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SYNAPSE® VNA

HL7 Messaging Specifications

Synapse VNA Software Version 7.X

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REVISION HISTORY

Date	Revision	Description
28-January-2020	0	• Added new section MDM Non-DICOM Instance Notification. • Updated TXA Segment (Study). • Synapse VNA version 7.x. • Updated copyright.
28-October-2019	N	• Removed reference to a NAK reply with a code of AE.
14-August-2019	M	• Added clarifying text to Explicit Merge section. • Updated MSH-4 processing behavior. • Added ADT^A03 as a default demographic message. (This message had been erroneously removed earlier.) • In the ORU, OBR:25 segment of Result Status added the words "Finalized Report",

Date	Revision	Description
		"Preliminary Report" or “Finalized Addendum” in the series description. • Updated corporate address.
6-June-2019	L	• Updated MDM Non DICOM Availability Notification. • Updated MDM Non-DICOM Cancel Notification
22-May-2019	K	• Added additional message types to enable EMR notifications. • Added new section Epic FHIR Support Messaging. • Updated Non-DICOM File Import Messaging. • Added folder name for non-DICOM HL7 upload. • Added HL7 Structured Reports section. • Updated ZDS SEGMENT. • Removed AE NAK references.
4-January-2019	J	• Updated copyright.
30-August-2018	I	• Added Note. • Added File Import support. • Added support of Thai character set.

14-March-2018	H	• Added MDM messaging.
		  ○ MDM Study Availability Notification
		  ○ MDM Non-DICOM Availability Notification
		  ○ MDM Non-DICOM Cancel Notification

28-February-2018	G	• Clarified use of OBR 4 segment. • Updated copyright.
9-May-2017	F	• Removed ADT^ A03 as a default demographic message. • Defined ADT^ A03 in Patient Worklist Messaging. • Updated Patient Worklist Messaging.

Date	Revision	Description
24-March-2017	E	• Updates to Patient Identifiers. • Updates to Merging. • Updated copyright year.
6-May-2016	D	• Added graphics reflecting 6.1 user interface. • Updated default message for Connext Patient Worklist. • Added use of special characters. • Added Character Set Detection.
26-January-2016	C	• Added Patient Worklist Messaging.
4-January-2016	B	• OBR Segment (Order) Sequence #2 shading changed to optional. • OBR Segment Sequence 2 shading changed to required.
25-September-2015	A	• Supports version 6.0.4. • Rebranded with FUJIFILM logo, disclaimer and contact information.
27-May-2015	NA	• Supports version 6.0.3. • Added additional acronyms and abbreviations. • Added Appendix A Data Types. • Corrected inaccuracies identified in several change requests.
25-March-2015	NA	• Supports version 6.0.2 • Completely refactored the document.
11-December-2014	NA	• Supports version 6.0.1 • Updated logo in header. • Copy edit. • Added additional copyrights information.
12-August-2014	NA	GA release for 6.0.

Product Description

The FUJIFILM Medical Systems U.S.A., Inc. (Fujifilm) Synapse VNA solution brings clinical content together under one institutional infrastructure. The Synapse VNA provides unique qualities of service

to the originating clinical areas and relieves them of the burden that accompanies long-term management of critical patient information. Physicians can procure and utilize the most care-effective departmental workflow and visualization products while knowing that their clinical data is managed according to their unique policies and rules in a secure, robust, IT managed solution.

INTENDED USE

Synapse VNA is a stand-alone software application specifically designed to be networked with diagnostic imaging systems, laboratory or hospital information systems to provide enterprise patient data storage, retrieval, and archiving on standard information technology hardware. Synapse VNA supports the retrieval of stored information by networked medical devices subsequently used for purposes defined by those medical devices.
Synapse VNA does not contain controls for the direct operation or influence the operation of another medical device and it does not manipulate patient data for medical purposes.
Synapse VNA is not intended to be used for direct patient care, is non-patient contacting and is not intended for diagnostic use.

WARNING NOTICES

Types of warning notices used in this document include—Caution and Warning.

Caution statements warn about the risks of material damage.

Warning statements warn about the risks of physical injury.

Table of Contents

Introduction

PURPOSE

HL7, which is an abbreviation of Health Level Seven, is a standard for exchanging information between medical applications. This standard defines a format for the transmission of health-related information.

Information sent using the HL7 standard is sent as a collection of one or more messages, each of which transmits one record or item of health-related information.

Although HL7 and their messages are widely used, many systems don't know how to speak the language and require a translator. HL7 interface engines work alongside existing applications as an interpreter, speaking the language of HL7.

An important part of the requirements gathering process with each customer is defining the appropriate HL7 messaging to exchange to and from Synapse VNA. This document specifies Synapse VNA's implementation of HL7. Synapse VNA ships with an HL7 V2.3 parser. Other HL7 versions are available: 2.1, 2.2, 2.3.1, or 2.4.

Note: The HL7 implementation can be customized as needed for each customer.

See the *Synapse VNA Advanced Feature and Configuration Guide HL7 Section, IUO-00100* for information pertaining to site specific customized messaging implementation.

This document describes the default message specifications of the Synapse VNA HL7 servers and clients.

Implementation Model contains a diagram of the various classes of HL7 message applications which may be received or sent by Synapse VNA. These message classes include:

- Creating and/or updating patient demographics
- Merging a patient with another
- Correcting a patient ID or MPI
- Notifying Synapse VNA of an order
- Notifying Synapse VNA of unsolicited results
- Notifying Synapse VNA of study interpretation results

- Notifying Synapse VNA of an external decision to delete images
- Notifying the Enterprise of important Synapse VNA system events regarding patients and/or studies
- Verifying patient/study information against the hospital RIS database

Synapse VNA HL7 Concepts has narratives for various HL7 features as they apply to Synapse VNA. This includes the following topics:

- Establishing context
- Context based processing features
- Selecting how to lookup a patient record
- Selecting what database fields are mapped by HL7
- Enabling creating new patient records
- Enabling demographic only updates for A08, A28
- Patient Identifiers
- ID Types
- Patient names
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- How Synapse VNA maps a DICOM image to a Patient/Study
- ID Type Schemes
- Messages which create a study
- EPIC Document Management Notifications
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Inbound HL7 Messaging documents the standard set of inbound messages accepted by Synapse VNA’s HL7 implementation.

Outbound HL7 Messaging documents the standard messages generated by Synapse VNA’s HL7 implementation.

Input Segment Descriptions and Output Segment Descriptions contain tables summarizing descriptions of each message segment used by inbound and

outbound messages, respectively. Each field used by Synapse VNA has descriptive text about the use and the database table and column, if applicable.

SR HL7 to DICOM Mapping covers the special case of how an SR HL7 message is mapped to a DICOM object.

Sources Used For This Document

Health Level 7 Message Profiles are based on HL7 version 2.3.

Acronyms and Abbreviations

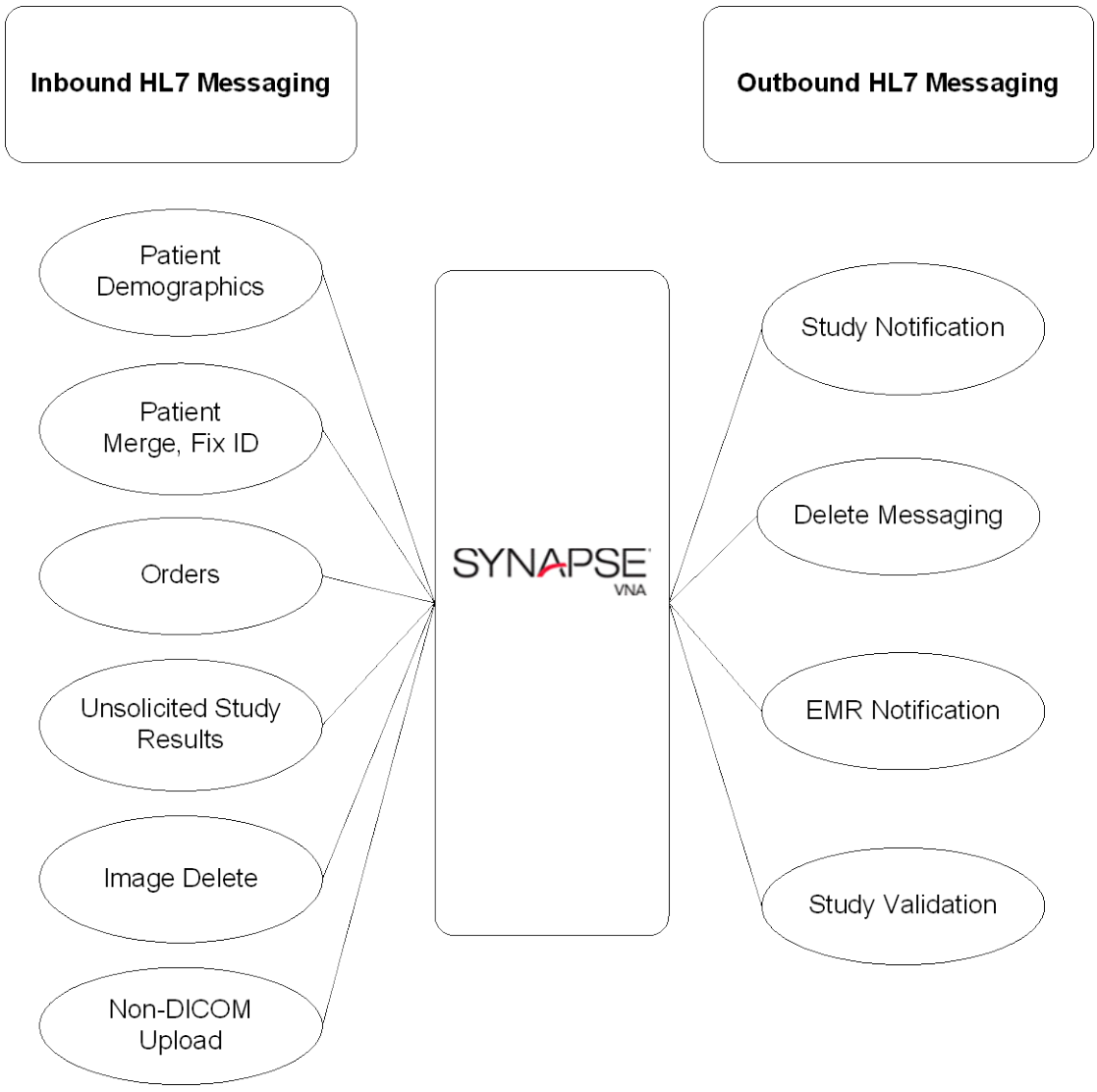
Item	Description
ACK	Acknowledgement
ADT	Admission, Discharge and Transfer
CVIS	Cardiovascular Information System
EMR	Electronic Medical Record
HIS	Hospital Information System
HL7	Health Level 7
ID Type	Defines the origin of MRN that is in a given ID Type. An MRN can only be used once. It's defined by the STMO and is used as the ID type for the patient record created by DICOM.
DICOM	Digital Imaging and Communications in Medicine
MPI ID	Master Patient Index
MRN	Medical Record Number
NEMA	National Electrical Manufactures Association
Patient ID	Patient Identifier made up of an MRN and ID Type
PMO	Patient Management Organization. This Synapse VNA term represents the organization level that is responsible for the ownership of patient records.
PMS	Practice Management System
RIS	Radiology Information System
STMO	Study Management Organization. This Synapse VNA term indicates the organization level that is responsible for the ownership and management of clinical study records.
TCP/IP	Transmission Control Protocol/Internet Protocol

