



Radiology/Nuclear Medicine 5.0
HL7 Setup/Implementation Manual
Version 4.0

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Revision History

Date	Version	Change	Page
2000	1.0	Initial version of this document	
February 2007	2.0	Fully updated to include current functionality Document reformatted to meet current Documentation Standards	
May 2009	3.0	For Patch RA*5*78: <ul style="list-style-type: none"> Added Legacy to the heading Added Legacy to the heading Added Legacy to the heading Added a section for TCP/IP Optimized HL7 Interfaces Refer to the HL7 Message Specifications document for more information on the structure of these v2.3 HL7 query and response messages Assuming that patch HL*1.6*139 is released when RA*5.0*78 is released. Naturally, the VistA Health Level Seven application should be fully patched Points 2 and 3 reference the double-headed arrow in the diagram Specific IP Port numbers for NTP: 21999 as the required TCP/IP PORT field value and 21998 as the required TCP/IP PORT (OPTIMIZED) field value Body means that all HL7 segments are stored, except the MSH (Message Header) segment Header means that the only HL7 segment stored, is the MSH (Message Header) segment 	3 13 23 93 93 93 94 96 98 98
August 2011	4.0	Patch RA*5*47 <ul style="list-style-type: none"> Added the name of the updated HL7 Specification for v2.4 Added an example message for HL7 v2.4 Added an example message for HL7 v2.4, single procedure Added an example message for HL7 v2.4, printset Added an example message for HL7 v2.4, ACK Removed the original 20. <i>TalkStation users are not allowed to group sets of exams together and mark them for a single report....</i> Removed the original 19. <i>PowerScribe users are not allowed to group sets of exams together and mark them for a single report....</i> Added a section about the HL7 messaging version 2.4: Setup Instructions/Examples for using IHE compliant HL7 v2.4 Protocols Updated three v2.4 message examples 	3 7 9 10 11 44 64 85

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Table of Contents

Introduction.....	1
Rad/Nuc Med Legacy HL7 Interface Specifications.....	3
Discussion of Vendor-Initiated Messages	3
Sample Clinical Scenario for Vendor-Initiated Messaging	3
Messaging Specifics for Vendor-Initiated Messages	3
Discussion of Rad/Nuc Med-Initiated Messages	4
Clinical Scenarios for Rad/Nuc Med-Initiated Messages.....	4
Registration	4
Exam Edited.....	5
Cancellation/Deletion.....	5
Verified/Released Unverified Report.....	5
Messaging Specifics for Rad/Nuc Med-Initiated Messages.....	6
Setup Instructions/Examples for VistA to VistA Same-system, Different Application Messages Initiated by Rad/Nuc Med.....	13
Introduction	13
Requirements.....	13
Setup of Legacy HL7 Files for VistA-VistA Radiology Interface.....	13
Setup Instructions/Examples for TCP/IP Legacy HL7 Interfaces between Rad/Nuc Med and COTS Products.....	23
Introduction	23
Requirements.....	23
Setup of HL7 Files for One-way Radiology to COTS Interface.....	23
Setup of HL7 Files for Two-way Radiology/COTS Interface	35
Message Flow Diagram.....	38
Scenario 1 - VA Sends Order or Report Messages to the COTS Product Server.....	38
Scenario 2 - Processing Reports from COTS Product Server.....	39
Startup and Recovery.....	40
One-way TCP/IP Interface	40
Two-way TCP/IP Interface	40
VistA HL7 Message Files	40
Implementing and Maintaining an Interface between Radiology and the TalkStation Voice Reporting Tool	43
Introduction	43
Requirements.....	43
Operational Features of the Interface	43
IRM and ADPAC Setup Procedures	45
Setup of HL7 Files.....	47
Detailed Explanation of Start-up/Recovery Procedure	60
Start-up/Recovery Procedure Quick Reference.....	61
Implementing and Maintaining an Interface between Radiology and the PowerScribe Voice Reporting Tool	63
Introduction	63

Requirements	63
Operational Features of the Interface	63
IRM and ADPAC Set-up Procedures	64
Setup of HL7 Files.....	66
Configuring PowerScribe HL7 Protocol Settings	77
Detailed Explanation of Start-up/Recovery Procedure	78
Start-up/Recovery Procedure Quick Reference.....	79
VistA Rad/Nuc Med HL7 Error Message and Troubleshooting Table for TalkStation and PowerScribe Interfaces.....	81
Setup Instructions/Examples for Using IHE compliant HL7 v2.4 Protocols	85
Setting Up the Voice Recognition Event Driver Protocols	85
Step 1 - Remove subscribers from existing ORM event driver protocols	85
Step 2 - Remove subscribers from existing ORU event driver protocol.....	87
Step 3 - Add subscribers to new ORM event driver protocols	88
Step 5 - Change the Version ID field of existing message receipt protocol to 2.4	90
Step 6 - Turn on the use of the long site accession number	91
Setup Instructions/Examples for TCP/IP Optimized HL7 Interfaces between Rad/Nuc Med and COTS Products.....	93
Introduction	93
Requirements	93
Setup of HLO Components for Two-way Radiology/COTS Interface	94
Message Flow Diagram.....	94
Part 1 – VistA Accepts an Inbound Query Message (QRY~R02).....	95
Part 2 – VistA Processes the Query and Returns a Response (QRY~R04).....	95
Part 3 – VistA Receives an Accept Acknowledgment from COTS.....	95
Startup and Recovery.....	95
HLO System Startup	95
Updating the RA-SCIMAGE Logical Link	96
VistA HL7 HLO Message Files	98
HLO Message Body File (#777)	98
HLO Messages File (#778)	98

Introduction

The Radiology/Nuclear Medicine (Rad/Nuc Med) 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 Rad/Nuc Med 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. The package interfaces with and through the Health Level Seven (HL7) package to exchange this exam and report information.

HL7 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.

The Rad/Nuc Med package supports the Integrating the Healthcare Enterprise (IHE) initiative. IHE is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care.

Because many vendors support the IHE initiative, it allows Rad/Nuc Med to exchange key datasets with other VistA and Commercial Off-The-Shelf (COTS) products.

Rad/Nuc Med allows report transmission. That is, reports can be transmitted to Rad/Nuc Med from an outside source and filed as if entered in the Rad/Nuc Med package.

Rad/Nuc Med also has the ability to broadcast messages to outside sources. These messages are typically consumed by vendor PACS Systems, VistA Imaging, and Voice Recognition (VR) dictation systems. Rad/Nuc Med broadcasts messages when exams are registered, edited, cancelled or deleted, and reported.

The following chapters describe the information that can be manipulated with the Rad/Nuc Med and HL7 software. It also describes how to set up an HL7 interface to and from Radiology (both TCP/IP and non-TCP), and later describes how to implement/maintain the three VR system interfaces (for PowerScribe, TalkStation, and RadWhere) which have been developed, and are supported by, the Rad/Nuc Med developers.

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Rad/Nuc Med Legacy¹ HL7 Interface Specifications

For a description of the HL7 messages shared between the Rad/Nuc Med application and those commercial off the shelf (COTS) applications subscribing to the Rad/Nuc Med application, refer to the

- *Radiology/Nuclear Medicine Health Level Seven (HL7) Interface Specifications for Voice Recognition Dictation Systems* – HL7 version 2.3
- *Radiology/Nuclear Medicine 5.0 HL7 Interface Specification* – HL7 version 2.4²

Discussion of Vendor-Initiated Messages

Vendor systems or other applications may send **report** (ORU) results for a selected exam back to the Rad/Nuc Med 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 Rad/Nuc Med 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 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 the vendor (or other) application sends report results, they send an Observational Results Unsolicited (ORU) message to the Rad/Nuc Med package. The ORU message consists of the following segments:

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

Example for HL7 v2.3

```
MSH^~|\&^RA-SERVER-IMG^HINES CIOFO^MAGD-CLIENT^884
^20050426130221-0600^^ORU~R01^499539643619^P^2.3.1^^^^^US
PID^^00-22-4444~^121~4~M10^^REALLYLONGSURNAMEXXXX~
MISSXXXX^^19730414^F^^^^^^^^^^000224444
OBR^^^6958798.8966-1~120104-1732~L^76090~MAMMOGRAM, ONE BREAST~C4~435~MAMMOGRAM
UNILAT~99RAP^^^200412011033-0600^" "" ""^20050426130124-0600^^0123~
STAFF~FIRST~M
^^MAMMOGRAM TEST CASE I^^23~MAMMOGRAPHY LAB~499~SUPPORT
ISC^^2005042613020600^^F^^^^^^^^0123~STAFF~FIRST~M
^0456~RESIDENT~FIRST^^0123~STAFF~FIRST~M^200412011033-0600
```

¹ Patch RA*5*78 May 2009: Added **Legacy** to the heading

² Patch RA*5*47 August 2011: Added the name of the updated HL7 Specification for v2.4

```

OBX^^CE^P~PROCEDURE~L^^435~MAMMOGRAM UNILAT~L^^^^^^F
OBX^^TX^I~IMPRESSION~L^^impression txt checking the HL7 messaged format for
verified (ORU) messages.  ^^^^^^F
OBX^^CE^D~DIAGNOSTIC CODE~L^^1~NORMAL~L^^^^^^F
OBX^^TX^R~REPORT~L^^report text checking the HL7 messaged format for verified (ORU)
messages.  ^^^^^^F
OBX^^TX^M~MODIFIERS~L^^RIGHT^^^^^^F
OBX^^TX^TCM~TECH COMMENT~L^^testing the VR interface with WH
MAMMOGRAM UNILAT (MAM Detailed) CPT:76090^^^^^^F

```

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 Rad/Nuc Med 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 Rad/Nuc Med package, missing or invalid patient identification, an attempt was made 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 Rad/Nuc Med-Initiated Messages

The Rad/Nuc Med 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 Rad/Nuc Med-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 recipients. For exam sets, each procedure will be sent in its own HL7 message.

