NAME: VISTA RADIOLOGY

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US

```
HL7 APPLICATION EDIT
-----
                NAME: RA-SERVER-IMG                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: VISTA RADIOLOGY        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
```

NAME: RA-CLIENT-IMG
FACILITY NAME: OUTSIDE VENDOR

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US

```
HL7 APPLICATION EDIT
-----
                NAME: RA-CLIENT-IMG                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: OUTSIDE VENDOR        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
```

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                LLP TYPE: HLLP
AUTOSTART: Enabled           HLLP DEVICE: VENDOR DEVICE
RE-TRANSMISSION ATTEMPTS: 3  BLOCK SIZE: 245
READ TIMEOUT: 10            ACK TIMEOUT: 10
LLP START BLOCK: 11        LLP END BLOCK: 28
PROTOCOL ID VERSION: 2.1
```

HL7 LOGICAL LINK

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 <PF1>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.

```
NAME: RA SEND ORM                ITEM TEXT: Client for Imaging (ORM)
TYPE: subscriber
DESCRIPTION: This protocol receives the HL7 message.
RECEIVING APPLICATION: RA-CLIENT-IMG  EVENT TYPE: 001
LOGICAL LINK: RAD HLLP              VERSION: 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): [This protocol receives the HL7 message.]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber	
COMMAND:	Press <PF1>H for help Insert

RECEIVING APPLICATION: RA-CLIENT-IMG

RESPONSE MESSAGE TYPE: ACK

EVENT TYPE: 001

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 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
RA REG

PAGE 2 OF 2

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORM

PROCESSING ID:

ACCEPT ACK CODE:

EVENT TYPE: 001

VERSION ID: 2.1

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

```

```

HL7 INTERFACE SETUP                      PAGE 1 OF 2
-----
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

```

```

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

```


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 COTS¹ 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:

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

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:

Note: The HL7 field separator and encoding characters listed below are the HL7 standard, but are not the VISTA HL7 standard. When interfacing with a COTS product you will most likely be required to use the HL7 standard. Be aware, however, that these 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. The VISTA HL7 standard, and default, is a field separator of '^' and encoding characters of '~\|&'

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

```

HL7 APPLICATION EDIT
-----
                NAME: RA-RADSERVER                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: VISTA RADIOLOGY        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

```

```

                NAME: RA-COTSCLIENT                ACTIVE/INACTIVE: ACTIVE
                FACILITY NAME: COTS EXAMPLE        COUNTRY CODE: US
                HL7 ENCODING CHARACTERS: ^~\&        HL7 FIELD SEPARATOR: |

```

```

HL7 APPLICATION EDIT
-----
                NAME: RA-COTSCLIENT                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: COTS EXAMPLE        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

```

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:

<u>Logical Link</u>	<u>Reason exported</u>
RA-MED	Radiology-MedSpeak link
RA-PSCRIBE	Radiology-PowerScribe link
RA-TALK	Radiology-TalkStation link

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:
LLP TYPE: TCP
AUTOSTART: Enabled
ACK TIMEOUT: 300
TCP/IP ADDRESS: 152.129.1.107
TCP/IP SERVICE TYPE: CLIENT (SENDER)
PERSISTENT: YES
```

HL7 LOGICAL LINK

```

NODE: RA-COTS

INSTITUTION:

DOMAIN:

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

QUEUE SIZE:

LLP TYPE: TCP
```