CONVENTIONS

In describing messages and fields, something that is optional is denoted in square brackets ([]) Something that can repeat is shown in braces ({}). *Italics* signifies database references.

Implementation Model

APPLICATION DATA FLOW DIAGRAM



Synapse VNA HL7 Concepts

ESTABLISHING CONTEXT

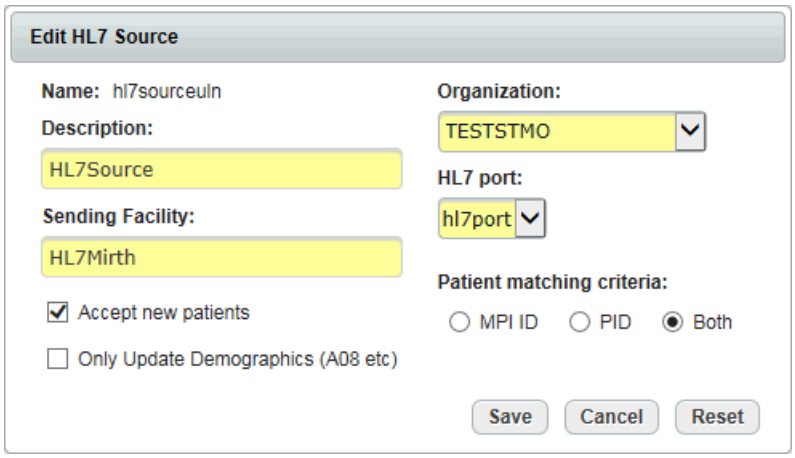
In Synapse VNA terms, an HL7 Source defines a Sending Facility. This is needed for parsing the incoming HL7 message. If the Sending Facility value in the message cannot be matched to an HL7 Source configuration, the message is discarded.

This configuration determines whether the HL7 messages create new patient records, controls the organization to which those patients belong and controls whether Patient IDs and/or MPI are used for looking up existing patients in the database.

If you have a simple topology and one HL7 Source covers the entire enterprise, it is always used. Otherwise the HL7 Source for an inbound HL7 is selected by using the **MSH Sending Facility** field (MSH-4). This value is mapped to the HL7Source instance SendingFacility attribute. If no mapping is made, Synapse VNA returns a negative acknowledgment (NAK).

HL7 Source Configuration Details

From the HL7 Source, Synapse VNA determines the **Organization** context (PMO or STMO) for the message and the context-based processing features discussed below. (**Setup ➢ Interfaces ➢ HL7 Sources**)



A STMO (Study Management Organization) is required for order (ORM^O01) or study (ORU^R01) messages. For all other messages, a PMO (Patient Management Organization) or FMO (Facility Management Organization) is sufficient.

Note: If only one HL7 Source is defined and the VNA receives an HL7 message with an unknown (and not NULL) MSH-4 value, the VNA will ACK the message.

However, if multiple HL7 Sources are defined and the VNA receives an HL7 message with an unknown or NULL MSH-4 value, the VNA will NAK the message.

Character Set Detection

For HL7 Protocol V2.5 only, the parser checks the incoming message and gets the first MSH-18 iteration value.

Single-byte

If the string is not empty, the first iteration is assumed to be the single-byte character set. This value is compared to available character sets and if a match is found, it is then set. If there is no match, the default character set is chosen (ASCII).

MSH Segment (Supported HL7 Character Sets)

Supported Single Byte HL7 Character Sets	Notes
ASCII	
8859/1	Latin 1
8859/2	Latin 2
8859/3	Latin 3
8859/4	Latin 4
8859/5	Cyrillic
8859/6	Arabic
8859/7	Greek
8859/8	Hebrew
8859/9	Latin 5
8859/11	Thai
8859/15	Latin 9
ISO IR14	Equivalent to JIS X 0201 1976
JIS X 0201 1976	Roman/katakana
ISO IR87	Equivalent to JIS X 0208 1990
JIS X 0208 1990	kanji
ISO IR159	Equivalent to JIS X 0212 1990
JIS X 0212 1990	Obscure kanji
GB 18030 2000	Official Chinese (People's Republic of China)
KS X 1001	South Korean
UTF 8	Unicode
ISO IR6	Equivalent to ASCII
JIS X 0202	Japanese Industrial Standard equal to ISO-2022-JP

MULTI-BYTE

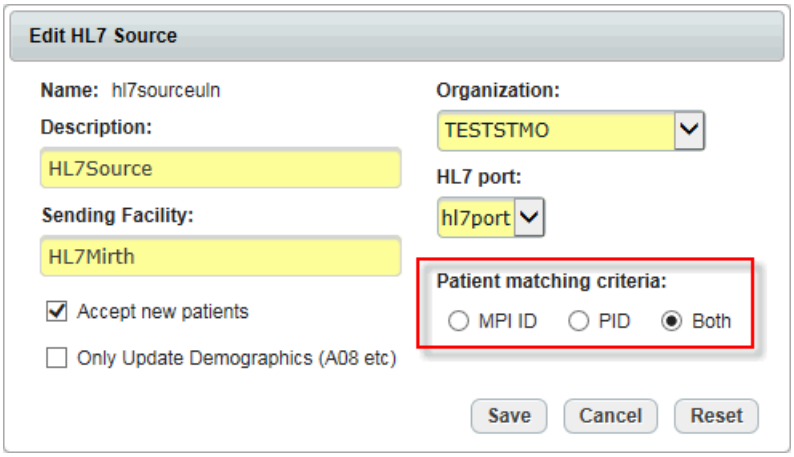
Multi-byte character sets are found by scanning the HL7 message for ISO 2022 escape sequences. The character sets available are listed below:

Supported Multi Byte HL7 Character Sets	ESC Sequence	Alternate Character Set	Notes
ISO 2022 IR 159	ESC $ (D	G0 94 char set	Japanese
ISO 2022 IR 159	ESC $) D		Japanese
ISO 2022 IR 149	ESC $ (C		Korean
ISO 2022 IR 149	ESC $) C	G1 94 char set	Korean
ISO 2022 IR 58	ESC $) A		Official Chinese (People's Republic of China)
ISO 2022 IR 58	ESC $ A	G0 94 char set	Official Chinese (People's Republic of China)
ISO 2022 IR 87	ESC $) B		Japanese
ISO 2022 IR 87	ESC $ B	G0 94 char set	Japanese
ISO IR 2022 IR 6	ESC (B	G0 94 char set	US

CONTEXT-BASED PROCESSING FEATURES

SELECTING HOW TO LOOK UP A PATIENT RECORD

Synapse VNA uses one or both of a patient's identification characteristics available through HL7—the Patient IDs and/or the Master Patient Index. The **Patient Matching Criteria** selection box in the HL7 Source lets you specify one or both identifiers (MpiId, PID) and the order in which they are used.



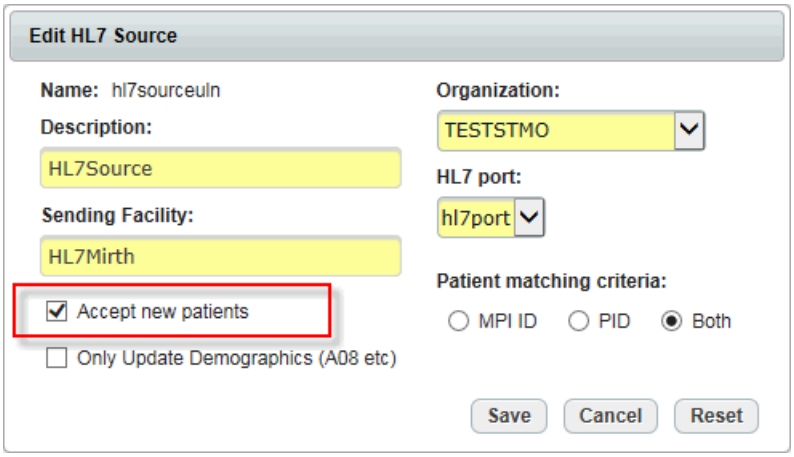
Patient ID is always required in an HL7 message so you should always use PID lookup.