Exam Edited

Anytime the exam is edited, either through edit or status tracking, an 'examined' message will be broadcast. In the past, the VistA Rad/Nuc Med software allowed the ADPAC to specify an exam status that will trigger this event. Unfortunately, exam specific data could be edited without moving to a status that triggers an examined message. 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.


```

OBX^1^TX^I~IMPRESSION~L^^impression text used as an example for documentation
  purposes.  ^^^^^^F
OBX^1^CE^D~DIAGNOSTIC CODE~L^^NORMAL^^^^^^F
OBX^2^CE^D~DIAGNOSTIC CODE~L^^N5-Malignant ACR Mammogram^^^^^^F
OBX^3^CE^D~DIAGNOSTIC CODE~L^^CODE WITH AN \T\ INIT (HL7 TEST)^^^^^^F
OBX^1^TX^M~MODIFIERS~L^^RIGHT^^^^^^F
OBX^1^TX^TCM~TECH COMMENT~L^^^^^^^^^F
OBX^2^TX^TCM~TECH COMMENT~L^^Edit Exam: added RIGHT^^^^^^F
OBX^3^TX^TCM~TECH COMMENT~L^^^^^^^^^F^1^CE^C4~CPT MODIFIERS~L^^7~PROFESSIONAL
  COMPONENT~C^^^^^^F

MSH^~|^\&^RA-SERVER-IMG^HINES CIOFO^MAGD-CLIENT^884^20050331130243-
  0600^ORU~R01^499539642663^P^2.3.1^^^^^US
PID^^^000453231~~~USSSA&&0363~SS~VA FACILITY ID&&L|97~~~USVHA&&0363~PI~VA
  FACILITYID&&L^^RADPATIENT~FIRST~~~L^^19000101^M^^"^^"^^"^^"^^"^^"^^"^^p^^"^^"^^"^^
  "^^~N^^"^^"^^"^^"^^"^^"^^000453231^^^^^^"^^^^^^^^^^
OBR^1^092601-1454^092601-1454^75685~ARTERY X-RAYS, SPINE~C4~297~ANGIO VERTEBRAL
  S\T\I~99RAP^^^20050331130122-0600^^^^^^^^^^4569~ RAD1~FIRST1^^6989073.865-
  2^092601-1454^4~X-RAY CLINIC COUNT~499~SUPPORT ISC^RAD~GENERAL RADIOLOGY^
  200503311302-0600^^^F^^^Printset: ZZRAD'S PRINTSET PARENT^^^RAD2~FIRST2~M^
  RAD1~FIRST1
OBX^^CE^P~PROCEDURE~L^^ANGIO VERTEBRAL S\T\I^^^^^^F
OBX^1^TX^I~IMPRESSION~L^^impression text used as an example for documentation
  purposes.  ^^^^^^F
OBX^1^TX^TCM~TECH COMMENT~L^^^^^^^^^F
OBX^1^CE^C4~CPT MODIFIERS~L^^7~PROFESSIONAL COMPONENT~C^^^^^^F

```

Example for HL7 v2.4 ¹

ORU message containing report for single procedure

```

MSH|^~\&|RA-VOICE-SERVER|HINES CIOFO|RA-TALKLINK-TCP|TalkStation|20110629133221-
  0500||ORU^R01|4993885703|P|2.4|||USA
PID||141-167^^^USVHA^PI|666432134^^^USVHA^NI|6666559019V812454^^^USVHA^NI|INPATI
  ENT^VISIT|19350101|M||"^^0005^"^^CDC|"^^"^^"^^"^^"^^"^^"^^"^^"^^"^^"^^"^^"^^"^^01
  89^"^^^CDC
OBR|1|141-062911-3432|141-062911-3432|73562^X-RAY EXAM OF KNEE 3^C4^155^KNEE 3
  VIEWS
  ^99RAP|||20110629132828-0500||||^&right|1901^PROVIDER^RADTHREE|123-456-
  7890^PRN^PH-098-765-4321^WPN^PH-543-543-5435^PH|141-062911-3432|3432|141
  0629113432|RAD_GENERAL RADIOLOGY`3_RADIOLOGY LAB`499_SUPPORT ISC|201106291331-
  0500|||F|||76^OERR^CLINICIAN^G|2188^RADIOLOGY^USER^G~22^STAFF^PROVIDER~4569^
  STAFF^PROVIDERTWO||1901^PROVIDER^RADTHREE
ZDS|1.2.840.113754.1.4.141.6889370.9079.1.141.62911.3432^VISTA^Application^DICOM
OBX|1|CE|P^PROCEDURE^L||155^KNEE 3 VIEWS^L|||F
OBX|2|TX|I^IMPRESSION^L||This is the generic impression text entered for this sa
  mple report for |||F
OBX|3|TX|I^IMPRESSION^L||documentation purposed. |||F
OBX|4|TX|I^IMPRESSION^L|| |||F
OBX|5|TX|I^IMPRESSION^L||This is the last line of the sample impression text. |
  |||F
OBX|6|CE|D^DIAGNOSTIC CODE^L||1^NORMAL^L|||F
OBX|7|CE|D^DIAGNOSTIC CODE^L||1000^NO ALERT REQUIRED^L|||F
OBX|8|CE|D^DIAGNOSTIC CODE^L||9^NO DISCRETE MASS^L|||F
OBX|9|TX|M^MODIFIERS^L|RIGHT|||F
OBX|10|TX|TCM^TECH COMMENT^L||The tech comment is that this is case #3432.||||F
OBX|11|CE|C4^CPT MODIFIERS^L||26^PROFESSIONAL COMPONENT^C4|||F
OBX|12|CE|C4^CPT MODIFIERS^L||LT^LEFT SIDE^C4|||F
OBX|13|CE|C4^CPT MODIFIERS^L||99^MULTIPLE MODIFIERS^C4|||F

```

¹ Patch RA*5*47 August 2011: Added an example message for HL7 v2.4, single procedure.

```

OBX|14|TX|R^REPORT^L||This is the report text for case #3432, which was a Knee e
  xam for the |||||F
OBX|15|TX|R^REPORT^L|patient. This sample report text will be filed in the Rad
  iology Report |||||F
OBX|16|TX|R^REPORT^L|file for the patient/exam. |||||F

```

Example for HL7 v2.4¹

ORU messages for "printset", (i.e., multiple procedures and single report)

```

MSH|^~\&|RA-VOICE-SERVER|HINES CIOFO|RA-TALKLINK-TCP|TalkStation|20110629134632-
  0500||ORU^R01|4993885704|P|2.4|||||USA
PID||141-167^^^USVHA^PI|666432134^^^USVHA^NI|6666559019V812454^^^USVHA^NI|INPATI
  ENT^VISIT|19350101|M|""^^0005^""^^CDC|""^""^""^""^""^""^""^""^""^""^""^""^""^""^""^
  89^""^^CDC
OBR|1|141-062911-3433|141-062911-3433|74330^X-RAY BILE/PANC
  ENDOSCOPY^C4^207^ENDOSCO
  PIC CATH BIL \T\ PANC DUCTS S\T\I^99RAP|||20110629133257-
  0500|||1901^PROVIDER
  ^RADTHREE|123-456-7890^PRN^PH~098-765-4321^WPN^PH~543-543-5435^^PH|141-062911-
  3433
  |3433|141-062911-3433|RAD_GENERAL RADIOLOGY`3_RADIOLOGY LAB`499_SUPPORT ISC|2011
  06291346-0500|||F|||Printset: ZZPRINTSET PROCEDURE|||76^OERR^CLINICIAN^G|2188^R
  ADIOLOGY^USER^G~2178^STAFF^PROVIDER~4569^STAFF^PROVIDERTWO|||1901^PROVIDER^RADTHREE
ZDS|1.2.840.113754.1.4.141.6889370.907.1.141.62911.3433^VISTA^Application^DICOM
OBX|1|CE|P^PROCEDURE^L|207^ENDOSCOPIC CATH BIL \T\ PANC DUCTS S\T\I^L|||F
OBX|2|TX|I^IMPRESSION^L||This is the impression text for the printset. |||||F
OBX|3|TX|I^IMPRESSION^L|| |||||F
OBX|4|TX|I^IMPRESSION^L||Cases 3433, 3434 and 3435 will all recive the same text.
  |||||F
OBX|5|TX|I^IMPRESSION^L|| |||||F
OBX|6|TX|I^IMPRESSION^L||Final line of impression text. |||||F
OBX|7|CE|D^DIAGNOSTIC CODE^L||1^NORMAL^L|||F
OBX|8|CE|D^DIAGNOSTIC CODE^L||9^NO DISCRETE MASS^L|||F
OBX|9|CE|D^DIAGNOSTIC CODE^L||13^CODE WITH AN \T\ IN IT (HL7 TEST)^L|||F
OBX|10|TX|M^MODIFIERS^L|PORTABLE EXAM|||F
OBX|11|TX|TCM^TECH COMMENT^L||This is the first case (3433) in the Printset.|||||F
OBX|12|TX|R^REPORT^L||This is the report text for the printset exam, case number
  s 3433, 3434 and|||||F
OBX|13|TX|R^REPORT^L|3435. |||||F
OBX|14|TX|R^REPORT^L| |||||F
OBX|15|TX|R^REPORT^L|This sample report text will be filed in the Radiology Rep
  ort file and all|||||F
OBX|16|TX|R^REPORT^L||3 cases in the printset will point to the same report.
  |||||F
OBX|17|TX|R^REPORT^L|| |||||F
OBX|18|TX|R^REPORT^L||This is the last line of the report text. |||||F

```

¹ Patch RA*5*47 August 2011: Added an example message for HL7 v2.4, printset.

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 for HL7 v2.3

```
MSH^~|\&^PACS^HINES^RADIOLOGY^578^199504121041^^ACK^170^P^2.3.1
MSA^AA^170
```

Example for HL7 v2.4¹

```
MSH|^~\&|RA-VOICE-SERVER|HINES CIOFO|RA-TALKLINK-TCP|TalkStation|20091130110935-
0500||ACK^R01|4993882144|P|2.4|||USA
MSA|AA||
```

¹ Patch RA*5*47 August 2011: Added an example message for HL7 v2.4, ACK.

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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-VistA same-system, different application HL7 interface from VistA Rad/Nuc Med.

VistA messages can be any one of the following:

1. Registration
2. Cancellation
3. Exam edited (i.e., images collected, usually set up in sites using the VistA Imaging package and/or a PACS system)
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 Rad/Nuc Med.

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

Setup of Legacy¹ HL7 Files for VistA-VistA Radiology Interface

HL7 Application Parameter File #771 Setup

Two HL7 Applications are required for VistA to VistA same system interfaces; one for each side of the interface.

Rad/Nuc Med v5.0 exports the RA-SERVER-IMG and RA-CLIENT-IMG applications for use in a VistA to VistA interface.

Next is an example of the HL7 Application setup for a VistA to VistA interface. Refer to section 7.4 of the VistA HL7 Site Manager & Developer Manual for an explanation of individual fields. There is also a screen shot from the HL7 Main Menu, HL7 Interface Developers Options..., Application Edit option.