COMMAND: Press <PF1>H for help Insert

HL7 LOGICAL LINK

```

TCP LOWER LEVEL PARAMETERS
RA-COTS

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

ACK TIMEOUT: 300 <- recommended RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT: EXCEED RE-TRANSMIT ACTION: ignore
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 Press <PF1>H for help Insert

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.

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

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.

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.

<u>Subscriber Protocol</u>	<u>Potential SUBSCRIBER to</u>	<u>HL7 Version</u>	<u>Message Type</u>
RA TCP ORM	RA REG, RA CANCEL, RA EXAMINED	2.1	ORM
RA TCP ORU	RA RPT	2.1	ORU
RA TALKLINK ORM	RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3	2.3	ORM
RA TALKLINK ORU	RA RPT 2.3	2.3	ORU
RA PSCRIBE ORM	RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3	2.3	ORM
RA PSCRIBE ORU	RA RPT 2.3	2.3	ORU

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
TYPE: subscriber
RECEIVING APPLICATION: RA-COTSCLIENT
LOGICAL LINK: RA-COTS
RESPONSE MESSAGE TYPE: ACK
RECEIVING FACILITY REQUIRED?: NO

ITEM TEXT: TCP Client
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
EVENT TYPE: 001
VERSION ID: 2.3
SENDING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA COTS ORM	
DESCRIPTION (wp): (empty)	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber	

COMMAND:	Press <PF1>H for help Insert

HL7 SUBSCRIBER	PAGE 2 OF 2
RA COTS ORM	

RECEIVING APPLICATION: RA-COTSCLIENT	
RESPONSE MESSAGE TYPE: ACK	EVENT TYPE: 001
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 COTS ORU
TYPE: subscriber
RECEIVING APPLICATION: RA-COTSCLIENT
LOGICAL LINK: RA-COTS
RESPONSE MESSAGE TYPE: ACK
RECEIVING FACILITY REQUIRED?: NO

ITEM TEXT: TCP Client
PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
EVENT TYPE: R01
VERSION ID: 2.3
SENDING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA COTS ORU	
DESCRIPTION (wp): (empty)	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber	
COMMAND: Press <PF1>H for help Insert	

HL7 SUBSCRIBER	PAGE 2 OF 2
RA COTS ORU	

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 <PF1>H for help

Insert

HL7 EVENT DRIVER
RA REG 2.3

PAGE 2 OF 2

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

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:

<u>Logical Link</u>	<u>Reason exported</u>
MED-RA	MedSpeak-Radiology link
PSCRIBE-RA	PowerScribe-Radiology link
TALK-RA	TalkStation-Radiology link

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.

```
NODE: COTS-RA                                LLP TYPE: TCP
DEVICE TYPE: Single-threaded Server          AUTOSTART: Enabled
TCP/IP PORT: 7078                            TCP/IP SERVICE TYPE: SINGLE LISTENER
STARTUP NODE:
```

```
HL7 LOGICAL LINK
-----
NODE: COTS-RA
INSTITUTION:
DOMAIN:
AUTOSTART: Enabled <-- set to Enabled if autostart of link required
QUEUE SIZE:
LLP TYPE: TCP

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

```
HL7 LOGICAL LINK
-----
TCP LOWER LEVEL PARAMETERS
COTS-RA
TCP/IP SERVICE TYPE: SINGLE LISTENER <-- recommended
TCP/IP ADDRESS:    <-- only required under Cache/NT
TCP/IP PORT: 7078  <-- port Rad/Nuc Med receives on

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
```

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.

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

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.

<u>Subscriber Protocol</u>	<u>Reason Exported</u>	<u>HL7 Version</u>	<u>Message Type</u>
RA VOICE TCP REPORT	MedSpeak subscriber protocol	2.1	ORU
RA TALKLINK TCP REPORT	TalkStation subscriber protocol	2.3	ORU
RA PSCRIBE TCP REPORT	PowerScribe subscriber protocol	2.3	ORU

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

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA COTS TCP REPORT	
DESCRIPTION (wp): [Subscriber protocol for sending report to VISTA]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber	

COMMAND:	Press <PF1>H for help Insert

HL7 SUBSCRIBER	PAGE 2 OF 2
RA COTS TCP REPORT	

RECEIVING APPLICATION: RA-RADSERVER	
RESPONSE MESSAGE TYPE: ACK	EVENT TYPE: R01
SENDING FACILITY REQUIRED?: NO	RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO	
LOGICAL LINK: COTS-RA	
PROCESSING RTN: D RPT^ZZHL7RA	
ROUTING LOGIC:	