Note: If an enterprise uses Master Patient Index, it is more efficient and recommended to search by MpiId followed by PID (as the second search criterion). In all cases, it is inefficient to search first by PID and then MpiId.

ENABLING CREATING NEW PATIENT RECORDS

If **Accept New Patients** is unchecked, HL7 will only update existing patient records. New patient records will only be created when a new MRN (Medical Record Number) is encountered during DICOM Study store operations.

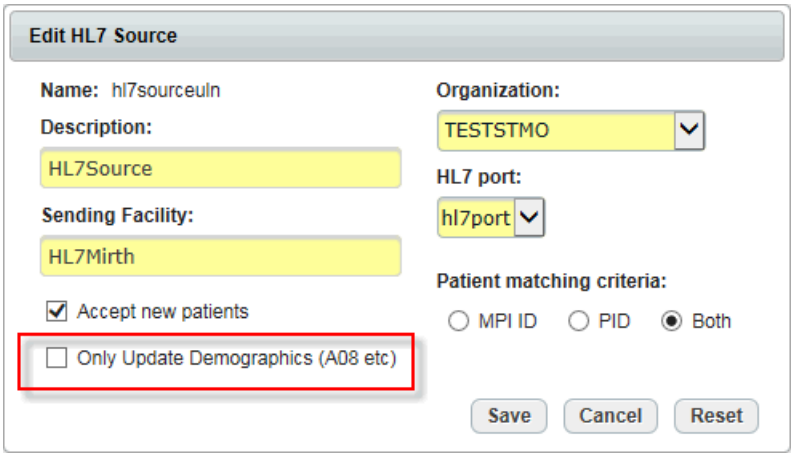
If **Accept New Patients** is checked, an incoming HL7 message will create a new patient record if none is found by the Patient Matching Criteria.



ENABLING DEMOGRAPHIC-ONLY UPDATES FOR A08, A28

Normally A08 and A28 messages are handled in the same manner as other A01—A05 ADT messages.

If the **Only Update Demographics** box is checked, A08 and A28 messages will only be allowed to update the name, birthdate, gender, and ethnic group fields in the patient record.



PATIENT IDENTIFIERS

Synapse VNA identifies patients by a collection of Patient IDs. Each Patient ID consists of a medical record number (MRN) and an ID Type string. The first match on one of the Patient IDs from PID-3 to one of the Patient IDs recorded in the database creates a match to the patient record. Any remaining Patient IDs are ignored.

Note: The same logic applies to how the MRG-1 field is used to find the source patient to merge to destination patient identified by PID-3.

Synapse VNA enforces two constraints for Patient IDs.

- Only one MRN/ID Type pair can exist for the patient records in the Synapse VNA database. The Patient IDs for a single patient record must all have unique ID Types.
- The other patient identifier Synapse VNA can use is the Master Patient Index (MPI) which Synapse VNA reads from PID-2. An MPI must be unique within a PMO.

ID TYPES

ID Types are created for and managed by Synapse VNA. The ID Type string distinguishes different MRN schemes that may be present across an enterprise. There must be an appropriate mapping between the ID Types used for Patient IDs and the ID Type specified in a STMO

Synapse VNA uses lower case for ID Types. The ID Types Synapse VNA receives in PID-3 are always converted to lowercase.

See the sections below titled **How Synapse VNA Maps a DICOM Image to a Patient/Study** and **ID Type Schemes** for more information on this subject.

MERGING

EXPLICIT MERGE

Explicit Merges are done when Synapse VNA receives an ADT^A18, A34, or A40 message. All of these messages are processed identically. The explicit merge moves the studies from the source patient record (MRG) to the destination patient record (PID). All other data records of the source patient record are also

moved to the destination patient record (orders, notifications, jobs, work lists, and non-DICOM data).

Note: Synapse VNA only handles a single PID/MRG segment pair in a given Explicit Merge message. If there are multiple MRG segments, only the first MRG segment is parsed. All subsequent MRG segments are ignored.

If there are multiple pairs of PID+ID_type values in the MRG-1 segment, VNA will sequentially search for an existing patient until a patient is found and then will process the Merge. It will not parse additional PIDs in the MRG -1 segment after it finds an existing source patient.

The explicit merge also moves the source patient record's Patient IDs to the destination patient record. If the ID Type of a source Patient ID is the same as the ID Type of a destination Patient ID, the patient ID will not be moved and is left with the source patient record. The source patient record's MPI will be moved if the destination patient record does not have one. The source patient record's MPI is always erased from the source patient record.

An explicit merge must wait for patient and study activities to finish. When an explicit merge cannot be done immediately, a merge job is created. This job is executed as soon as all patient and study activities finish.

IMPLICIT MERGE

Synapse VNA occasionally performs an implicit merge to combine two patient records which Synapse VNA determines are actually for the same patient. An implicit merge is handled identically to the explicit merge.

For example, suppose Synapse VNA stores different studies for the same patient to two different STMOs. Each created patient record has different MRNs and ID Types. Sometime later an HIS sends an HL7 ADT^A05 which has both MRNs and ID Types in PID 3. Synapse VNA will implicitly merge the two patient records.

Another example occurs when validation is used for a new study and the validation results returns the patient's MPI. Synapse VNA checks to find if this MPI is already associated with another patient record. Synapse VNA will implicitly merge the two patient records.

PATIENT NAMES

Synapse VNA requires a minimum of a last name in patient name field. If Synapse VNA receives a name like "^John^^^ the message fails. Synapse VNA returns negative acknowledgement (Establishing Context).If the message is updating an existing patient record, Synapse VNA sets the patient name to the entire patient name provided in PID-5. So if the current patient record contains "Doe^John^Warren^^^Dr." and Synapse VNA receives (in a subsequent HL7 message) a PID-5 of "Doe^John", Synapse VNA changes the patient name to "Doe^John".

ACCESSION NUMBERS

Synapse VNA stores accession number by the study's STMO ID Type This allows copies of the same study (based upon Study Instance UID) with different (or the same) accession numbers to be present in separate STMOs as long as the STMOs have different ID types.

Unlike DICOM, HL7 does not have an explicit accession number field. Synapse VNA gets the accession number from OBR-3and gets the ID Type from the STMO when establishing context. If context for Orders or SR Results is a PMO, the message fails and Synapse VNA returns a negative acknowledgement (NAK).

HOW SYNAPSE VNA MAPS A DICOM IMAGE TO A PATIENT STUDY

As stated earlier, ID Types are managed by Synapse VNA. In the case of DICOM, each DICOM Equipment configuration is defined within one STMO. Each STMO has an ID Type.

Note:	Multiple STMOs may have the same ID Type.

The patient record created by the DICOM Server gets its MRN from (0010, 0020) and ID Type from the STMO associated with the DICOM equipment (or custom overrides if configured).

A patient record created by HL7 gets its MRN from PID-3, 1 and ID Type from PID-3, 4. If this set of ID Types matches the ones in the created STMOs, all is well. But often this is not the case and some site-specific, custom logic will need to be defined and implemented.

ID TYPE SCHEMES

Enterprises have used a variety of ID Type schemes to map the DICOM patient's MRN and ID Type to an HL7 patient's MRN and ID Type. Following are examples of various schemes Synapse VNA has encountered.

SEND ONLY THE MRN IN THE HL7 PID-3 FIELD

When an Enterprise sends only the MRN in the HL7 PID-3 field and no ID Type, the HL7 Source defines which STMO supplies the ID Type. This ties the mapping between HL7 and DICOM to a common value. A drawback of this approach is that an HL7 message can only have a single MRN (no tilde used) because you cannot have two MRNs in a PID with the same ID Type.

SEND ONLY VALID PATIENT IDS IN THE HL7 PID-3, 4 FIELD THAT CORRESPOND TO STMO ID TYPES

When an Enterprise sends PID-3 values whose ID Types (PID-3, 4) match that of some STMO(s), this creates a mapping between HL7 and DICOM. This scheme allows you to send multiple Patient IDs in the H7 message.

Note:	Synapse VNA does not enforce that the ID Types from HL7 PID-3 match STMO ID Types.

SEND ANY PATIENT IDS IN THE HL7 PID-3.

When an Enterprise sends PID-3 values whose ID Types can be anything, the ID Types that do match STMO(s) can be used for mapping between HL7 and DICOM. All the ID Types will be used for patient record lookup.

ONLY STORE PATIENT IDS FROM THE HL7 PID-3 FIELD WHICH CORRESPOND TO STMO ID TYPES

Another customization has Synapse VNA checking HL7 PID-3 Patient ID Types against the STMO ID Types. Synapse VNA discards Patient IDs which do not match.

SPLIT AN INCOMING PATIENT ID INTO SEVERAL APPROPRIATE PATIENT IDS

A customization which was done makes multiple Patient IDs from an incoming HL7 Patient ID. This is used when the enterprises use a unique ID Type for all of

its STMOs. Synapse VNA creates a Patient ID for each of the STMOs specified (in the customization) by using the incoming MRN and the STMO ID Type.

MAP A FIELD FROM THE HL7 MESSAGE TO AN STMO

A different customization uses values in Organization's Prefix ID to map some value in the HL7 message. The ID Type does not have to be used in this scheme.

One customer uses a common PMO to map HL7 messages. For orders, the site uses custom code to select the STMO using the Organization's Prefix ID values. This site takes its department *code* from OBR-24 and looks for a match in the Organization's Prefix IDs. This is considered to be the organization to use for the order.

This gives the Enterprise exact control in finding STMOs to use for orders. The logic can be applied to any fields in the HL7 messages.