¹ Patch RA*5*78 May 2009: Added **Legacy** to the heading

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

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US

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

                FACILITY NAME: RADIOLOGY 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
```

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.

Protocol File #101 Setup

Four event driver protocols (RA REG 2.3.1, RA EXAMINED 2.3.1, RA CANCEL 2.3.1, RA RPT 2.3.1) were exported with Rad/Nuc Med and subsequent patches to send exam or report data from the Rad/Nuc Med 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.

Protocol	Triggering event in VistA Rad/Nuc Med processing
RA REG 2.3.1	Rad/Nuc Med case registration
RA CANCEL 2.3.1	Rad/Nuc Med case cancellation or deletion
RA EXAMINED 2.3.1	Rad/Nuc Med case edit
RA RPT 2.3.1	Rad/Nuc Med report status changes to "Released/Not Verified" or "Verified"

Two "subscriber" protocols, RA SEND ORM and RA SEND ORU, were also exported. RA SEND ORM should be entered in the SUBSCRIBERS field of the three ORM event driver protocols (RA REG 2.3.1, RA CANCEL 2.3.1, RA EXAMINED 2.3.1), and RA SEND ORU should be entered in the SUBSCRIBERS field of the ORU event driver protocol (RA RPT 2.3.1). 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.

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 next examples, 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 Rad/Nuc Med v5.0 or associated patches

```
NAME: RA SEND ORM                ITEM TEXT: Client for Imaging
TYPE: subscriber                 PACKAGE: ANYPKG
RECEIVING APPLICATION: RA-CLIENT-IMG  EVENT TYPE: 001
VERSION ID: 2.3.1                RESPONSE MESSAGE TYPE: ACK
PROCESSING ROUTINE: D ^ZZTEST1      SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO     SECURITY REQUIRED?: NO
```

HL7 INTERFACE SETUP	PAGE 1 OF 2

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

COMMAND:	Press <PF1>H for help Insert

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

ITEM TEXT: Client for Imaging

TYPE: subscriber

PACKAGE: ANYPKG

RECEIVING APPLICATION: RA-CLIENT-IMG

EVENT TYPE: R01

VERSION ID: 2.3.1

RESPONSE MESSAGE TYPE: ACK

PROCESSING ROUTINE: D ^ZZTEST2

SENDING FACILITY REQUIRED?: NO

RECEIVING FACILITY REQUIRED?: NO

SECURITY REQUIRED?: NO

NAME: RA SEND ORU

DESCRIPTION (wp): (empty)

ENTRY ACTION:

EXIT ACTION:

TYPE: subscriber

COMMAND:

Press <PF1>H for help

Insert

RA SEND ORU

RECEIVING APPLICATION: RA-CLIENT-IMG

RESPONSE MESSAGE TYPE: ACK

EVENT TYPE: R01

SENDING FACILITY REQUIRED?: NO

RECEIVING FACILITY REQUIRED?: NO

SECURITY REQUIRED?: NO

LOGICAL LINK:

PROCESSING RTN: D ^ZZTEST2 <-- empty when exported

ROUTING LOGIC:

Exit Save Refresh

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

COMMAND:

Press <PF1>H for help

Insert

NAME: RA REG 2.3.1

ITEM TEXT: Rad/Nuc Med exam registered (v2.3.1 HL7)

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, OBX and ZDS segments. The message contains all relevant information about the exam, including procedure, time of registration, procedure modifiers, patient allergies, and clinical history.

This protocol is used to trigger v2.3.1 compliant HL7 messages.

TIMESTAMP: 59851,50559

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORM

EVENT TYPE: O01

VERSION ID: 2.3.1

SUBSCRIBERS: RA SEND ORM

NAME: RA REG 2.3.1

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

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

COMMAND:

Press <PF1>H for help

Insert


```

                                RA REG
-----
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM          EVENT TYPE: 001
PROCESSING ID:                          VERSION ID: 2.3.1
ACCEPT ACK CODE:                        APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

                                SUBSCRIBERS
RA SEND ORM

-----
COMMAND:                               Press <PF1>H for Help   Insert

```

```

NAME: RA CANCEL 2.3.1
ITEM TEXT: Rad/Nuc Med exam cancellation (v2.3.1 HL7)
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, OBX and ZDS segments. The message contains all
relevant information about the exam, including procedure, time of
cancellation, procedure modifiers, patient allergies and clinical history.

```

```

This protocol is used to trigger v2.3.1 compliant HL7 messages.
TIMESTAMP: 59851,50573                SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM          EVENT TYPE: 001
VERSION ID: 2.3.1

```

```

SUBSCRIBERS: RA SEND ORM

```

```

HL7 INTERFACE SETUP                                PAGE 1 OF 2
-----
                                NAME: RA CANCEL 2.3.1
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

                                TYPE: event driver

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

```

RA CANCEL

```

-----
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM                      EVENT TYPE: 001
PROCESSING ID:                                       VERSION ID: 2.3.1
ACCEPT ACK CODE:                                    APPLICATION ACK TYPE:

```

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA SEND ORM

COMMAND: Press <PF1>H for help Insert

NAME: RA EXAMINED 2.3.1
 ITEM TEXT: Rad/Nuc Med examined case (v2.3.1 HL7)
 TYPE: event driver PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
 DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear
 Medicine exam has been edited by the user. It executes code that creates
 an HL7 ORM message consisting of PID, ORC, OBR, OBX and ZDS segments. This
 message contains all relevant information about the exam, including procedure,
 time of registration, procedure modifiers, patient allergies, and clinical
 history.

This protocol is used to trigger v2.3.1 compliant HL7 messages.

```

TIMESTAMP: 59851,50545          SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM    EVENT TYPE: 001
VERSION ID: 2.3.1

```

SUBSCRIBERS: RA SEND ORM

NAME: RA EXAMINED 2.3.1

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

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

COMMAND: Press <PF1>H for help Insert

RA EXAMINED

```

-----
SENDING APPLICATION: RA-SERVER-IMG
TRANSACTION MESSAGE TYPE: ORM                      EVENT TYPE: 001
PROCESSING ID:                                       VERSION ID: 2.3.1
ACCEPT ACK CODE:                                    APPLICATION ACK TYPE:

```

RESPONSE PROCESSING RTN:

```

SUBSCRIBERS
RA SEND ORM

```

COMMAND:

Press <PF1>H for help Insert

NAME: RA RPT 2.3.1

ITEM TEXT: Rad/Nuc Med report released/verified (v2.3.1 HL7)

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.

This protocol is used to trigger v2.3.1 compliant HL7 messages.

TIMESTAMP: 59851,50886

SENDING APPLICATION: RA-SERVER-IMG

TRANSACTION MESSAGE TYPE: ORU

EVENT TYPE: R01

VERSION ID: 2.3.1

SUBSCRIBERS: RA SEND ORU

NAME: RA RPT 2.3.1

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 RPT

PAGE 2 OF 2

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

EVENT TYPE: R01
VERSION ID: 2.3.1
APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

RA SEND ORU

SUBSCRIBERS

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 TCP/IP Legacy¹ HL7 Interfaces between Rad/Nuc Med and COTS² 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)
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 Rad/Nuc Med 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.

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

Setup of HL7 Files for One-way Radiology to COTS Interface

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 Rad/Nuc Med v5.0 and associated patches, these can be used as exported, or they can serve as an example for creating new HL7 applications:

¹ Patch RA*5*78 May 2009: Added **Legacy** to the heading

² The term COTS product is used throughout meaning Commercial Off-The-Shelf product

File 771 Entry	Explanation
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)

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 Rad/Nuc Med 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.

Next is an example of two HL7 applications created for a TCP/IP interface. Refer to 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
FACILITY NAME: VistA RADIOLOGY
HL7 ENCODING CHARACTERS: ^~\&

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US
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
FACILITY NAME: COTS EXAMPLE
HL7 ENCODING CHARACTERS: ^~\&

ACTIVE/INACTIVE: ACTIVE
COUNTRY CODE: US
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

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 acknowledgments 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 acknowledgments 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.

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 Rad/Nuc Med and subsequent patches. These are exported for use in specific supported interfaces but can be viewed as examples of sender links:

Logical Link	Reason exported
RA-PSCRIBE	Radiology-PowerScribe link
RA-TALK	Radiology-TalkStation link

Next 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 Acknowledgment from the COTS product.

The 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

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 Rad/Nuc Med and subsequent patches to send exam or report data from the Rad/Nuc Med 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.

Event Driver Protocol	Triggering Event in Rad/Nuc Med	HL7 Version	Message Type
RA REG 2.3.1	Rad/Nuc Med case registration	2.3	ORM
RA EXAMINED 2.3.1	When all Rad/Nuc Med exam edit and status tracking options are exercised.	2.3	ORM
RA CANCEL 2.3.1	Rad/Nuc Med case cancellation or deletion	2.3	ORM
RA RPT 2.3.1	Rad/Nuc Med report status changes to 'Verified' or 'Released/Not Verified'	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 Rad/Nuc Med 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.

Subscriber Protocol	Potential SUBSCRIBER to	HL7 Version	Message Type
RA TALKLINK ORM	RA REG 2.3.1, RA CANCEL 2.3.1, RA EXAMINED 2.3.1	2.3.1	ORM
RA TALKLINK ORU	RA RPT 2.3.1	2.3.1	ORU
RA PSCRIBE ORM	RA REG 2.3.1, RA CANCEL 2.3.1, RA EXAMINED 2.3.1	2.3.1	ORM
RA PSCRIBE ORU	RA RPT 2.3.1	2.3.1	ORU

Listed next are examples 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: 2.3.1
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: 2.3.1
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 2.3.1

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: 2.3.1

SUBSCRIBERS: RA COTS ORM

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA REG 2.3.1	
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: event driver	
COMMAND: Press <PF1>H for help Insert	

HL7 EVENT DRIVER	PAGE 2 OF 2
RA REG 2.3	

SENDING APPLICATION: RA-RADSERVER	EVENT TYPE: 001
TRANSACTION MESSAGE TYPE: ORM	VERSION ID: 2.3.1
PROCESSING ID:	APPLICATION ACK TYPE:
ACCEPT ACK CODE:	
RESPONSE PROCESSING RTN:	
RA COTS ORM	SUBSCRIBERS
COMMAND: Press <PF1>H for Help Insert	

NAME: RA CANCEL 2.3.1 ITEM TEXT: Rad/Nuc Med exam cancellation
TYPE: event driver PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear
 Medicine exam is cancelled. It executes code that creates an HL7 ORM version
 2.3 message consisting of PID,ORC, OBR, and OBX segments. The message
 contains all relevant information about the exam, including procedure, time of
 cancellation, procedure modifiers, patient allergies and clinical history.
 SENDING APPLICATION: RA-RADSERVER TRANSACTION MESSAGE TYPE: ORM
 EVENT TYPE: 001 VERSION ID: 2.3.1

SUBSCRIBERS: RA COTS ORM

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA CANCEL 2.3.1	
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 2.3	

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

COMMAND:	Press <PF1>H for help Insert

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

SUBSCRIBERS: RA COTS ORM

HL7 INTERFACE SETUP	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	

COMMAND:	Press <PF1>H for help Insert

HL7 EVENT DRIVER	PAGE 2 OF 2
RA EXAMINED 2.3	

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

COMMAND:	Press <PF1>H for help Insert

NAME: RA RPT 2.3

ITEM TEXT: Rad/Nuc Med report released/verified

TYPE: event driver

PACKAGE: RADIOLOGY/NUCLEAR MEDICINE

DESCRIPTION: This protocol is triggered whenever a Radiology/Nuclear Medicine report enters into a status of Verified or Released/Not Verified. It executes code that creates an HL7 ORU message consisting of PID, OBR and OBX segments. The message contains relevant information about the report, including procedure, procedure modifiers, diagnostic code, interpreting physician, impression text and report text.

SENDING APPLICATION: RA-RADSERVER

TRANSACTION MESSAGE TYPE: ORU

EVENT TYPE: R01

VERSION ID: 2.3

SUBSCRIBERS: RA COTS ORU

HL7 INTERFACE SETUP

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

COMMAND:

Press <PF1>H for help

Insert

HL7 EVENT DRIVER
RA RPT 2.3

PAGE 2 OF 2

SENDING APPLICATION: RA-RADSERVER

TRANSACTION MESSAGE TYPE: ORU

EVENT TYPE: R01

PROCESSING ID:

VERSION ID: 2.3

ACCEPT ACK CODE:

APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN:

SUBSCRIBERS

RA COTS ORU

Exit Save Refresh

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

COMMAND:

Press <PF1>H for help

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 Rad/Nuc Med 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.

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 the site's Multiple Listener, running on port 5000, be used as the listener.. The main benefit being that it is that the multi-listener is capable of handling many connections at once, requires less support, and has proven to be the most reliable type of listener over time.

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 Rad/Nuc Med and subsequent patches.

Event Driver Protocol	Reason Exported	HL7 Version	Message Type
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.

Subscriber Protocol	Reason Exported	HL7 Version	Message Type
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 acknowledgment needs to be returned to the sending COTS product, the code should call GENACK^HLMA1. Rad/Nuc Med exports one Processing Routine, RAHLTCPB, which can be used as an example. This Processing Routine is used for the 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:

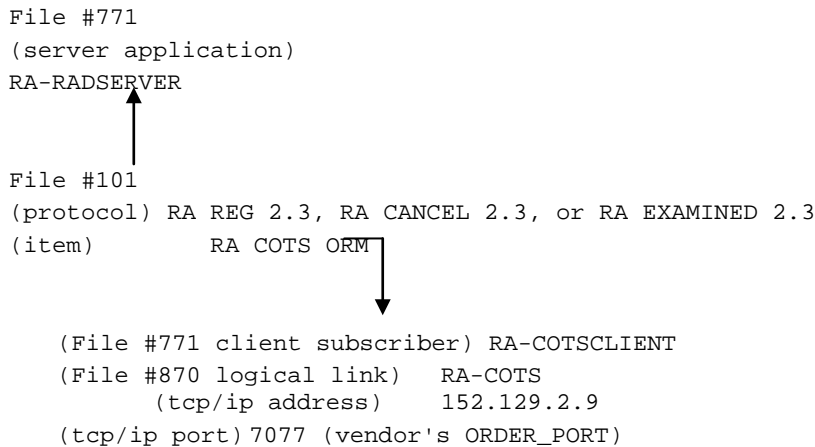
- One to send new orders, (i.e., registration data, cancels, examined messages, and reports) to COTS product, and to receive ACK's from COTS product for these orders, and
- A second to receive reports from COTS product and send ACK's to COTS product.

Because 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

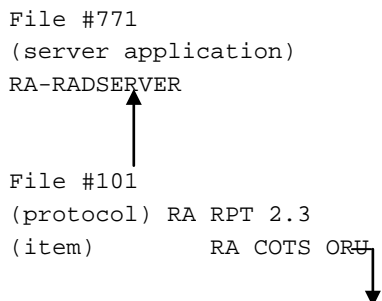
VA Rad/Nuc Med Sends Order Message (ORM) to COTS Product Server

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



VA Rad/Nuc Med Sends Verified or Preliminary (Released/Not Verified) Report Order Message (ORU) to COTS Product Server

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