COMMAND:	Press <PF1>H for help Insert

NAME: RA COTS TCP REPORT SERVER
ITEM TEXT: COTS product sends report to VistA
TYPE: event driver
SENDING APPLICATION: RA-COTSCLIENT
EVENT TYPE: R01
SUBSCRIBERS: RA COTS TCP REPORT

PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
TRANSACTION MESSAGE TYPE: ORU
VERSION ID: 2.3

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	
PROCESSING ID:	VERSION ID: 2.3	
ACCEPT ACK CODE:	APPLICATION ACK TYPE:	
RESPONSE PROCESSING RTN:		
SUBSCRIBERS		
RA COTS TCP REPORT		

Exit	Save	Refresh
Enter a command or '^' followed by a caption to jump to a specific field.		
COMMAND:	Press <PF1>H for help	Insert

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:

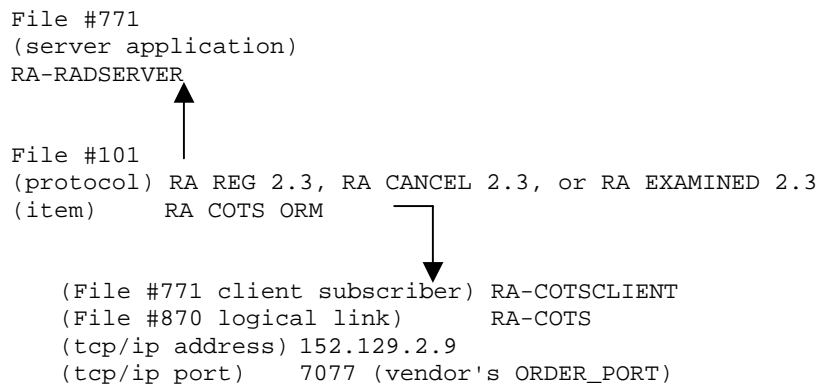
- One to send new orders, (i.e., registration data, cancels, examined messages, and reports) to COTS product, and to receive ACK's from COTS product for these orders, and
- A second to receive reports from COTS product and send ACK's to COTS product.

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

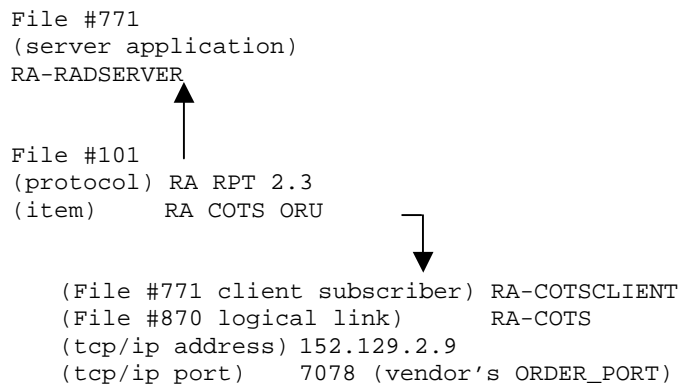
1A. VA RAD/NUC MED SENDS ORDER MESSAGE (ORM) TO COTS PRODUCT SERVER

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



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.



1C. COTS PRODUCT SERVER SENDS ACKNOWLEDGEMENT FOR ORDER MESSAGE OR REPORT MESSAGE TO VA

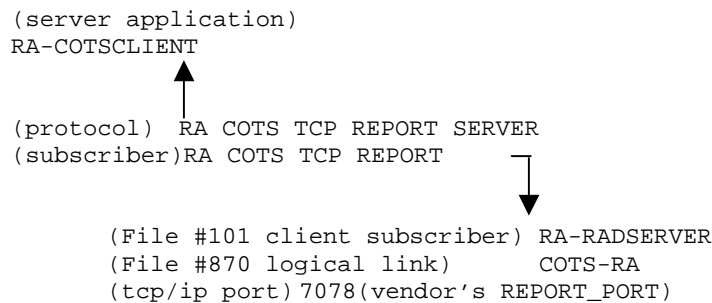
(File #870 logical link) RA-COTS
(tcp/ip address) 152.129.2.9
(tcp/ip port) 7077 (vendor's ORDER_PORT)