MESSAGES WHICH CREATE A STUDY

The SR Results message (inbound ORU with MSH-3 = SRTEXT) and the non-DICOM File Upload message (inbound ORU with MSH-3=UPLOAD) will create a study if one does not already exist for the patient record. In both cases, Synapse VNA uses the OBR (Study) table for field-to-database mappings.

HL7 STRUCTURED REPORTS

The SR Results message processing takes an HL7 SR message and creates a DICOM Basic Text SR Image. The mapping of HL7 to DICOM for an SR is shown in **SR HL7 to DICOM Mapping**.

A Synapse VNA created SR object is flagged as such. All of the below comments apply only to Synapse VNA-created SRs. A DICOM SR image received by a C-STORE is handled by the DICOM rules.

- The HL7 SR message may not contain a Study UID. If not, the created DICOM image is tied to the images in the study by using the accession number (by default OBR-3). If the SR message contains a study UID it will be found in ZDS-1.
- The HL7 SR message does not contain Series or SOP UIDs, so these values are created by the VNA.
- Because the process creates a study, the Organization Context must be a STMO.

- The DICOM image has a modality type of **SR.** Hence it is stored in its own series and SOP in the DICOM study.
- The created SR is controlled by the associated STMO's DICOM Storage policy. If a second HL7 SR arrives with the same accession number as the previous HL7 SR, it will replace the first SR image if the Storage Policy has **Accept/Replace** enabled. Any other policy will cause a new DICOM SR to be created in a new SR series and SOP.
- If the Storage Policy has **Accept/Replace** enabled, the stored DICOM image is the last HL7 SR message received. It is possible that an Addendum or Correction SR would be overwritten by a late arriving normal HL7 SR message. This has been seen at some sites.

  This behavior can be changed by enabling the site-wide startup option *Generate QA issue if HL7 SR state indicates an out of sequence replacement*. The VNA then uses OBR-25 (Result Status) to enforce a strict HL7 SR message sequence that the first received SR must be a **F** or **C** and all subsequent OBR-25 values must be a **C**.

Note:	A null value for OBR-25 is considered to be an **F**. The OBR-25 values are case-insensitive.

  If an out-of-sequence SR is received, a QA issues is created for the Study to notify the Site Administrator that this problem happened.
- SRs are essential to the diagnosis of a DICOM study. To prevent this critical information from being lost, the site-wide startup option *Save text of HL7 SRs to database* can be enabled.

  If enabled, generated SRs will include the Primary Key of the new entry so the Site Administrator can look at the HL7_SR_JOURNAL_T table to compare the stored Hl7 SR message to the one which caused the QA issue. If the message which caused the QA is the correct SR, the corrective action is to create a message from the saved text, set OBR-25 to **C**, and resend the message.
- An HL7 SR can arrive before any DICOM images. This requires that a temporary study be created. If Organization Details has the **Merge structured report** checkbox checked, when DICOM images arrive, the VNA detects the presence of the temporary study via the accession number and creates a **Move Series Between Studies** job to move the SR to the actual study.

The **Move Series Between Studies** job waits for all other active or pending Study related jobs to be completed. It may be some time before the SR Image is moved to the actual study.

- Some values from the HL7 SR message are not stored in the VNA database and therefore are not available for the created DICOM SR image. Past examples of this using OBR-22 (Results Rpt/Status Change - Date/Time) for the Content Date (0008,0023). This can be accomplished with a site jar change.
- Some sites require that when a study is C-MOVEd, the Synapse VNA-created DICOM SRs are not included or sent as an HL7 message. See the other checkboxes shown above.

EPIC DOCUMENT MANAGEMENT NOTIFICATIONS

A standard feature of Synapse VNA is sending notification messages for different events. Epic wants the same notifications but using MDM Document Management messages, specifically MDM^T02 for new document and MDM^T11 for withdrawn document.

MDM notifications are selected by using the broadcaster class

TMNotificationUsingMDM.

STUDY VALIDATION AS RELATED TO HL7

When a study is first created, Synapse VNA validates that the external world agrees with the patient identifiers and study accession number.

- If they do agree, the returned patient values are used to upgrade the patient record. The actual values updated are controlled by the Validation setup in the user interface (**Setup ➢ Validation**).
- If they don't agree, Synapse VNA assigns a QA Issue status to the study. This limits processing and access to the study and its images until the QA status is cleared. User interface screens are used to resolve the QA Issue.

Synapse VNA has two forms of validation available: using received orders or through HL7 validation against an external system. Synapse VNA also has the ability to add other custom validation algorithms, if needed.

USING ORDERS

Synapse VNA validates the study against prior orders received in HL7 ORM^O01 messages. Synapse VNA's DICOM Server creates a patient record and a study from the DICOM image data. Then the validation looks for an Order from a patient record with same MRN, study's STMO ID Type, and accession number. If no matching order is found, Synapse VNA assigns the study a QA Issued status.

Note:	When an order arrives, the logic to map order to study is repeated. If a match is found, the study QA issue is removed. This handles the case when the DICOM image arrives before the ORM^O01 message.

Note:	Study/Order validation does not need to be used to have order data (order ID, etc.) used in an outgoing OBR segment.

USING EXTERNAL SYSTEM (VALIDATION RIS)

Synapse VNA also validates by sending an HL7 query to an external Enterprise system and processes the return message. This mechanism allows the Enterprise system to use its knowledge to return a Master Patient Index (MPI) which can then be set in Synapse VNA and used to tie the study to a patient record with the same MPI. Other patient fields are updated according to Validation setup in the user interface (**Setup ➢ Validation**).

USE OF "NAK" MESSAGE TYPE

Synapse VNA's original (and current) HL7 implementation uses the message codes ACK and NAK to acknowledge incoming messages. NAK is not a legal HL7 message type Thus, if Synapse VNA's use of the NAK message type causes problems, custom code can be created to fix the issue.

HAPI PARSER

Synapse VNA uses a public-domain HL7 parser named HAPI (HL7 application programming interface). It is an exacting parser covering the entire HL7 protocol specification. Required HL7 fields must be present in a message and

the contents of a field must match the correct format of the HL7 datatype. All of this is done when the message is received. Any problems encountered will cause Synapse VNA to send an acknowledgement message using an ACK message type and an AE code describing the field in question.

In some cases this has presented problems with incoming messages failing because of the presence of fields not used by Synapse VNA. HAPI has separate parsing tables for each of the HL7 protocols we support. The default HL7 code uses the parsing table for 2.3.

If a customer requires another version, a site-specific installation can be created with the appropriate version of HL7 HAPI parser.

USE OF SPECIAL CHARACTERS IN URL

The HL7 standard defines escape sequences for the separator and delimiter characters (that is, \T\ is the escape sequence for subcomponent separator-'&').

For example, observe the multiple arguments separated by the '&' character in this URL Template:

https://**server**:**port**/iemv/?l=scan&p=scan&&id={patient_id}&s1={study_uid}&s2=auto

Because the '&' is a special character used in HL7 parsing, escape characters must be substituted in the url:

https://**server**:**port**/iemv/?l=scan\T\p=scan\T\\T\id={patient_id}\T\s1={study_uid}\T\s2=auto

When a receiving application reads this message it should follow the rules of the HL7 standard. Prior to importing this information into their system, the receiving application they should convert the following:

\T\ to the '&' character

\S\ to the '^' character

\R\ to the '~' character

\F\ to the '|' character

\E\ to the '\' character

Inbound HL7 Messaging

Inbound Synapse VNA HL7 messaging applies to received ADT, Order, and Result messages. Additional custom HL7 interfaces can be created as-needed by submitting a request to Client Services.

ACKNOWLEDGMENTS

All of the messages in this section will return an ACK or NAK message.

- A NAK reply with a code of AR means something failed processing during the requested action. If the reason for failure is fixed by Synapse VNA, the message can succeed.

Note: If a NAK message hangs the client system, Synapse VNA can set the code to always return an ACK for AR errors. Contact Client Services to request custom code.

PATIENT DEMOGRAPHICS MESSAGING

The Patient Demographics messaging function accepts messages generated by the hospital's ADT system of record, which typically is the HIS. In some installations, this role may be played by a departmental information system (that is, CVIS, RIS).

Following are the default ADT Demographic messages Synapse VNA supports:

- ADT^A01 – Patient Admit Notification
- ADT^A02 – Transfer Patient
- ADT^A03 – Patient Discharged
- ADT^A04 – Patient Registered
- ADT^A05 – Patient Pre-Admission
- ADT^A08 – Update Patient Information (can be set to demographics only)
- ADT^A28 – Add person information (can be set to demographics only)

Only the MSH and PID segments of these messages are used by Synapse VNA, all other segments are ignored.

MSH Message Header

PID Patient Identification

PATIENT MERGE MESSAGING

The Patient Merge messaging operation accepts messages generated by the system of record which manages patient records. This is typically the HIS. In some installations, this role may be played by a departmental information system (that is, CVIS, RIS).

The following are the default ADT Merge messages Synapse VNA supports:

- ADT^A18 –Merge Patient Information
- ADT^A34 –Merge Patients
- ADT^A40 –Merge Patients

Only the MSH, PID and MRG segments of this message are processed; all other segments are ignored.

The MRG segment is used to find the existing patient record into which studies are to be merged (source). The PID segment defines an existing or new patient record to merge into (destination).

MSH Message Header

PID Patient Identification

MRG Merge Information

See the section above titled **Merging** for details on what transpires in a merge.

PATIENT WORKLIST MESSAGING

The Patient Worklist Messaging function is the standard operation to create patient worklist entries for Connext Mobile. This is done using ADT^A14 messaging. A worklist entry is created using the Patient Account Number (PID-18) as the encounter number. If the Patient Account Number is not found, no worklist entry is created.