```
(File #771 client subscriber) RA-COTSCLIENT
(File #870 logical link) RA-COTS
(tcp/ip address) 152.129.2.9
(tcp/ip port) 7078 (vendor's ORDER_PORT)
```

COTS Product Server Sends Acknowledgment 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

Cots Product Server Sends Report Message (ORU) To VA

```
(File #870 logical link) VAHIN
(tcp/ip port) 5000 (vendor's REPORT_PORT)
```

VA Sends Report Acknowledgment To COTS Product Server

```
(server application)
RA-COTSCLIENT
↑
(protocol)RA COTS TCP REPORT SERVER
(subscriber)RA COTS TCP REPORT ↓
(File #101 client subscriber) RA-RADSERVER
(File #870 logical link) VAHIN
(tcp/ip port) 5000(vendor's REPORT_PORT)
```

Notes: VistA orders are sent to the COTS server's TCP/IP address, 152.129.2.9. Acknowledgments 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 acknowledgments 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; the site's multi-listener link, like the VAHIN (using Hines as an example) link described earlier; and a sender link, like the RA-COTS link described earlier; you need to stop and start the RA-COTS link following the guidelines.

UCX Multi-Threaded Listener System

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.

The status of the RA-COTS link will be shown on the Systems Link Monitor. 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.

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.

Next 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 multisexam for one visit|||X
OBX||TX|TCM^TECH COMMENT^L||This is a Tech Comment|||X¹
STATUS: SUCCESSFULLY COMPLETED
DATE/TIME PROCESSED: APR 11, 2000@11:47:33
NO. OF CHARACTERS IN MESSAGE: 509 NO. OF EVENTS IN MESSAGE: 1

¹ Patch RA*5*25 Tech comment added

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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 Rad/Nuc Med and the TalkStation COTS Voice Recognition System.

This is a two-way TCP/IP HL7 interface using two links for message transactions. The sender link, RA-TALK, has been exported by Rad/Nuc Med and subsequent patches to send order messages to TalkStation. The listener link, TALK-RA, has been exported by Rad/Nuc Med to receive reports from TalkStation. Message acknowledgments 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 Rad/Nuc Med 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.

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.

8. 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.
 9. 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).
 10. 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).
 11. 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.
 12. 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.
 13. 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.
 14. 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.
 15. 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.
 16. 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.
 17. 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.
 18. 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.
 19. 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.
- 1
20. 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'.
 21. At integrated sites using more than one COTS Voice Reporting system, it may be necessary to limit messages to specific Divisions for optimal performance. This can be achieved by using ROUTING LOGIC, as described later in this section.²

¹ Patch RA*5*47 August 2011: Removed the original **20. TalkStation users are not allowed to group sets of exams together and mark them for a single report....**

² Patch RA*5*25, Divisional Filtering

IRM and ADPAC Setup 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.

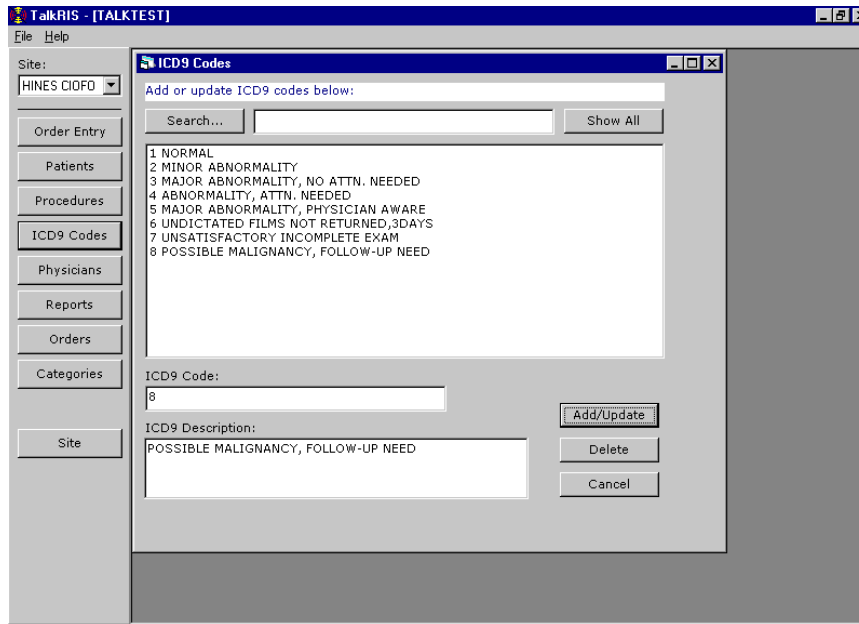
Note: You will only be required to put in a TCP/IP Address for the listener on Cache for NT sites.

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: See the Rad/Nuc Med Technical Manual section on Security for further electronic signature information.

4. At integrated sites using more than one COTS Voice Reporting system, it may be necessary to limit messages to specific Divisions for optimal performance.¹ This can be achieved by setting the ROUTING LOGIC field to 'D ^RAHLROUT' for **all** subscriber protocols in use by Radiology HL7 event drivers (RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3, RA RPT 2.3). The ROUTING LOGIC routine, ^RAHLROUT, will check the HL7 RECEIVING APPLICATIONS multiple field in the Rad/Nuc Med Division file (#79). If this field includes 'RA-TALKLINK-TCP', then messages created in the Division will be passed to TalkStation, otherwise they will not be sent to TalkStation.
5. 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.

¹ Patch RA*5*25, Divisional Filtering



Talk RIS>ICD9 Codes>Add/Update ICD9 Codes

6. Make sure all other TalkStation setup is correct and complete according to TalkStation documentation.
7. 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.)
8. It is very helpful to synchronize the TalkStation PC clock to closely agree with the Vista system clock.
9. 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.
10. 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. Additionally, setting a MAIL GROUP for the TalkStation application in the HL7 APPLICATION PARAMETERS file (#771) will mean that these errors will also be sent as mail messages to the defined mail group and the verifying physician.¹
11. 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.

¹ Patch RA*5*25

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.

HL7 Application Parameter File #771 Setup

```
NAME: RA-TALKLINK-TCP                ACTIVE/INACTIVE: ACTIVE
FACILITY NAME: TALKSTATION          MAIL GROUP:1 RAD HL7 REJECTIONS
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:2 RAD HL7 REJECTIONS <-- optional mail group defined