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



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|" "|
" "|||" "|1895^SHAMUKHAMEDOV^SHAVKAT||2ASM||4^X-RAY CLINIC^49
9^SUPPORT ISC|RAD^GENERAL RADIOLOGY|20000411114732||^R
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 <-- 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
```

NAME: RA-SERVER-IMG
FACILITY NAME: **VISTA RADIOLOGY**

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US

```
HL7 APPLICATION EDIT
-----
NAME: RA-SERVER-IMG                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 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: RA-MED
DEVICE TYPE: Persistent Client
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RA-TRANSMIT ACTION: ignore
TCP/IP PORT: 5010
PERSISTENT: YES

LLP TYPE: TCP
AUTOSTART: Enabled
ACK TIMEOUT: 300
TCP/IP ADDRESS: 152.129.2.9
TCP/IP SERVICE TYPE: CLIENT (SENDER)
STARTUP NODE:

```

```

HL7 LOGICAL LINK
-----

      NODE: RA-MED

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   Insert

```

```

HL7 LOGICAL LINK
-----

      TCP LOWER LEVEL PARAMETERS
      RA-MED

TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: 152.129.2.9 <-- address of MedSpeak server
TCP/IP PORT: 5010 <-- port MedSpeak receives on

ACK TIMEOUT: 300 <-- recommended  RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT:                                     EXCEED RE-TRANSMIT ACTION: ignore
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                               Press <PF1>H for help   Insert

```

```

NODE: MED-RA                      LLP TYPE: TCP
DEVICE TYPE: Single-threaded Server  AUTOSTART: Enabled
TCP/IP PORT: 5012                  TCP/IP SERVICE TYPE: SINGLE LISTENER
STARTUP NODE:

```

```

HL7 LOGICAL LINK
-----

      NODE: MED-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   Insert

```

```

HL7 LOGICAL LINK
-----

          TCP LOWER LEVEL PARAMETERS
          MED-RA

TCP/IP SERVICE TYPE: SINGLE LISTENER  <-- MULTIPLE LISTENER under UCX
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 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                                PAGE 1 OF 2
-----
      NAME: RA CANCEL
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
-----
      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                               PAGE 1 OF 2
-----
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                                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 TCP ORU  <-- add this subscriber

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


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

<u>Step</u>	Machine	Action	Mandatory, Optional, or Conditional
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: Shutdown 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'.

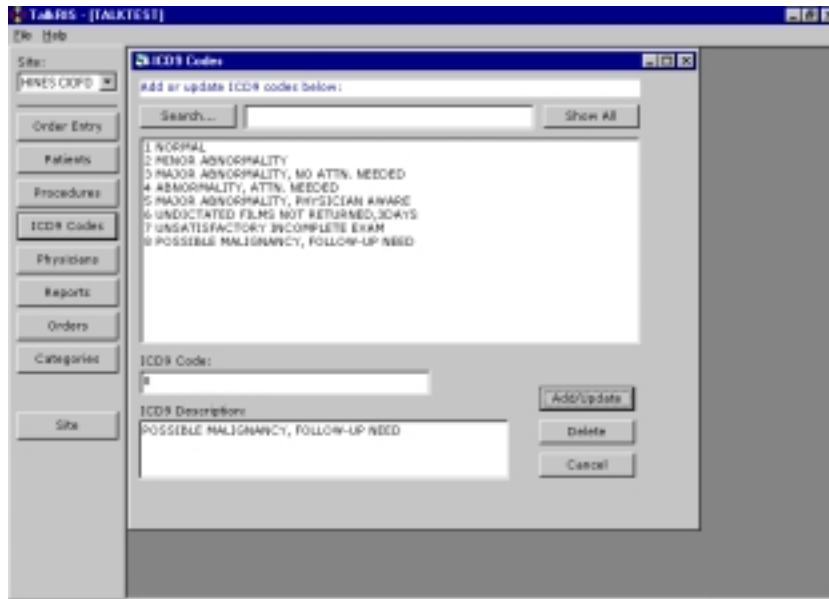
IRM and ADPAC Set-up Procedures

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 #.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: |
```