The following is the default ADT Worklist message Synapse VNA supports:

- ADT^A14 –Pending Admit – creates a Patient Worklist entry and a patient if one does not exist
- ADT^A03 –Discharge Patient –removes the Patient Worklist entry; does not remove the patient

Patient Worklist Messaging uses the MSH PID, PV1, and DG1 segments, all other segments are ignored.

MSH Message Header

PID Patient Identification

[PV1 Visit]

[DG1 Diagnosis]

The worklist description is taken first from Diagnosis Description (DG1-4), if that is empty from the patient birthplace (PID-23), and If that is empty, left blank. The worklist date/time is taken first from Diagnosis Date/Time (DG1-5), if that is empty from admit date/time (PV1-4], and if that is empty from the system date/time.

A03 uses standard algorithms to find a patient (PID, MPI) and then deletes all worklist entries for that patient. It does no other patient operation.

CHANGING PATIENT ID OR MPI MESSAGING

Synapse VNA accepts messages which change either the MPI (ADT^A46) or the Patient ID (ADT^A47) in a patient record. These messages are generated by the system of record which manages patient records. This is typically the HIS. In some installations, this role may be played by a departmental information system (that is, CVIS, RIS).

The messages use the MRG segment to find a specific patient record. The messages use the PID segment to supply the new MPI or Patient ID value. Synapse VNA's processing of each is identical except for the type of identifier being changed:

ADT^A46–Change MPI ID

- The message finds the patient record by using the MPI from the MRG-4 field. Then the patient record's MPI is changed to PID-2 value.

ADT^A47 –Change Patient ID

- The message finds the patient record using the Patient ID(s) found in the MRG-1 field. Then the patient record's Patient ID(s) is changed to the values found in the PID-3 field.

Only the MSH, PID and MRG segments of this `message` are processed, all other segments are ignored. Also, these messages do not use or change any demographic information.

MSH Message Header

PID Patient Identification

MRG Merge Information

ORDERS MESSAGING

The Synapse VNA HL7 implementation can receive HL7 order messages (ORM^O01). The message creates a new Patient (PATIENT_T record) if the patient named in the PID segment does not exist.

- ORM^O01 – General Order Message

Order messaging implements three ORC Control Codes. Any other control codes are ignored and the message is acknowledged.

ORC	Description
NW:	Stores a new order.
CA:	Deletes an order from Synapse VNA's database.
XO:	Changes the accession number of a study and an optional matching order. This control code requires a Study UID from the ZDS segment.

Only the MSH, PID, ORC, OBR, and ZDS segments of these messages are processed. All other segments are ignored.

Note: The ORC, OBR segments may repeat. Each repetition creates an order.

```
MSH  Message Header
PID  Patient Identification
{
ORC          Order Control
OBR (Order)  Order Information
}
[
      ZDS  Study UID
]
```

SR Results Messaging

A SR results message conveys the results of the interpretation text from an examination of an imaging study. Internally, Synapse VNA converts the interpretation (or diagnostic report) into a DICOM Structured Report (SR).

The message creates a new Patient (PATIENT_T record) if the patient record named in the PID segment does not exist in the database. Otherwise an update of the found patient's identifiers and demographics is performed using the same logic as in the Patient Demographics Messaging. The message creates a Study (STUDY_T record) if the study's accession number contained in the OBR does not exist.

This DICOM Structured Report is stored within a new series of the study. Synapse VNA creates UIDs for the series and image. If the ZDS segment is present, it supplies the study UID; otherwise Synapse VNA creates that UID.

Results messaging handles the following message:

- ORU^R01 – Observation Results, MSH-3 set to **SRTEXT**

Resulting messaging differs for all other HL7 message in that it creates a DICOM SR Image. See SR HL7 to DICOM Mapping for the mapping of the HL7 fields to the DICOM SR Image.

```
MSH  Message Header
PID  Patient Identification
[
      PV1  Visit
]
OBR (Study)  Study Information
{
      OBX (SR Text)
}
[
ZDS  Study UID
]
```

Note: The standard Synapse VNA processing expects a separate OBX line for each line in the report, including blank lines. It can also use text that includes tildes (~) in the OBX segment to denote a line break.

NON-DICOM FILE IMPORT MESSAGING

A Non-DICOM File Import message tells Synapse VNA to import the contained, Base-64 encoded file into its non-DICOM archives. This message uses the following:

- ORU^R01 – Observation Results, MSH-3 set to **IMPORT_FILE**

If the patient record named in the PID segment does not exist, the message creates a new Patient (PATIENT_T record). Otherwise an update of the found patient record's identifiers and demographics is performed using the same logic as in the Patient Demographics Messaging.

If the study's accession number contained in the OBR does not exist, the message creates a Study (STUDY_T record).

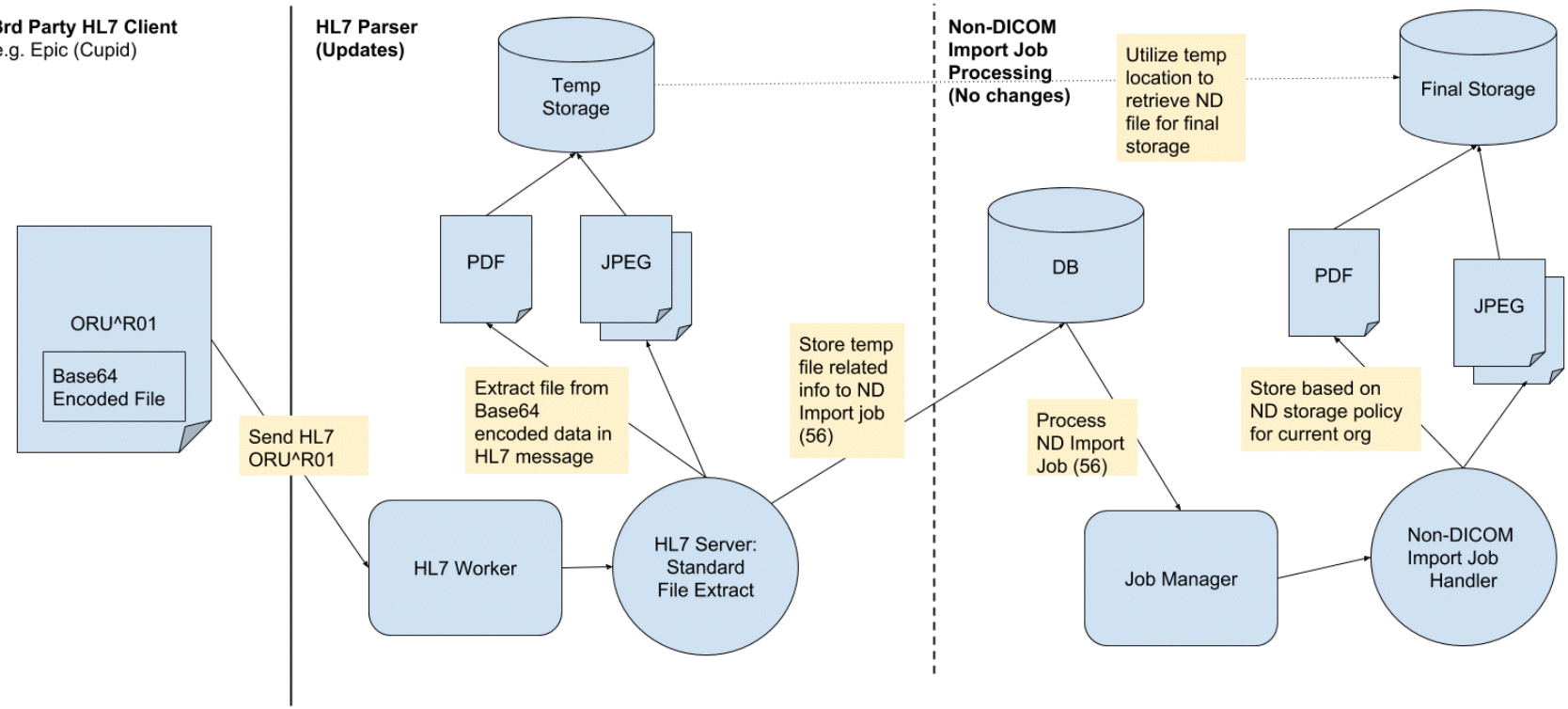
Synapse VNA uses a separate OBX segment for each file to be imported.

The maximum file size to import via this method is 10MB – if larger files are needed, use a Non-DICOM File Upload message.

An instance of **NonDicomImportJobHandler** job is created to do the actual upload. This job must be able to access the path to the non-DICOM files' location.

```
MSH  Message Header
PID  Patient Identification
[
      PV1  Visit
]
OBR (Study)  Study Information
{
      OBX (File Import)
}
```

WORKFLOW


3rd Party HL7 Client
e.g. Epic (Cupid)
HL7 Parser
(Updates)
Non-DICOM
Import Job
Processing
(No changes)
Temp
Storage
Utilize temp
location to
retrieve ND
file for final
storage
Final Storage
PDF
JPEG
DB
PDF
JPEG
ORU^R01
Base64
Encoded File
Send HL7
ORU^R01
Extract file from
Base64
encoded data in
HL7 message
Store temp
file related
info to ND
Import job
(56)
Process
ND Import
Job (56)
Store based on
ND storage policy
for current org
HL7 Worker
HL7 Server:
Standard
File Extract
Job Manager
Non-DICOM
Import Job
Handler

NON-DICOM FILE UPLOAD MESSAGING

A Non-DICOM File Upload message tells Synapse VNA to upload the named file(s) into its non-DICOM archives. This message uses the following:

- ORU^R01 – Observation Results, MSH-3 set to **UPLOAD**

The message creates a new Patient (PATIENT_T record) if the patient record named in the PID segment does not exist. Otherwise an update of the found patient record's identifiers and demographics is performed using the same logic as in the Patient Demographics Messaging.

The message creates a Study (STUDY_T record) if the study's accession number contained in the OBR does not exist.