Exit      Save      Refresh

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

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

¹ Patch RA*5*25

² Patch RA*5*25

NAME: RA-VOICE-SERVER
FACILITY NAME: **VistA RADIOLOGY**
COUNTRY CODE: US
HL7 FIELD SEPARATOR: |

ACTIVE/INACTIVE: ACTIVE
MAIL GROUP:¹ **RAD HL7 REJECTIONS**
HL7 ENCODING CHARACTERS: ^~\&

```
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:2 RAD HL7 REJECTIONS  <-- optional mail group defined

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**

Although the values of Sending Facility and Receiving Facility are unimportant, 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/TCM^TECH COMMENT^L³

¹ Patch RA*5*25

² Patch RA*5*25

³ Patch RA*5*25

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:

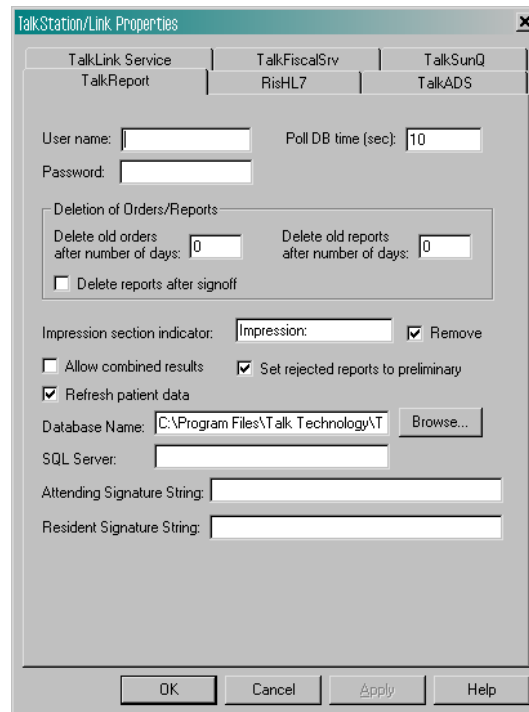
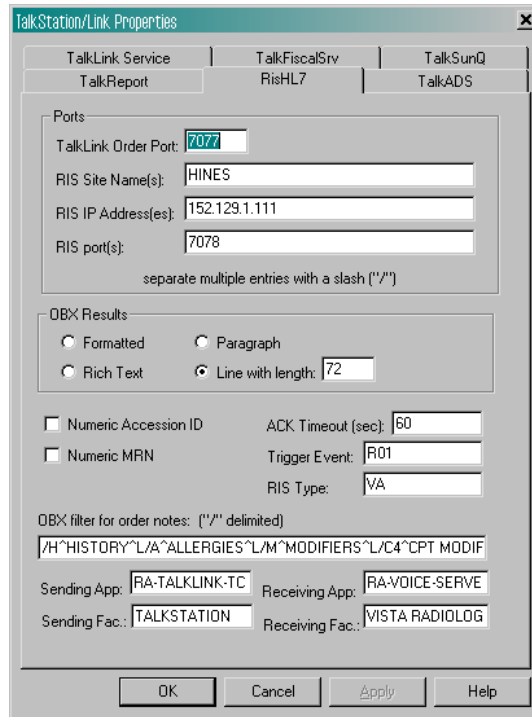
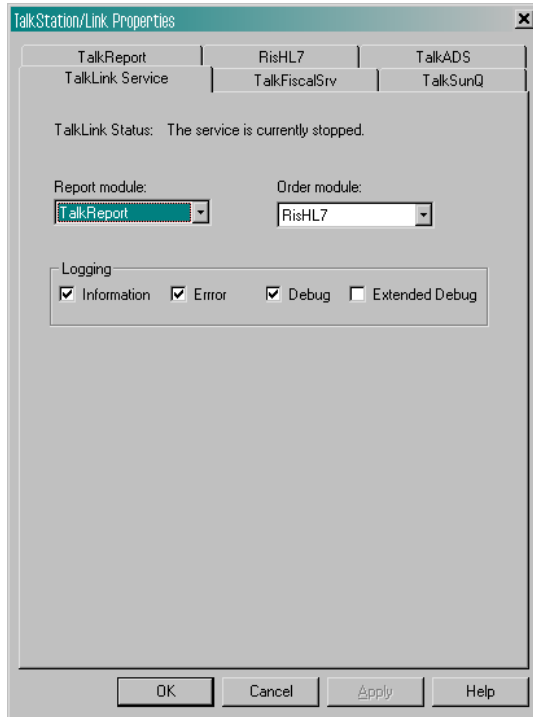
Report Module: **TalkReport**

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.



Screen Captures of TalkStation Link Properties

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.

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

LLP TYPE: TCP
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

```

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)

(Refer to the 'Rad/Nuc Med HL7 Interface Specifications' section of this document for information about messages initiated by Rad/Nuc Med.)

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 subscriber protocols shown (RA TALKLINK ORM and RA TALKLINK ORU) are setup to use ROUTING LOGIC to filter messages depending on Division. This is not the usual situation, but is shown to highlight how this can be achieved.¹

Note: If the ROUTING LOGIC field is set, but no Rad/Nuc Med Division file (#79) has 'RA-TALKLINK-TCP' as an HL7 RECEIVING APPLICATION, then no messages will be sent to TalkStation.

If other subscriber protocols exist for the event drivers (RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3, RA RPT 2.3), for example RA PSCRIBE ORM, then these will also need to be setup to use ROUTING LOGIC. Otherwise all HL7 subscribers will receive messages from all divisions, and all messages will still be passed to TalkStation.

If in doubt, do not set the ROUTING LOGIC field.

¹ Patch RA*5*25, Divisional Filtering

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

SUBSCRIBERS: RA TALKLINK ORM

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA CANCEL 2.3	
DESCRIPTION (wp): [This protocol is triggered whenever a Radiology]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: event driver <- hit <return> here to edit event driver details	

COMMAND:	Press <PF1>H for help Insert

HL7 EVENT DRIVER	PAGE 2 OF 2
RA CANCEL 2.3	

SENDING APPLICATION: RA-VOICE-SERVER	
TRANSACTION MESSAGE TYPE: ORM	EVENT TYPE: 001
PROCESSING ID:	VERSION ID: 2.3
ACCEPT ACK CODE:	APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:	
SUBSCRIBERS	
RA TALKLINK ORM	<- add this subscriber

COMMAND:	Press <PF1>H for help Insert

```

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

```

SUBSCRIBERS: RA TALKLINK ORM

```

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 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

```

NAME: RA TALKLINK ORM          ITEM TEXT: TCP Client
TYPE: subscriber              PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA REG 2.3, RA
EXAMINED 2.3, and RA CANCEL 2.3 event protocols. It is used by the Vista HL7
package to send ORM messages to TCP/IP recipients. This protocol should be
entered in the SUBSCRIBERS multiple field of those event point protocols if
this type of messaging scenario is used at a facility. This is part of the
file set-up to enable HL7 message flow when exams are registered, cancelled,
and when they reach the status flagged as 'examined' by the site.
RECEIVING APPLICATION: RA-TALKLINK-TCP  EVENT TYPE: 001
LOGICAL LINK: RA-TALK          VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK      SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO SECURITY REQUIRED?: NO
ROUTING LOGIC:1 D ^RAHLROUT

```

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA TALKLINK ORM	
DESCRIPTION (wp): [This protocol is used in conjunction with the R]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber <- hit <return> here to edit subscriber details	

COMMAND:	Press <PF1>H for help Insert

HL7 SUBSCRIBER	PAGE 2 OF 2
RA TALKLINK ORM	

RECEIVING APPLICATION: RA-TALKLINK-TCP	
RESPONSE MESSAGE TYPE: ACK	EVENT TYPE: 001
SENDING FACILITY REQUIRED?: NO	RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO	
LOGICAL LINK: RA-TALK	
PROCESSING RTN:	
ROUTING LOGIC: D ^RAHLROUT <--only set if using divisional filtering	

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

¹ Patch RA*5*25, Divisional Filtering


```

NAME: RA TALKLINK ORU                ITEM TEXT: TCP Client
TYPE: subscriber                      PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: This protocol is used in conjunction with the RA RPT 2.3 event
point protocol. The HL7 package uses this protocol to send rad/nuc med report
(ORU) messages to TCP/IP recipients. This protocol should be entered in the
SUBSCRIBERS multiple field of the RA RPT protocol if this messaging scenario
is used in a facility. This is part of the file set-up to enable message flow
when a rad/nuc med report is verified.
RECEIVING APPLICATION: RA-TALKLINK-TCP  EVENT TYPE: R01
LOGICAL LINK: RA-TALK                  VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK              SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO         SECURITY REQUIRED?: NO
ROUTING LOGIC:1 D ^RAHLROUT

```

HL7 INTERFACE SETUP	PAGE 1 OF 2

NAME: RA TALKLINK ORU	
DESCRIPTION (wp): [This protocol is used in conjunction with the R]	
ENTRY ACTION:	
EXIT ACTION:	
TYPE: subscriber <- hit <return> here to edit subscriber details	

COMMAND:	Press <PF1>H for help Insert

HL7 SUBSCRIBER	PAGE 2 OF 2
RA TALKLINK ORU	

RECEIVING APPLICATION: RA-TALKLINK-TCP	
RESPONSE MESSAGE TYPE: ACK	EVENT TYPE: R01
SENDING FACILITY REQUIRED?: NO	RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO	
LOGICAL LINK: RA-TALK	
PROCESSING RTN:	
ROUTING LOGIC: D ^RAHLROUT <--only set if using divisional filtering	

COMMAND:	Press <PF1>H for help Insert

¹ Patch RA*5*25, Divisional Filtering

The following protocols, shown without screen shots, are exported as part of the Radiology TalkStation interface, but do not require amendment:¹

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

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

Detailed Explanation of Start-up/Recovery Procedure

1. Stop the appropriate links from the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links:
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.)
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. Regarding the site specific "multi-listener link" 'Vaxxx':
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.
6. Verify that the listener link is up and running:
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.
7. Start the "sender" link RA-TALK: From the HL7 Main Menu, Filer and Link Management Options ..., Start/Stop Links.
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.

¹ Patch RA*5*25

8. Use the Systems Link Monitor option again to verify that the RA-TALK sender link is 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	UCX Multi-Threaded Listener System: Shut down the RA-TALK link.	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
6	VistA	UCX Multi-Threaded Listener System: enable the OpenVMS UCX Service (if disabled)	Mandatory
7	VistA	Start the sender logical link: RA-TALK	Mandatory

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

Shutdown the RA-TALK link

If the VistA machine is going to be shutdown:

Shut down the RA-TALK link.

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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 Rad/Nuc Med 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 Rad/Nuc Med and subsequent patches to send order messages to PowerScribe. The listener link, PSCRIBE-RA, has been exported by Rad/Nuc Med to receive reports from PowerScribe. Message acknowledgments 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 Rad/Nuc Med 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.

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. 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'.
- 1
20. At integrated sites using more than one COTS Voice Reporting system, it may be necessary to limit messages to specific Divisions for optimal performance. This can be achieved by using ROUTING LOGIC, as described later in this section.²

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 Patch RA*5*47 August 2011: Removed the original **19. PowerScribe users are not allowed to group sets of exams together and mark them for a single report....**

² Patch RA*5*25, Divisional Filtering

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 put in 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: See also the Rad/Nuc Med Technical Manual section on Security for further electronic signature information.

4. At integrated sites using more than one COTS Voice Reporting system, it may be necessary to limit messages to specific Divisions for optimal performance.¹ This can be achieved by setting the ROUTING LOGIC field to 'D ^RAHLROUT' for all subscriber protocols in use by Radiology HL7 event drivers (RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3, RA RPT 2.3). The ROUTING LOGIC routine, ^RAHLROUT, will check the HL7 RECEIVING APPLICATIONS multiple field in the Rad/Nuc Med Division file (file #79). If this field includes 'RA-PSCRIBE-TCP', then messages created in the Division will be passed to PowerScribe, otherwise they will not be sent to PowerScribe.
5. 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 UNDICTIONATED FILMS NOT RETURNED, 3 DAYS
- 7 UNSATISFACTORY/INCOMPLETE EXAM
- 8 POSSIBLE MALIGNANCY, FOLLOW-UP NEEDED

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

¹ Patch RA*5*25, Divisional Filtering

6. Make sure all other PowerScribe setup is correct and complete according to PowerScribe documentation.
7. 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.)
8. It is very helpful to synchronize the PowerScribe PC clock to closely agree with the VistA system clock.
9. 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.
10. PowerScribe users and IRM should learn how to find and interpret error messages for rejected reports. See the section for VistA Rad/Nuc Med HL7 Error Message and Troubleshooting Table for TalkStation and 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. Additionally, setting a MAIL GROUP for the PowerScribe application in the HL7 APPLICATION PARAMETERS file #771 will mean that these errors will also be sent as mail messages to the defined mail group and the verifying physician.¹
11. 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 Patch RA*5*25

HL7 Application Parameter File #771 Setup

NAME: RA-PSCRIBE-TCP ACTIVE/INACTIVE: ACTIVE
FACILITY NAME: **POWERSCRIBE** MAIL GROUP:¹ **RAD HL7 REJECTIONS**
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:2 RAD HL7 REJECTIONS <- optional mail group defined

-----
Exit      Save      Refresh

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

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

¹ Patch RA*5*25

² Patch RA*5*25

NAME: RA-VOICE-SERVER
FACILITY NAME: **VistA RADIOLOGY**
COUNTRY CODE: US
HL7 FIELD SEPARATOR: |

ACTIVE/INACTIVE: ACTIVE
MAIL GROUP:¹ **RAD HL7 REJECTIONS**
HL7 ENCODING CHARACTERS: ^~\&

```
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:2 RAD HL7 REJECTIONS <-- optional mail group defined

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**

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.