```
HL7 APPLICATION EDIT
-----
                NAME: RA-TALKLINK-TCP                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: TALKSTATION <- 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
```

NAME: RA-VOICE-SERVER
FACILITY NAME: **VISTA RADIOLOGY**
HL7 ENCODING CHARACTERS: ^~\&

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US
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**

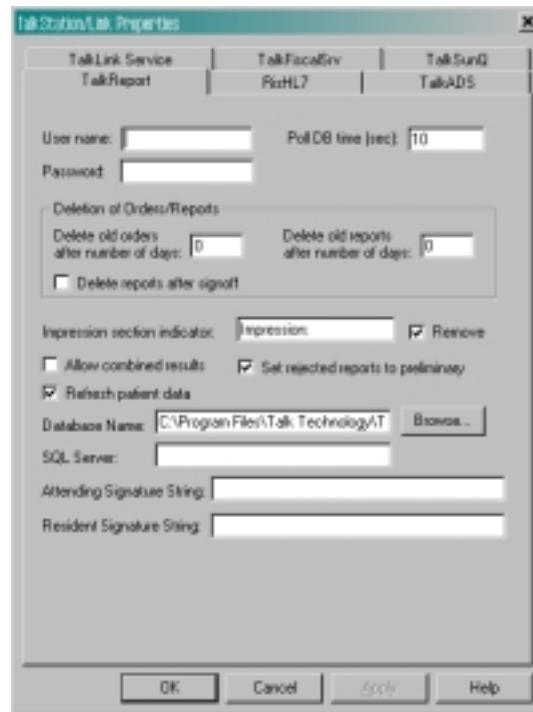
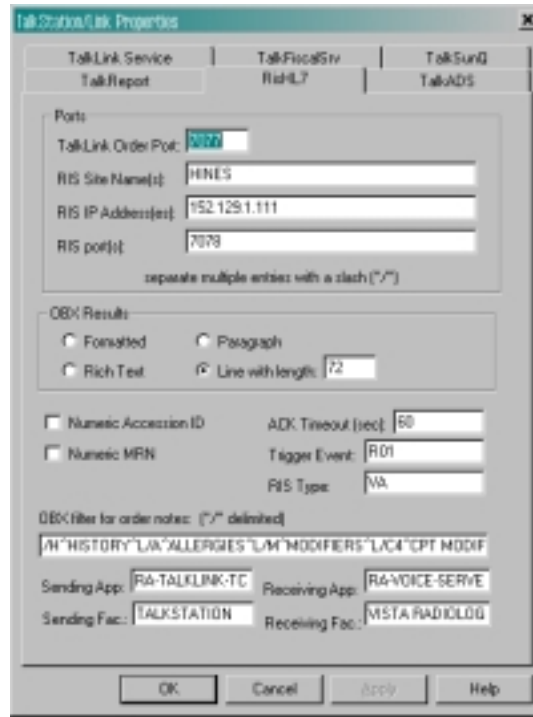
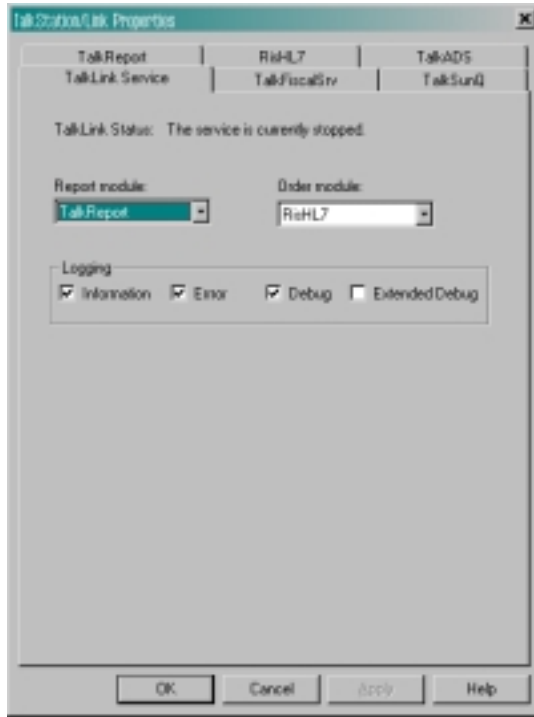
To ensure that TalkStation functions correctly the Report and Order modules must be defined. Within the TalkLink Service tab of the TalkStation/Link application choose the following values:

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

DEVICE TYPE: Persistent Client
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RE-TRANSMIT ACTION: ignore
TCP/IP PORT: 7077
PERSISTENT: YES

AUTOSTART: Enabled
ACK TIMEOUT: 300
TCP/IP ADDRESS: 152.129.1.107
TCP/IP SERVICE TYPE: CLIENT (SENDER)
STARTUP NODE:

HL7 LOGICAL LINK

NODE: RA-TALK

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 Insert

HL7 LOGICAL LINK

TCP LOWER LEVEL PARAMETERS
RA-TALK

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: EXCEED RE-TRANSMIT ACTION: ignore
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 Press <PF1>H for help Insert