Synapse VNA uses a separate OBX segment for each file to be uploaded, using either http:// notation (http://host/dir1/dir2/thefile.pdf) or UNC notation (//host/dir1/dir2/thefile.pdf).

An instance of **NonDicomImportJobHandler** job is created to do the actual upload. This job must be able to access the path to the non-DICOM files' location.

```
MSH  Message Header
PID  Patient Identification
[
      PV1  Visit
]
OBR (Study)  Study Information
{
      OBX (File Upload)
}
```

IMAGE DELETE MESSAGING

In some Enterprises, external systems decide that patient studies, series, or images should be deleted from the archive. Sending HL7 messages, with special extensions, is a method of informing Synapse VNA of these decisions.

The Image Delete messaging is a message which allows an external information system to notify Synapse VNA that

- a set of images for a study should be deleted;
- an entire series for a study should be deleted;
- an entire study should be deleted.

The Image Delete implementation handles the following messages:

- ORU^R01 – Observation Results, MSH-3 set to **DELETE**

Only the MSH, PID and Z01 segments of this message are processed. All other segments are ignored. The PID segment is parsed and used to find the patient record for the studies named in the Z01 segments. The Z01 segments supply the UIDs for the study and optionally for the series and specified images.

All the logic is based on the UIDs in the Z01 segments.

Multiple Z01 segments are allowed and are processed independently of each other.

```
MSH  Message Header
PID  Patient Identification
{
  Z01 Study[, Series[, Image] UIDs
}
```

EPIC FHIR SUPPORT MESSAGING

Note: These messages only work for content stored via FHIR.

The FHIR (Fast Healthcare Interoperability Resources) support messaging consists of two message types that are used for managing content stored via FHIR in the VNA. The messages are MDM^T08 (Update instance) and MDM^T11 (Delete instance).

MDM^T08 is used to update the patient or encounter of a non-DICOM instance stored via FHIR. This can be updating the demographics of the patient associated with the instance, or it can also associate the FHIR content with a new patient entirely.

The updated patient is found in the PID segment of the message. If this matches an existing patient (using our standard configurable match criteria - PID, MPI, or both), the demographics of the patient will be updated from the PID segment.

This new patient will be created (if needed), similar to how a normal ADT message works. The patient is created with the information in the PID segment. After this patient operation is completed, the message then associates the referenced non-DICOM instance with this patient. The document reference is found in OBX 5.1, and refers to the Document Reference ID that Epic received when Epic stored this content via FHIR.

There are three use cases for this update.

1. The content is already associated with the correct patient: We update the encounter number if one is present in PV1-19, do nothing further and are finished.
2. The content is stored in a folder by itself, and the referenced patient is different. We move the entire folder to the referenced patient. We update the encounter number of the folder if one is present in PV1-19.
3. The content is stored in a folder with other non-DICOM instances: We create a new folder under the referenced patient with the same metadata as the original folder (name/description/encounter number/STMO/access flags) and move the referenced non-DICOM instance into that folder. If an updated encounter number is present in PV1-19, we use it for the new folder.

MDM^T11 is used for deleting a non-DICOM instance stored via FHIR. This message only looks at the contents of OBX 5.1, which is the Document Reference ID. If there are no active or pending Archive, Dispatch, or Bag Flush jobs, we delete the instance and return successfully. If there are, we are unable to delete the instance and will return AR.

Outbound HL7 Messaging

Synapse VNA supports outbound HL7 messages for notification and validation. Additional custom HL7 interfaces can be created as-needed by submitting a request to Client Services.

NOTIFICATION MESSAGING

Synapse VNA generates internal events whenever changes to its database and image archives occur. One use of these events can be to send HL7 messages with information about the event.

The next four subsections document the types of notifications available for general use. All messages create the following message type:

- ORU^R01 – Observation Results

The messages differ only in the content of the OBX segments.

For all notifications, Synapse VNA expects a general ACK message to be returned. Synapse VNA resends the message if the MSA Acknowledgment Code is not **AA.**

STUDY NOTIFICATION

For study events (such as study created, study completed, and/or study completed- repeated), Synapse VNA can be configured to send a Study Notification. Synapse VNA can also be configured to send notifications for study, series, and image copy or move operations.

Note: A study, series, or image move always creates two notifications, first a delete notification and then a study notification.

The generated message uses the following segments: MSH, PID and OBR and one or more OBX.

MSH Message Header

PID Patient Identification

OBR Study Information

{

OBX (Study Notification)

}

IMAGE DELETE NOTIFICATION

For different types of deletes (study, series, or images), Synapse VNA can be configured to send an image delete notification.

Note:	A study, series, or image move always creates two notifications, first a delete notification and then a study notification.

The generated message uses the following segments: MSH, PID and OBR and one or more OBX.

MSH Message Header

PID Patient Identification

OBR ***Study Information***

{

OBX (Image Delete)

}

EMR Viewer Study Availability Notification

For study events such as study created, study completed, and/or study completed repeated, Synapse VNA can be configured to send an EMR Viewer Study Availability Notification. This message sends a URL which can be used to view the study's DICOM images via the Synapse VNA EMR Viewer.

The generated message uses the following segments: MSH, PID OBR and an OBX.

MSH Message Header

PID Patient Identification

OBR Study Information

{

OBX (EMR)

}

EMR Viewer non-DICOM Availability Notification

For non-DICOM events, a site can be configured to send an EMR Viewer non-DICOM Availability Notification. This message sends a URL which can be used to view the study's non-DICOM files via the Synapse VNA EMR Viewer.

The generated message is the based on the same format as for EMR Viewer Study Availability Notification.

MSH Message Header

PID Patient Identification

OBR Study Information

{

OBX (EMR)

}

MDM Study Availability Notification

For study events such as study created, study completed, and/or study completed repeated, Synapse VNA can be configured to send an MDM^T02 Study Availability Notification. This message sends a URL which can be used to view the study's DICOM images via the Synapse VNA EMR Viewer.

The generated message uses the following segments: MSH, PID, TXA and an OBX.

```
MSH  Message Header
PID  Patient Identification
TXA  Transcript Document (Study)
{
      OBX (EMR)
}
```

MDM Non-DICOM Availability Notification

For a non-DICOM folder create event, Synapse VNA can be configured to send an MDM^T02 Non-DICOM Availability Notification. This message sends a URL which can be used to view the non-DICOM Folder via the Synapse VNA EMR Viewer.

The generated message uses the following segments: MSH, PID, PV1, TXA and an OBX.

```
MSH  Message Header
PID  Patient Identification
PV1  Patient Visit (EPIC CSN)
TXA  Transcript Document (Non-Dicom)
{
      OBX (EMR)
}
```

MDM Non-DICOM Instance Notification

For a non-DICOM instance create event, Synapse VNA can be configured to send an MDM^T02 Non-DICOM Availability Notification. This message sends the instance UUID which can be used to retrieve the non-DICOM instance using SOAP or REST web services.

The generated message uses the following segments: MSH, PID, PV1, TXA, and an OBX.

MSH Message Header

PID Patient Identification

PV1 Patient Visit (EPIC CSN)

TXA Transcript Document (Non-Dicom)

{

OBX (EMR)

}

MDM Non-DICOM Cancel Notification

For a non-DICOM folder delete event, Synapse VNA can be configured to send an MDM^T11 Non-DCIOM Cancel Notification.

The generated message uses the following segments: MSH, PID, PV1, and TXA.

MSH Message Header

PID Patient Identification

PV1 Patient Visit (EPIC CSN)

TXA Transcript Document (Non-Dicom)

Study Verification Messaging

Another way that Synapse VNA interacts with an external enterprise system is to verify that a C-STORE of a DICOM study has accurate patient and study information. If the verification fails, Synapse VNA assigns a QA issue to the study. The QA issue indicates a discrepancy between the data Synapse VNA received from the DICOM modality and the enterprise's data. A person from the enterprise can later resolve the QA issue.

The Study Verification messaging is a query message which is sent by Synapse VNA to the external system to validate patient and/or study.

The Study Verification messaging sends the following message:

- OSQ^Q06 – Order Status Query

The following segments are supplied: MSH and QRD.

MSH Message Header

QRD Query

The response is expected to be an OSR^Q06 with the MSH, MSA, QRD, and PID segments.

MSH Message Header

MSA Message Acknowledgement

QRD Query

PID Patient Identification

The response is used to update patient information (such as setting an MPI) if the MSA-1 is “AA”. Any other value causes the validation to fail and the study be assigned a QA issue.

Input Segment Descriptions

These are the HL7 segments that Synapse VNA receives from HL7 Sources. In each segment table, a description is provided for the usage Synapse VNA makes for the various fields that it parses. Upon request, the Synapse VNA HL7 interface can be customized to create site-specific parsing that overrides the standard usage or adds parsing for previously ignored fields.

TABLE CONVENTIONS

In the message profile tables that follow, the following conventions are used.

- Bold typeface is used for text constants.
- Shading is used to denote the following:

Synapse VNA Use	Shading
Not Used	
Optional	
Required	

The meaning of the column headings are defined below.

SEQ	LEN	DT	OPT

SEQ (Sequence within the segment): Ordinal position of the data field within the segment.

LEN (Length): Maximum number of characters that one occurrence of the data field may occupy.

DT (Data type): Describes restrictions on the contents of the data field. See Appendix A Data Types.

OPT (Optionality): Whether the field is required, optional or conditional in a segment.

- R - required
- O - optional
- C - conditional on the trigger event or on some other field(s).
- X - not used with this trigger event
- B - left in for backward compatibility with previous versions of HL7.