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 Acknowledgment from 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 is populated by the HL7 package when you start up the links.

¹ Patch RA*5*25

² Patch RA*5*25

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

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

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

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

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

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

```
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-TRANSMISION 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

```

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).

(Refer to the 'Rad/Nuc Med HL7 Interface Specifications' section of this manual for information about messages initiated by Rad/Nuc Med.)

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.

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

The subscriber protocols shown (RA PSCRIBE ORM and RA PSCRIBE ORU) are setup to use ROUTING LOGIC to filter messages depending on Division. This is not the usual situation, but is shown to highlight how this can be achieved.¹

Note: If the ROUTING LOGIC field is set, but no Rad/Nuc Med Division (file #79) has 'RA-PSCRIBE-TCP' as an HL7 RECEIVING APPLICATION, then no messages will be sent to PowerScribe.

Also, if other subscriber protocols exist for the event drivers (RA REG 2.3, RA CANCEL 2.3, RA EXAMINED 2.3, RA RPT 2.3), for example RA TALKLINK ORM, then these will need to be setup to use ROUTING LOGIC also. Otherwise all HL7 subscribers will receive messages from all divisions, and messages will still be passed to PowerScribe.

If in doubt, do not set the ROUTING LOGIC field.

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

¹ Patch RA*5*25, Divisional Filtering

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

 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

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

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

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

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

NAME: RA PSCRIBE ORM ITEM TEXT: TCP Client
 TYPE: subscriber PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
 DESCRIPTION: This protocol is used in conjunction with the RA REG 2.3, RA EXAMINED 2.3, and RA CANCEL 2.3 event protocols. It is used by the Vista HL7 package to send ORM messages to TCP/IP recipients. This protocol should be entered in the SUBSCRIBERS multiple field of those event point protocols if this type of messaging scenario is used at a facility. This is part of the file set-up to enable HL7 message flow when exams are registered, cancelled, and when they reach the status flagged as 'examined' by the site.
 RECEIVING APPLICATION: RA-PSCRIBE-TCP EVENT TYPE: 001
 LOGICAL LINK: RA-PSCRIBE VERSION ID: 2.3
 RESPONSE MESSAGE TYPE: ACK SENDING FACILITY REQUIRED?: NO
 RECEIVING FACILITY REQUIRED?: NO SECURITY REQUIRED?: NO
 ROUTING LOGIC:¹ D ^RAHLROUT

HL7 INTERFACE SETUP PAGE 1 OF 2

NAME: RA PSCRIBE ORM

DESCRIPTION (wp): [This protocol is used in conjunction with the R]

ENTRY ACTION:

EXIT ACTION:

TYPE: subscriber <- hit <return> here to edit subscriber details

COMMAND: Press <PF1>H for help Insert

HL7 SUBSCRIBER PAGE 2 OF 2
RA PSCRIBE ORM

¹ Patch RA*5*25, Divisional Filtering

```

RECEIVING APPLICATION: RA-PSCRIBE-TCP
RESPONSE MESSAGE TYPE: ACK                      EVENT TYPE: 001
SENDING FACILITY REQUIRED?: NO                    RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
LOGICAL LINK: RA-PSCRIBE
PROCESSING RTN:
ROUTING LOGIC: D ^RAHLROUT  <--only set if using Divisional filtering

```

```

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

```

```

NAME: RA PSCRIBE ORU                          ITEM TEXT: TCP Client
TYPE: subscriber                              PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION:  This protocol is used in conjunction with the RA RPT 2.3 event
point protocol. The HL7 package uses this protocol to send rad/nuc med report
(ORU) messages to TCP/IP recipients. This protocol should be entered in the
SUBSCRIBERS multiple field of the RA RPT protocol if this messaging scenario
is used in a facility. This is part of the file set-up to enable message flow
when a rad/nuc med report is verified.
RECEIVING APPLICATION: RA-PSCRIBE-TCP        EVENT TYPE: R01
LOGICAL LINK: RA-PSCRIBE                     VERSION ID: 2.3
RESPONSE MESSAGE TYPE: ACK                   SENDING FACILITY REQUIRED?: NO
RECEIVING FACILITY REQUIRED?: NO              SECURITY REQUIRED?: NO
ROUTING LOGIC:1 D ^RAHLROUT

```

```

HL7 INTERFACE SETUP                          PAGE 1 OF 2
-----
NAME: RA PSCRIBE ORU
DESCRIPTION (wp):  [This protocol is used in conjunction with the R]
ENTRY ACTION:
EXIT ACTION:
TYPE: subscriber  <- hit <return> here to edit subscriber details

```

```

COMMAND:                                     Press <PF1>H for help   Insert

```

¹ Patch RA*5*25, Divisional Filtering

```

HL7 SUBSCRIBER                                PAGE 2 OF 2
                                RA PSCRIBE ORU
-----
RECEIVING APPLICATION: RA-PSCRIBE-TCP
RESPONSE MESSAGE TYPE: ACK                    EVENT TYPE: R01
SENDING FACILITY REQUIRED?: NO                RECEIVING FACILITY REQUIRED?: NO
SECURITY REQUIRED?: NO
LOGICAL LINK: RA-PSCRIBE
PROCESSING RTN:
ROUTING LOGIC: D ^RAHLROUT <--only set if using Divisional filtering
-----
COMMAND:                                Press <PF1>H for help   Insert

```

The following protocols, shown without screen shots, are exported as part of the Radiology TalkStation interface but do not require amendment:¹

```

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

```

SUBSCRIBER: RA PSCRIBE TCP REPORT

```

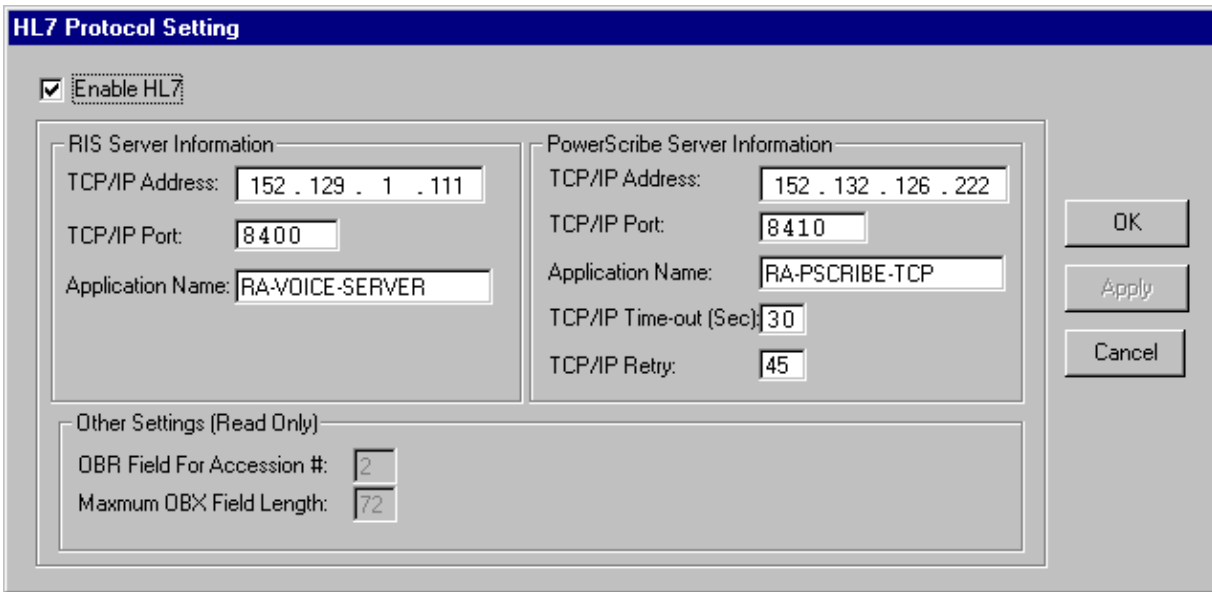
NAME: RA PSCRIBE TCP REPORT                    ITEM TEXT: Client for PowerScribe TCP rpt
TYPE: subscriber                                PACKAGE: RADIOLOGY/NUCLEAR MEDICINE
DESCRIPTION: Subscriber protocol for sending report to Vista
Radiology/Nuclear Medicine. This protocol is used by the HL7 package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

```

Configuring PowerScribe HL7 Protocol Settings

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

¹ Patch RA*5*25



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:
 - 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.)
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. Regarding the site specific "multi-listener link" VAXxx:
 - 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.
6. Verify that the listener link is up and running:
 - 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.
7. Start the "sender" link RA-PSCRIBE: From the HL7 Main Menu, Filer and Link Management Options..., Start/Stop Links.
 - 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.

8. Use the Systems Link Monitor option again to verify that the RA-PSCRIBE sender link is 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	UCX Multi-Threaded Listener System: Shut down the RA-PSCRIBE link.	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
6	VistA	UCX Multi-Threaded Listener System: enable the OpenVMS UCX Service (if disabled)	Mandatory
7	VistA	Start the sender logical link: RA-PSCRIBE	Mandatory

Notes: If the PowerScribe HL7Server goes down or loses the link, the recovery process is necessary.

Shutdown the RA-PSCRIBE link

If the VistA machine is going to be shutdown:

Shut down the RA-PSCRIBE link

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VistA Rad/Nuc Med HL7 Error Message and Troubleshooting Table for TalkStation and PowerScribe Interfaces

Because the 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. Additionally, setting a MAIL GROUP for the application in the HL7 APPLICATION PARAMETERS file (#771) will mean that these errors will also be sent as mail messages to the defined mail group and the verifying physician.¹

Error Message	Cause/Solution
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.

¹ Patch RA*5*25

Error Message	Cause/Solution
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 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 Rad/Nuc Med 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.

Error Message	Cause/Solution
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 2.3.1, RA CANCEL 2.3.1, RA EXAMINED 2.3.1. The RA TALKLINK ORU protocol must be an item under RA RPT 2.3.1, 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 TaskMan, links will not stay up.	Clustered Alpha systems running more than one 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.

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Setup Instructions/Examples for Using IHE compliant HL7 v2.4 Protocols¹

Four newly created event driver protocols are exported in patch RA*5.0*47: RA REG 2.4, RA EXAMINED 2.4, RA CANCEL 2.4, and RA RPT 2.4.

Notes: Do not proceed with these steps until ready to begin using the new HL7 v2.4 messaging.

- Once you are ready to switch over to the new HL7 v2.4 messaging, you must perform the following steps.
- These steps must be done in coordination with the voice recognition software in use at the site.
- These steps should be done when the Radiology options or voice recognition software is not in use.

Setting Up the Voice Recognition Event Driver Protocols

In order to use the new IHE compliant HL7 v2.4 messaging provided by this patch, you must add the corresponding voice recognition subscriber protocols as SUBSCRIBERS to the new v2.4 event driver protocols exported in this patch.