```

NODE: TALK-RA                      LLP TYPE: TCP
DEVICE TYPE: Single-threaded Server  AUTOSTART: Enabled
TCP/IP PORT: 7078                   TCP/IP SERVICE TYPE: SINGLE LISTENER
STARTUP NODE:

```

```

HL7 LOGICAL LINK
-----
NODE: TALK-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   Insert

```

```

HL7 LOGICAL LINK
-----
TCP LOWER LEVEL PARAMETERS
TALK-RA
TCP/IP SERVICE TYPE: SINGLE LISTENER <-MULTIPLE LISTENER under UCX
TCP/IP ADDRESS: <- address of listener only needed for Cache/NT
TCP/IP PORT: 7078 <- port TalkStation 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 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	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 ← hit <return> here to edit event driver details	

COMMAND:	Press <PF1>H for help Insert

HL7 EVENT DRIVER	PAGE 2 OF 2
RA REG 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 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

HL7 INTERFACE SETUP	PAGE 1 OF 2

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	PAGE 2 OF 2
RA RPT 2.3	

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

Exit	Save Refresh
Enter a command or '^' followed by a caption to jump to a specific field.	
COMMAND:	Press <PF1>H for help Insert

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

Step	Machine	Action	Mandatory, Optional, or Conditional
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-PSCRIBE, 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 “Dagnosis 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

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

```
HL7 APPLICATION EDIT
-----
                NAME: RA-PSCRIBE-TCP                ACTIVE/INACTIVE: ACTIVE

                FACILITY NAME: POWERSCRIBE <-- 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
```

NAME: RA-VOICE-SERVER
FACILITY NAME: **VISTA RADIOLOGY**
HL7 ENCODING CHARACTERS: ^~\&

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US
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
```

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 thebox-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
RE-TRANSMISSION ATTEMPTS: 3
EXCEED RE-TRANSMIT ACTION: ignore
TCP/IP PORT: 8410
PERSISTENT: YES

AUTOSTART: Enabled
ACK TIMEOUT: 300
TCP/IP ADDRESS: 152.132.126.222
TCP/IP SERVICE TYPE: CLIENT (SENDER)
STARTUP NODE:

HL7 LOGICAL LINK

 NODE: RA-PSCRIBE

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 Insert

HL7 LOGICAL LINK

TCP LOWER LEVEL PARAMETERS

RA-PSCRIBE

TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: 152.132.126.222 <-- address of PowerScribe server
TCP/IP PORT: 8410 <-- port PowerScribe receives on

ACK TIMEOUT: 300 <-- recommended RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT: EXCEED RE-TRANSMIT ACTION: ignore
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 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 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: 001

VERSION ID: 2.3

SUBSCRIBERS: RA PSCRIBE 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 ← hit <return> here to edit event driver details	

COMMAND:	Press <PF1>H for help Insert

HL7 EVENT DRIVER	PAGE 2 OF 2
RA REG 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 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	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 PSCRIBE 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
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