MSH SEGMENT (FROM CUSTOMER'S HL7 SOURCE)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	1	ST	R	Field Separator	Used by Synapse VNA as field separator.
2	4	ST	R	Encoding Characters	Used by Synapse VNA as encoding characters.
3	180	HD	O	Sending Application	Will be used for MSH-5 in Acknowledgement.
4	180	HD	O	Sending Facility	Will be used for MSH-6 in Acknowledgement, used to look up HL7Source object.
5	180	HD	O	Receiving Application	Will be used for MSH-3 in Acknowledgement.
6	180	HD	O	Receiving Facility	Will be used for MSH-4 in Acknowledgement.
7	26	TS	O	Date/Time Of Message	
8	40	ST	O	Security	
9	7	CM	R	Message Type	Determines type of message. Anything not processed is simply acknowledged.
10	20	ST	R	Message Control ID	Will be used for MSH-10, MSA-2 in Acknowledgement.
11	3	PT	R	Processing ID	Will be used for MSH-11 in Acknowledgement.
12	60	VID	R	Version ID	Will be used for MSH-12 in Acknowledgement By default, Synapse VNA requires a value of 2.3 (Despite requiring 2.3 as a value here, Synapse VNA does support other 2.x Hl7 versions: 2.1, 2.2, 2.3.1, and 2.4.
13	15	NM	O	Sequence Number	
14	180	ST	O	Continuation Pointer	
15	2	ID	O	Accept Acknowledgment Type	
16	2	ID	O	Application Acknowledgment Type	
17	2	ID	O	Country Code	
18	16	ID	O	Character Set	The first iteration is used for MSH-18 in support of single byte character sets. Multiple byte character sets are found programmatically.
19	60	CE	O	Principal Language Of Message	
20	20	ID	O	Alternate Character Set Handling Scheme	

MSH SEGMENT (ACKNOWLEDGEMENT)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	1	ST	R	Field Separator	Set to MSH-1 from client message.
2	4	ST	R	Encoding Characters	Set to MSH-2 from client message.
3	180	HD	O	Sending Application	Set to MSH-5 from client message.
4	180	HD	O	Sending Facility	Set to MSH-6 from client message.
5	180	HD	O	Receiving Application	Set to MSH-3 from client message.
6	180	HD	O	Receiving Facility	Set to MSH-4 from client message.
7	26	TS	O	Date/Time Of Message	Set to MSH-7 from client message.
8	40	ST	O	Security	
9	7	CM	R	Message Type	**ACK** or **NAK**
10	20	ST	R	Message Control ID	Set to MSH-10 from client message.
11	3	PT	R	Processing ID	Set to MSH-11 from client message.
12	60	VID	R	Version ID	Set to MSH-12 from client message.
13	15	NM	O	Sequence Number	
14	180	ST	O	Continuation Pointer	
15	2	ID	O	Accept Acknowledgment Type	Set to MSH-15 from client message.
16	2	ID	O	Application Acknowledgment Type	Set to MSH-16 from client message.
17	2	ID	O	Country Code	
18	16	ID	O	Character Set	
19	60	CE	O	Principal Language Of Message	

MSA SEGMENT

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	2	ID	R	Acknowledgment Code	Set to **AA, AE**, or **AR**.
2	20	ST	R	Message Control ID	Set to MSH-10 from client message.
3	80	ST	O	Text Message	If AE or AR, has text describing error.
4	15	NM	O	Expected Sequence Number	
5	1	ID	B	Delayed Acknowledgment Type	
6	250	CE	O	Error Condition	

PID SEGMENT

This segment provides the data that Synapse VNA records in its PATIENT_T and PATIENT_ID_T tables.

Note: The Patient Account Field is stored as a part of the ORDER_T table.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PID	
2	20	CX	B	Patient ID	Used to find existing patient if MPI ID is in criteria list. Matches against *PATIENT_T.MPI_ID* (PID-2, 1 only). Stored as MPI ID if new patient.
3	20	CX	R	Patient Identifier List	Used to find existing patient if MEDICAL_ID is in criteria list. The match is against *PATIENT_ID_T.MEDICAL_ID* (PID-3, 1) and *PATIENT_ID_T.ID_TYPE* (PID-3, 4). If ID type subfield is blank, uses ID type from selected context. The parsing supports multiple IDs separated by tildes (~). The ID types must all be different. Only one needs to match to select a patient. Stored as new *PATIENT_ID_T* entries if new patient.
4	20	CX	B	Alternate Patient ID - PID	
5	48	XPN	R	Patient Name	Stored in *PATIENT_T* if last name is non-null. First five subfields of name are stored as Last Name, First Name, Middle Name, Suffix, and Prefix. *PATIENT_T.LAST_NAME* *PATIENT_T.FIRST_NAME* *PATIENT_T.MIDDLE_NAME* *PATIENT_T.SUFFIX* *PATIENT_T.PREFIX* If a patient record already exists and the last name is present, the patient name is always assumed to be complete. Null values in any of the last four subfields will overwrite existing strings.
6	48	XPN	O	Mother's Maiden Name	
7	26	TS	O	Date/Time of Birth	Stored as Birth Date *PATIENT_T.BirthDate.*
8	1	IS	O	Sex	Stored as Gender *PATIENT_T.GENDER*.
9	48	XPN	O	Patient Alias	
10	80	CE	O	Race	Stored as Ethic Origin *PATIENT_T.ETHNIC_ORIGIN*.
11	106	XAD	O	Patient Address	
12	4	IS	B	County Code	
13	40	XTN	O	Phone Number - Home	
14	40	XTN	O	Phone Number - Business	
15	60	CE	O	Primary Language	
16	80	CE	O	Marital Status	
17	80	CE	O	Religion	
18	20	CX	O	Patient Account Number	First as encounter number for worklist messaging (ADT^A14) and is stored in *PATIENT_WORKLIST_T.ENCOUNTER_NUMBER* If no value. A random encounter number is generated. Second use is for order message (ORM^O01), the value is stored as *ORDER_T.PATIENT_ACCOUNT_NUMBER.*

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
19	16	ST	B	SSN Number - Patient	
20	25	DLN	O	Driver's License Number - Patient	
21	20	CX	O	Mother's Identifier	
22	80	CE	O	Ethnic Group	
23	60	ST	O	Birth Place	
24	1	ID	O	Multiple Birth Indicator	
25	2	NM	O	Birth Order	
26	80	CE	O	Citizenship	
27	60	CE	O	Veterans Military Status	
28	80	CE	O	Nationality	
29	26	TS	O	Patient Death Date and Time	
30	1	ID	O	Patient Death Indicator	

MRG SEGMENT

This segment selects the source patient for Merge (A18, A34, A40) and Fix (A46, A47).

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	20	CX	R	Prior Patient Identifier List	Used to find existing patient record if MEDICAL_ID is in criteria list. The match is against *PATIENT_ID_T.MEDICAL_ID* (MRG-1,1) and *PATIENT_ID_T.ID_TYPE* (MRG-1,4), If ID type subfield is blank, uses ID type from selected context. The parsing supports multiple IDs separated by tildes (~). The ID types must all be different. Only one needs to match to select a patient record.
2	20	CX	O	Prior Alternate Patient ID	
3	20	CX	O	Prior Patient Account Number	
4	20	CX	O	Prior Patient ID	Used to find existing patient record if MPI_ID is in criteria list. Matches against *PATIENT_T.MPI_ID* (subfield 4, 1 only).
5	20	CX	O	Prior Visit Number	
6	20	CX	O	Prior Alternate Visit ID	
7	48	XPN	O	Prior Patient Name	

ORC SEGMENT

This segment is only used to control how an order is processed. Control codes other than those listed, result in the message being acknowledged and ignored.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	2	ID	R	Order Control	**NW** (Create order), **CA** (Cancel order), or **XO** (change study and order accession number). Stored in *ORDER_T.CONTROL_CODE*. For any other control codes, make no changes to the database and just acknowledge the message.
2	22	EI	C	Placer Order Number	
3	22	EI	C	Filler Order Number	
4	22	EI	O	Placer Group Number	
5	2	ID	O	Order Status	
6	1	ID	O	Response Flag	
7	200	TQ	O	Quantity/Timing	
8	200	CM	O	Parent	
9	26	TS	O	Date/Time of Transaction	
10	250	XCN	O	Entered By	
11	250	XCN	O	Verified By	
12	250	XCN	O	Ordering Provider	
13	80	PL	O	Enterer's Location	
14	250	XTN	O	Call Back Phone Number	
15	26	TS	O	Order Effective Date/Time	
16	250	CE	O	Order Control Code Reason	
17	250	CE	O	Entering Organization	
18	250	CE	O	Entering Device	
19	250	XCN	O	Action By	
20	250	CE	O	Advanced Beneficiary Notice Code	
21	250	XON	O	Ordering Facility Name	
22	250	XAD	O	Ordering Facility Address	
23	250	XTN	O	Ordering Facility Phone Number	
24	250	XAD	O	Ordering Provider Address	
25	250	CWE	O	Order Status Modifier	

OBR SEGMENT (ORDER)

This segment provides the data that Synapse VNA records in the *ORDER_T table*. This table applies to messages which create orders (ORM^O01).