Note: For setting up the VistA Imaging MAGD SEND ORM and MAGD SEND ORU subscriber protocols, refer to MAG*3.0*49 patch documentation.

- The voice recognition subscriber protocols are likely the subscriber protocols that the site currently uses for the existing v2.3 (or previous) protocols.
- Prior to adding the voice recognition subscriber protocols to the new v2.4 event driver protocols, the corresponding voice recognition subscriber protocols must be removed from the existing v2.3 event driver protocols, to prevent sending duplicate messages.

Note: If the listed protocols were renamed locally at your site, use the appropriately named protocols.

In the examples, TalkStation is used to illustrate the process, but the steps are the same for PowerScribe and RadWhere; so, substitute the correct name.

Step 1 - Remove subscribers from existing ORM event driver protocols

For the RA CANCEL 2.3, RA EXAMINED 2.3 and RA REG 2.3 protocols (or the appropriate protocols if the site is using a version previous to v2.3), remove the voice recognition **ORM** subscriber protocol.

- For TalkStation, it is usually RA TALKLINK ORM ←**Note ORM**
- For PowerScribe, it is usually RA PSCRIBE ORM ←**Note ORM**
- For RadWhere, it is usually RA RADWHERE ORM ←**Note ORM**

¹ Patch RA*5*47 August 2011: Added a section about the HL7 messaging version 2.4: *Setup Instructions/Examples for using IHE compliant HL7 v2.4 Protocols*

Example for Step 1

Note: You must perform step 1 for the RA REG 2.3, RA CANCEL 2.3, and RA EXAM 2.3 protocols, but only RA REG 2.3 is shown in this example.

Select OPTION NAME: HL7 MAIN MENU HL MAIN MENU HL7 Main Menu

Event monitoring menu ...
Systems Link Monitor
Filer and Link Management Options ...
Message Management Options ...
Interface Developer Options ...
Site Parameter Edit
HLO HL7 (Optimized) MAIN MENU ...

Select HL7 Main Menu Option: Interface Developer Options

EA Application Edit
EP Protocol Edit
EL Link Edit
VI Validate Interfaces
 Reports ...

Select Interface Developer Options Option: Protocol Edit

Select PROTOCOL NAME: RA REG 2.3

←Select v2.3 event driver protocol

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

←Press <return> at this field to go to next screen

COMMAND:

Press <PF1>H for help

HL7 EVENT DRIVER
RA REG 2.3

PAGE 2 OF 2

SENDING APPLICATION: RA-VOICE-SERVER

TRANSACTION MESSAGE TYPE: ORM

EVENT TYPE: 001

MESSAGE STRUCTURE:

PROCESSING ID:

VERSION ID: 2.3

ACCEPT ACK CODE:

APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN: *****

SUBSCRIBERS

RA TALKLINK ORM

←Remove VR ORM subscriber

Step 2 - Remove subscribers from existing ORU event driver protocol

For the RA RPT 2.3 protocol (or the appropriate protocol if the site is using a version previous to v2.3), remove the voice recognition **ORU** subscriber protocol.

- For TalkStation, it is usually RA TALKLINK ORU ←Note ORU
- For PowerScribe, it is usually RA PSCRIBE ORU ←Note ORU
- For RadWhere, it is usually RA RADWHERE ORU ←Note ORU

Example for Step 2

Select OPTION NAME: HL7 MAIN MENU HL MAIN MENU HL7 Main Menu

```
Event monitoring menu ...
Systems Link Monitor
Filer and Link Management Options ...
Message Management Options ...
Interface Developer Options ...
Site Parameter Edit
HLO HL7 (Optimized) MAIN MENU ...
```

Select HL7 Main Menu Option: Interface Developer Options

```
EA Application Edit
EP Protocol Edit
EL Link Edit
VI Validate Interfaces
Reports ...
```

Select Interface Developer Options Option: Protocol Edit

Select PROTOCOL NAME: RA RPT 2.3

←Select v2.3 event driver protocol

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

←Press <return> at this field to go to next screen

COMMAND: Press <PF1>H for help
HL7 EVENT DRIVER PAGE 2 OF 2
RA RPT 2.3

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

RESPONSE PROCESSING RTN: *****

SUBSCRIBERS

RA TALKLINK ORU

←Remove appropriate VR ORU subscriber

Step 3 - Add subscribers to new ORM event driver protocols

For the RA CANCEL 2.4, RA EXAMINED 2.4, and RA REG 2.4 protocols, add the voice recognition **ORM** subscriber protocol.

- For TalkStation, it is usually RA TALKLINK ORM ←Note ORM
- For PowerScribe, it is usually RA PSCRIBE ORM ←Note ORM
- For RadWhere, it is usually RA RADWHERE ORM ←Note ORM

Example for Step 3

Note: You must perform step 1 for the RA REG 2.4, RA CANCEL 2.4 and RA EXAM 2.4 protocols, but only RA REG 2.4 is shown in this example.

Select OPTION NAME: HL7 MAIN MENU HL MAIN MENU HL7 Main Menu

Event monitoring menu ...
Systems Link Monitor
Filer and Link Management Options ...
Message Management Options ...
Interface Developer Options ...
Site Parameter Edit
HL0 HL7 (Optimized) MAIN MENU ...

Select HL7 Main Menu Option: Interface Developer Options

EA Application Edit
EP Protocol Edit
EL Link Edit
VI Validate Interfaces
Reports ...

Select Interface Developer Options Option: Protocol Edit

Select PROTOCOL NAME: RA REG 2.4

←Select v2.4 event driver protocol

HL7 INTERFACE SETUP

PAGE 1 OF 2

```

NAME: RA REG 2.4
DESCRIPTION (wp):                               ←[This protocol is triggered whenever a Radiology]

ENTRY ACTION:
EXIT ACTION:

TYPE: event driver                               ←Press <return> at this field to go to next screen
-----

COMMAND:                                         Press <PF1>H for help
          HL7 EVENT DRIVER                       PAGE 2 OF 2
          RA REG 2.4
-----

SENDING APPLICATION: RA-VOICE-SERVER
TRANSACTION MESSAGE TYPE: ORM                   EVENT TYPE: 001
MESSAGE STRUCTURE:
PROCESSING ID:                                 VERSION ID: 2.4
ACCEPT ACK CODE:                             APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN: *****
                               SUBSCRIBERS
RA TALKLINK ORM                               ←Add appropriate VR ORM subscriber
-----

```

Step 4 - Add subscribers to new ORU event driver protocol

For the RA RPT 2.4 protocol, add the voice recognition **ORU** subscriber protocol.

- For TalkStation, it is usually RA TALKLINK ORU ←**Note ORU**
- For PowerScribe, it is usually RA PSCRIBE ORU ←**Note ORU**
- For RadWhere, it is usually RA RADWHERE ORU ←**Note ORU**

Example for Step 4

```

Select OPTION NAME: HL7 MAIN MENU  HL MAIN MENU  HL7 Main Menu

                               Event monitoring menu ...
                               Systems Link Monitor
                               Filer and Link Management Options ...
                               Message Management Options ...
                               Interface Developer Options ...
                               Site Parameter Edit
HLO  HL7 (Optimized) MAIN MENU ...

Select HL7 Main Menu Option:  Interface Developer Options

EA  Application Edit
EP  Protocol Edit
EL  Link Edit
VI  Validate Interfaces
    Reports ...

```

Select Interface Developer Options Option: Protocol Edit

Select PROTOCOL NAME: RA RPT 2.4

←Select v2.4 event driver protocol

HL7 INTERFACE SETUP

PAGE 1 OF 2

NAME: RA RPT 2.4

DESCRIPTION (wp):

←[This protocol is triggered whenever a Radiology]

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver

←Press <return> at this field to go to next screen

COMMAND:

Press <PF1>H for help

HL7 EVENT DRIVER

PAGE 2 OF 2

RA RPT 2.4

SENDING APPLICATION: RA-VOICE-SERVER

TRANSACTION MESSAGE TYPE: ORU

EVENT TYPE: R01

MESSAGE STRUCTURE:

PROCESSING ID:

VERSION ID: 2.4

ACCEPT ACK CODE:

APPLICATION ACK TYPE:

RESPONSE PROCESSING RTN: *****

SUBSCRIBERS

RA TALKLINK ORU

←Add appropriate VR ORU subscriber

Step 5 - Change the Version ID field of existing message receipt protocol to 2.4

For the existing message receipt protocol, change the **Version ID** field to 2.4.

- For TalkStation, it is usually RA TALKLINK TCP SERVER REPORT
- For PowerScribe, it is usually RA PSCRIBE TCP SERVER REPORT
- For RadWhere, it is usually RA RADWHERE TCP SERVER REPORT

Example for Step 5

Select OPTION NAME: HL7 MAIN MENU HL MAIN MENU HL7 Main Menu

Event monitoring menu ...
Systems Link Monitor
Filer and Link Management Options ...
Message Management Options ...
Interface Developer Options ...

Site Parameter Edit
HLO HL7 (Optimized) MAIN MENU ...

Select HL7 Main Menu Option: Interface Developer Options

EA Application Edit
EP Protocol Edit
EL Link Edit
VI Validate Interfaces
Reports ...

Select Interface Developer Options Option: EP Protocol Edit

Select PROTOCOL NAME: RA TALKLINK TCP SERVER RPT **←Select existing message receipt event driver protocol (TALKLINK is used in this example)**

HL7 INTERFACE SETUP PAGE 1 OF 2

NAME: RA TALKLINK TCP SERVER RPT

DESCRIPTION (wp): **←[Driver protocol for sending report to VISTA Rad]**

ENTRY ACTION:

EXIT ACTION:

TYPE: event driver **←Press <return> at this field to go to next screen**

HL7 EVENT DRIVER PAGE 2 OF 2
RA TALKLINK TCP SERVER RPT

SENDING APPLICATION: RA-TALKLINK-TCP
TRANSACTION MESSAGE TYPE: ORU EVENT TYPE: R01
MESSAGE STRUCTURE:
PROCESSING ID: VERSION ID: 2.3 **←Change this field to 2.4**
ACCEPT ACK CODE: APPLICATION ACK TYPE:
RESPONSE PROCESSING RTN:
SUBSCRIBERS
RA TALKLINK TCP REPORT

Step 6 - Turn on the use of the long site accession number

The option, Site Accession Number Set-up, functions as the *switch* to turn on the use of the Site Specific Accession Number (SSAN).

- Until this field is set to **YES**, the system will **not** generate and store the SSAN during the registration of a new case.
- Only when all devices are able to handle the SSAN, should this field be set to **YES**, at which point, the system will generate and store the SSAN during Registration.

Example for Step 6

```
Select OPTION NAME: RA SITEMANAGER          IRM Menu

      Device Specifications for Imaging Locations
      Distribution Queue Purge
      Failsoft Parameters
      Imaging Type Activity Log
      Purge Data Function
      Rebuild Distribution Queues
      Report File x-ref Clean-up Utility
      Site Accession Number Set-up
      Credit completed exams for an Imaging Location
      Resource Device Specifications for Division
      Schedule Perf. Indic. Summary for 15th of month
      Template Compilation
Select IRM Menu Option: Site Accession Number Set-up
```

Warning: Turning on the Site Specific Accession Number should only be done in conjunction with using the RA v2.4 messaging protocols.