```

```

HL7 INTERFACE SETUP                      PAGE 1 OF 2
-----
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

```

```

HL7 EVENT DRIVER                        PAGE 2 OF 2
                                RA EXAMINED 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 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	PAGE 1 OF 2

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	PAGE 2 OF 2
RA RPT 2.3	

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 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

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

Enable HL7

RIS Server Information	PowerScribe Server Information
TCP/IP Address: 152 . 129 . 1 . 111	TCP/IP Address: 152 . 132 . 126 . 222
TCP/IP Port: 8400	TCP/IP Port: 8410
Application Name: RA-VOICE-SERVER	Application Name: RA-PSCRIBE-TCP
	TCP/IP Time-out (Sec): 30
	TCP/IP Retry: 45

Other Settings (Read Only)

OBR Field For Accession #:	2
Maximum OBX Field Length:	72

OK
Apply
Cancel

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

Step	Machine	Action	Mandatory, Optional, or Conditional
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 (Open-M / Cache only)	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.

<u>Error Message</u>	<u>Cause/Solution</u>
Missing Case Number Internal Patient ID Missing Missing Exam Date Missing Exam Date and/or Case Number Missing Patient ID Missing report date Missing Internal Patient ID Invalid Report 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.)
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 Report for CANCELLED case not permitted Please use VISTA to edit CANCELLED printset cases.	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.
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.

<u>Error Message</u>	<u>Cause/Solution</u>
Report already on file	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
Missing addendum report/impression text	Unlikely because COTS product software will not allow a blank report to be sent. Re-edit and re-send report from COTS product.
Missing Impression Text Impression Text missing for current record	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.
No Imaging Type for Location where exam was performed	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.
Provider not classified as resident or staff	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.
Residents are not permitted to verify reports	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.
Provider does not meet security requirements to verify report	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.
Inactive Rad/Nuc Med Classification for Interpreting Physician	The COTS product user has been inactivated under the Rad/Nuc Med Personnel Classification option.
Staff review required to verify report	The COTS product user has a 'resident' classification, and the division where the exam was performed requires staff review before report verification.
Invalid Impression Text Invalid Report Text	Report or Impression text does not meet VISTA Rad/Nuc Med requirements – possibly too few

<u>Error Message</u>	<u>Cause/Solution</u>
	characters or all special characters.
Missing Diagnostic Code	Unlikely. A null diagnostic code was entered. Re-edit diagnostic code and re-send report.
Invalid Diagnostic Code	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.
ANOTHER USER IS CURRENTLY EDITING THIS PRINTSET. TRY LATER This report is being edited by another user	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.
An <UNDEFINED> error in the HL7 routine HLTP01 is logged in the error trap	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.
Messages not always reaching VISTA machine	Make sure that the COTS product knows its own domain name on your LAN. (See instructions from vendor.)
Open-M/Cache systems only -- some %ZISTCP processes continue to run when all links are shut down.	Since Open-M/Cache does not kill off these jobs like DSM, you must manually kill these jobs when all links are down.
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.	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.
COTS product rejects an ACK message after sending a report. The ACK message generated by VISTA has an incorrect mix of field separators.	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.
On a clustered system running more than one	Clustered Alpha systems running more than one

<u>Error Message</u>	<u>Cause/Solution</u>
TaskMan, links will not stay up.	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.
Link statuses indicate that the links are up and running, but no messages are being sent or received.	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.