NOTE: Changing the Site Specific Accession Number parameter at a multidivisional site will change the parameter for ALL divisions.

```
Current value of Site Specific Accession Number parameter: NO
Use Site Specific Accession Number? YES
```

Setup Instructions/Examples for TCP/IP Optimized HL7 Interfaces between Rad/Nuc Med and COTS Products¹

Introduction

The VistA Rad/Nuc Med application or VistA Radiology Information System (VistA RIS) with the release of RA*5.0*78 adds the functionality to process inbound v2.3 HL7 queries². The traditional method of messaging with COTS was through the implementation of the VistA Health Level Seven application. The release of patch HL*1.6*126 (**HL7 Optimized**) changed the method by which to implement the Health Level Seven application

HLO Optimized consists of:

1. A set of Application Programming Interfaces (APIs) that VistA M developers use to build and transmit HL7 messages, and receive and parse HL7 messages.
2. A messaging engine, consisting of a client and a server, that sends and receives HL7 messages between systems.
3. A user interface that sites use to control and monitor the HL7 messaging, view messages, message errors, message statistics, logical links, and queues.

HLO was designed to support version 2.4 of the HL7 messaging standard using the traditional delimited format for HL7 messages. The application may designate other versions of the standard in the message header, but does not otherwise affect how HLO formats the message. HLO supports Enhanced Mode Acknowledgments and does not support Original Mode Acknowledgments.

Requirements

The VistA RIS patch RA*5.0*78 must be installed and the VistA Health Level Seven application must be patched through HL*1.6*139³. The persons responsible for the implementation of RA*5.0*78 must make sure that they have an understanding of the processes to be implemented within VistA Health Level Seven application, in order to activate this interface.

The *VistA HL7- Optimized (HLO) Supplement to VistA Health Level Seven (HL7) Version 1.6 Installation Manual/Release Notes* (Patch HL*1.6*126) is located at

[www.va.gov/vdl/documents/Infrastructure/Health_Level_7_\(HL7\)/hl_1_6_126_ig.pdf](http://www.va.gov/vdl/documents/Infrastructure/Health_Level_7_(HL7)/hl_1_6_126_ig.pdf)

Chapter 5 Listeners and Chapter 6 Daily Oversight and Troubleshooting are of particular importance.

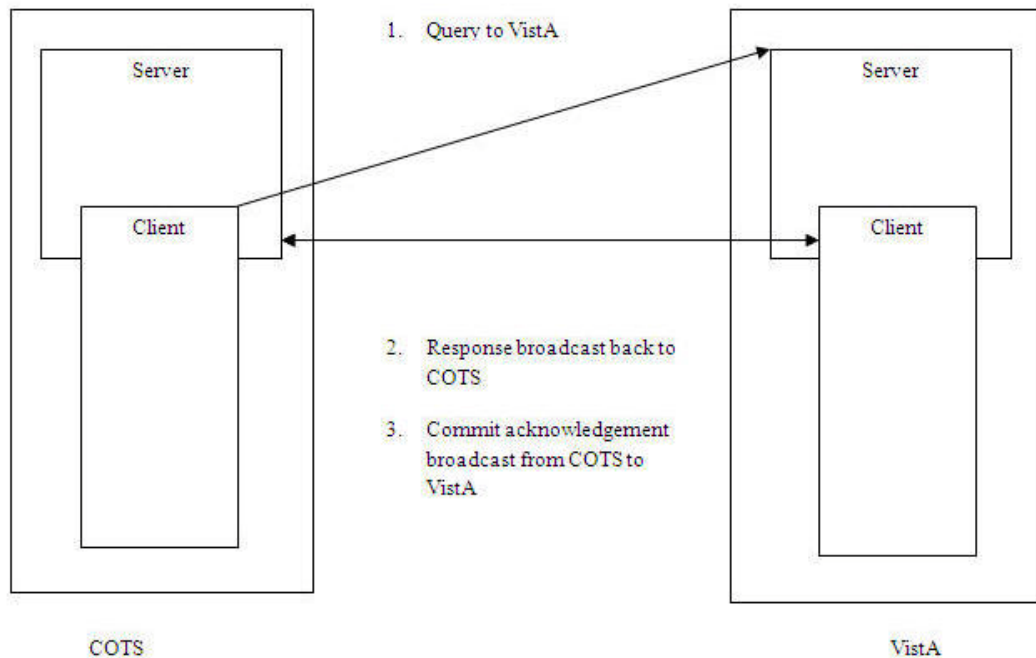
¹ Patch RA*5*78 May 2009: Added a section for **TCP/IP Optimized HL7 Interfaces**

² Patch RA*5*78 May 2009: Refer to the HL7 Message Specifications document for more information on the structure of these v2.3 HL7 query and response messages

³ Patch RA*5*78 May 2009: Assuming that patch HL*1.6*139 is released when RA*5.0*78 is released. Naturally, the VistA Health Level Seven application should be fully patched.

Setup of HLO Components for Two-way Radiology/COTS Interface

Message Flow Diagram



4. The COTS application sends the query (QRY~R04) to VistA. VistA is *listening* on the HLO specific multi-threaded listener (port 5001).

Note: The COTS application is not requiring an acknowledgment to be broadcast over this socket.

5. Over a separate socket,¹ VistA broadcasts a query response (ORF~R02) back to the COTS application.

Note: The Logical Link defines the socket. The *TCP/IP ADDRESS* and *TCP/IP PORT (OPTIMIZED)* fields defines the socket.

6. Over the same socket, the COTS application broadcasts a *commit acknowledgement*. A successful commit acknowledgment indicates that the COTS application received the VistA-based query response. Without a commit acknowledgment, VistA continues to rebroadcast to the vendor until the message receipt is acknowledged.

¹ Points 2 and 3 reference the double-headed arrow in the diagram.

Part 1 – VistA Accepts an Inbound Query Message (QRY~R02)

VistA Rad/Nuc Med accepts the query message from the vendor with VistA HL7 acting as the message broker between VistA Rad/Nuc Med and the vendor. The VistA HL7 passes the HL7 segments to the VistA Rad/Nuc Med application through an API. The VistA Rad/Nuc Med application breaks down the HL7 message and validates VistA Rad/Nuc Med-specific data.

- If the data is not valid, the VistA Rad/Nuc Med application informs a radiology-specific mail group, RAD HL7 MESSAGES, that the query was not valid.
- If the query is valid, the sort criterion is saved and we move to step two of the process.

Part 2 – VistA Processes the Query and Returns a Response (QRY~R04)

The sort criterion is used to efficiently search examination data for reports that were resulted (VistA Rad/Nuc Med's equivalent term for Report Status is Verified).

- If there is no data to return, the VistA Rad/Nuc Med returns a negative acknowledgement to the vendor.
- If there is data to return, that data is passed back to the vendor defined as a QRY~R04 (Query) HL7 message. The QRY~R04 acts as a wrapper around *ORU~R01 (Observation results – unsolicited)*.

Part 3 – VistA Receives an Accept Acknowledgment from COTS

For the HL7 message transaction to be complete, the vendor is required to broadcast back to VistA, on receipt of the query HL7 message, a *commit acknowledgment*. The commit acknowledgment informs the VistA Rad/Nuc Med application that the HL7 message was successfully delivered to the vendor. Without a *commit acknowledgment*, the VistA Rad/Nuc Med application continues to rebroadcast the HL7 message until a *commit acknowledgment* is received.

Startup and Recovery

HLO System Startup

The HLO SYSTEM STARTUP option should be scheduled after installing and configuring HLO. It is best to have the local IRM service manage the HLO application. The information needed to manage the HLO application is in the *Patch HL*1.6*126 Technical Manual*, which is in the VHA Software Document Library (VDL) under *Infrastructure* and *HL7 (VistA Messaging)*.

Updating the RA-SCIMAGE Logical Link

1. Follow this menu path to edit the RA-SCIMAGE logical link.

```
Select OPTION NAME: HLO MAIN MENU          HL7 (Optimized) MAIN MENU

SM      HLO SYSTEM MONITOR
MV      HLO MESSAGE VIEWER
APPS    HLO APPPLICATION REGISTRY
STAT    HLO MESSAGE STATISTICS
ES      HLO ERROR STATISTICS
EL      Link Edit                                <-- this is the option

Select HL7 (Optimized) MAIN MENU Option:  Link Edit

Select HL LOGICAL LINK NODE: RA-SCIMAGE      <-- this is the logical link
```

2. Edit the following fields.
 - DNS DOMAIN (#.08)
 - TCP/IP PORT (OPTIMIZED) (#400.08)
3. Request the DNS value for the local NTP gateway server from your network manager.
4. Enter the DNS value of the NTP gateway server into the DNS DOMAIN field.
5. Enter the agreed to port number, 21998, into the TCP/IP PORT (OPTIMIZED) field¹.

¹ Patch RA*5*78 May 2009: Added specific IP Port numbers for NTP: **21999** as the required TCP/IP PORT field value and **21998** as the required TCP/IP PORT (OPTIMIZED) field value.

Editing the *DNS Domain* field

```
HL7 LOGICAL LINK
-----
      NODE: RA-SCIMAGE          DESCRIPTION:
INSTITUTION:
MAILMAN DOMAIN:
      AUTOSTART: Enabled
      QUEUE SIZE: 10
      LLP TYPE: TCP
      DNS DOMAIN: Enter DNS DOMAIN information here.

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

Editing the *TCP/IP Port (Optimized)* field

```
HL7 LOGICAL LINK
-----
      TCP LOWER LEVEL PARAMETERS
      RA-SCIMAGE
TCP/IP SERVICE TYPE: CLIENT (SENDER)
TCP/IP ADDRESS: XX.X.XXX.XX
TCP/IP PORT: 21999
TCP/IP PORT (OPTIMIZED): 21998

ACK TIMEOUT: 60                      RE-TRANSMISSION ATTEMPTS: 3
READ TIMEOUT: 60                     EXCEED RE-TRANSMIT ACTION: restart
BLOCK SIZE:                          SAY HELO:
STARTUP NODE:                         TCP/IP OPENFAIL TIMEOUT:
RETENTION:                            PERSISTENT: NO
UNI-DIRECTIONAL WAIT:

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

Notes: The fields TCP/IP PORT and TCP/IP PORT (OPTIMIZED) must be defined with legitimate and unique port numbers. Contact the site IRM to obtain the specific domain name and port number to be used by the client-side communicating with VistA.

Currently, HLO uses the same domain name with port 5001 on production systems and 5026 on test systems.

If you experience problems with the HL7 messaging associated with this patch, contact the national support team responsible for the VistA Rad/Nuc Med application.

VistA HL7 HLO Message Files

HLO Message Body File (#777)

Stored in the ^HLA(data global. In this messaging schematic, this file stores the *body*¹ of the HL7 message.

HLO Messages File (#778)

Stored in the ^HLB(data global. In this messaging schematic, this file stores the *header*² of the HL7 message.

¹ **Body** means that all HL7 segments are stored, except the MSH (Message Header) segment

² **Header** means that the only HL7 segment stored, is the MSH (Message Header) segment