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID -OBR	
2	22	EI	C	Placer Order Number	Stored in *ORDER_T.ORDER_ID*
3	22	EI	C	Filler Order Number	Stored in *ORDER_T.ACCESSION_NUMBER.* The context's STMO supplies *ORDER_T.ID_TYPE* **Note**: While not required per the DICOM standard, this is required by Synapse VNA for proper operation.
4	200	CE	R	Universal Service ID	VNA Combines 4,1 (Exam ID) and 4,2 (Exam Description) and stores them in ORDER_T.EXAM_ID_DESCRIPTION as EXAM_ID^EXAM_DESCRIPTION.
5	2	ID	X	Priority	
6	26	TS	X	Requested Date/Time	Stored in *ORDER_T.OBSERVATION_DATE*, if not present store current date/time
7	26	TS	C	Observation Date/Time #	
8	26	TS	O	Observation End Date/Time #	
9	20	CQ	O	Collection Volume	
10	60	XCN	O	Collector Identifier	
11	1	ID	O	Specimen Action Code	
12	60	CE	O	Danger Code	
13	300	ST	O	Relevant Clinical Info.	
14	26	TS	C	Specimen Received Date/Time	
15	300	CM	O	Specimen Source	
16	80	XCN	O	Ordering Provider	
17	40	XTN	O	Order Callback Phone Number	
18	60	ST	O	Placer Field 1	
19	60	ST	O	Placer Field 2	
20	60	ST	O	Filler Field 1	
21	60	ST	O	Filler Field 2	
22	26	TS	C	Results Rpt/Status Chng - Date/Time	
23	40	CM	O	Charge to Practice	
24	10	ID	O	Diagnostic Serv Sect ID	
25	1	ID	C	Result Status	
26	400	CM	O	Parent Result	
27	200	TQ	O	Quantity/Timing	
28	150	XCN	O	Result Copies To	
29	200	CM	O	Parent	
30	20	ID	O	Transportation Mode	
31	300	CE	O	Reason for Study	
32	200	CM	O	Principal Result Interpreter	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
33	200	CM	O	Assistant Result Interpreter	
34	200	CM	O	Technician	
35	200	CM	O	Transcriptionist	
36	26	TS	O	Scheduled Date/Time	
37	4	NM	O	Number of Sample Containers	
38	60	CE	O	Transport Logistics of Collected Sample	
39	200	CE	O	Collector's Comment	
40	60	CE	O	Transport Arrangement Responsibility	
41	30	ID	O	Transport Arranged	
42	1	ID	O	Escort Required	
43	200	CE	O	Planned Patient Transport Comment	
44	80	CE	O	Procedure Code	
45	80	CE	O	Procedure Code Modifier	

OBR SEGMENT (STUDY)

This segment provides the data that Synapse VNA records in its STUDY_T table. This table applies to messages which create a study if needed: SR Results and Non-DICOM File Upload.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID -OBR	
2	22	EI	C	Placer Order Number	
3	22	EI	C	Filler Order Number	Stored in *ACCESSION_NUMBER_T.ACCESSION_NUMBER*. The context's STMO is *ACCESSION_NUMBER_T.ID_TYPE.* **Note**: While not required per the DICOM standard, this is required by Synapse VNA for proper operation.
4	200	CE	R	Universal Service ID	The exam ID (OBR-4, 1) is required and is stored in *STUDY_T.PROC_CODE_VALUE*. The exam description (OBR-4, 2) is stored *in STUDY_T.DESCRIPTION*.
5	2	ID	X	Priority	
6	26	TS	X	Requested Date/Time	Stored in *STUDY_T.PERFORMED_DATE_TIME* if OBR-7 is empty. If not present, no date is stored.
7	26	TS	C	Observation Date/Time #	Stored in *STUDY_T.PERFORMED_DATE_TIME*. If not present, use OBR-6.
8	26	TS	O	Observation End Date/Time #	
9	20	CQ	O	Collection Volume	
10	60	XCN	O	Collector Identifier	
11	1	ID	O	Specimen Action Code	
12	60	CE	O	Danger Code	
13	300	ST	O	Relevant Clinical Info.	
14	26	TS	C	Specimen Received Date/Time	
15	300	CM	O	Specimen Source	
16	80	XCN	O	Ordering Provider	If present, stored OBR-16, 2 to OBR-16, 6 as the requesting physician name, stored as record in *PERSON_T* table and linked by *STUDY_T REQUESTING_PHYSICIAN_FK.*
17	40	XTN	O	Order Callback Phone Number	
18	60	ST	O	Placer Field 1	
19	60	ST	O	Placer Field 2	
20	60	ST	O	Filler Field 1	For Non-DICOM File Upload, if present, this field will be stored as the Non-DICOM folder name.
21	60	ST	O	Filler Field 2	
22	26	TS	C	Results Rpt/Status Chng - Date/Time	
23	40	CM	O	Charge to Practice	
24	10	ID	O	Diagnostic Serv Sect ID	
25	1	ID	C	Result Status	If present, used for the result status of Final (**F),** preliminary (**P**) or addendum (**A**). • If **F** and this is an SR Results message, the created series description will be set to 'Finalized Report'. • If **P** and this is an SR Results message, the created series description will be set to 'Preliminary Report'. • If **A** and this is an SR Results message, the created series description will be set to 'Finalized Addendum'.

OBR Segment (Study)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
26	400	CM	O	Parent Result	
27	200	TQ	O	Quantity/Timing	
28	150	XCN	O	Result Copies To	
29	200	CM	O	Parent	
30	20	ID	O	Transportation Mode	
31	300	CE	O	Reason for Study	
32	200	CM	O	Principal Result Interpreter	
33	200	CM	O	Assistant Result Interpreter	
34	200	CM	O	Technician	
35	200	CM	O	Transcriptionist	
36	26	TS	O	Scheduled Date/Time	
37	4	NM	O	Number of Sample Containers	
38	60	CE	O	Transport Logistics of Collected Sample	
39	200	CE	O	Collector's Comment	
40	60	CE	O	Transport Arrangement Responsibility	
41	30	ID	O	Transport Arranged	
42	1	ID	O	Escort Required	
43	200	CE	O	Planned Patient Transport Comment	
44	80	CE	O	Procedure Code	
45	80	CE	O	Procedure Code Modifier	

PV1 SEGMENT

This segment shows information about the visit. It is used by the study message to supply the referring physician.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PV1	
2	1	IS	R	Patient Class	
3	80	PL	O	Assigned Patient Location	
4	2	IS	O	Admission Type	
5	250	CX	O	Preadmit Number	
6	80	PL	O	Prior Patient Location	
7	250	XCN	O	Attending Doctor	
8	250	XCN	O	Referring Doctor	Stores PV1—8, 2 to PV1 8, 6 as the referring physician name, if present stored as record in *PERSON_T* table and linked by *STUDY_T* REFERRING_*PHYSICIAN_FK.*
9	250	XCN	B	Consulting Doctor	
10	3	IS	O	Hospital Service	
11	80	PL	O	Temporary Location	
12	2	IS	O	Preadmit Test Indicator	
13	2	IS	O	Re-admission Indicator	
14	6	IS	O	Admit Source	
15	2	IS	O	Ambulatory Status	
16	2	IS	O	VIP Indicator	
17	250	XCN	O	Admitting Doctor	
18	2	IS	O	Patient Type	
19	250	CX	O	Visit Number	
20	50	FC	O	Financial Class	
21	2	IS	O	Charge Price Indicator	
22	2	IS	O	Courtesy Code	
23	2	IS	O	Credit Rating	
24	2	IS	O	Contract Code	
25	8	DT	O	Contract Effective Date	
26	12	NM	O	Contract Amount	
27	3	NM	O	Contract Period	
28	2	IS	O	Interest Code	
29	1	IS	O	Transfer to Bad Debt Code	
30	8	DT	O	Transfer to Bad Debt Date	
31	10	IS	O	Bad Debt Agency Code	
32	12	NM	O	Bad Debt Transfer Amount	
33	12	NM	O	Bad Debt Recovery Amount	
34	1	IS	O	Delete Account Indicator	
35	8	DT	O	Delete Account Date	
36	3	IS	O	Discharge Disposition	
37	25	CM	O	Discharged to Location	
38	250	CE	O	Diet Type	
39	2	IS	O	Servicing Facility	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
40	1	IS	B	Bed Status	
41	2	IS	O	Account Status	
42	80	PL	O	Pending Location	
43	80	PL	O	Prior Temporary Location	
44	26	TS	O	Admit Date/Time	
45	26	TS	O	Discharge Date/Time	
46	12	NM	O	Current Patient Balance	
47	12	NM	O	Total Charges	
48	12	NM	O	Total Adjustments	
49	12	NM	O	Total Payments	
50	250	CX	O	Alternate Visit ID	
51	1	IS	O	Visit Indicator	
52	250	XCN	B	Other Healthcare Provider	

OBX SEGMENT (FILE UPLOAD)

This is the OBX format for the non-DICOM file upload message. Use one OBX RP segment for each file.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Incrementing value starting at 1.
2	3	ID	C	Value Type	Set to **RP** to get filename from OBX 5. Otherwise the segment is ignored. Typically other values are **FT**, **ST**, or **TX**. The value must be a legal HL7 non-blank datatype or a negative acknowledgement is returned stating the field is in error.
3	80	CE	C	Observation Identifier	
4	20	ST	C	Observation Sub-ID	
5	x	*	C	Observation Value	Set to filename to upload. Name is either in HTTP notation (string starts with “http://”) or UNC notation (everything else). Multiple files to upload can be specified by using multiple OBX segments. No tildes (~) can be used. The field may be left blank.
6	60	CE	O	Units	
7	60	ST	O	References Range	
8	5	ID	O	Abnormal Flags	
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	C	Observation Result Status	
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	
14	26	TS	O	Date/Time of the Observation	
15	60	CE	O	Producer's ID	
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	

OBX SEGMENT (FILE IMPORT)

This is the OBX format for the non-DICOM file import message. Use one OBX segment for each file.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Incrementing value starting at 1.
2	3	ID	C	Value Type	Set to **ED** for file import.
3	80	CE	C	Observation Identifier	Set to filename with valid extension.
4	20	ST	C	Observation Sub-ID	
5	x	*	C	Observation Value	OBX 5,1 ignored, 5,2 ignored, 5,3 ignored, 5,4 set to encoding type (base64), 5.5 set to Base-64 encoded data.
6	60	CE	O	Units	
7	60	ST	O	References Range	
8	5	ID	O	Abnormal Flags	
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	C	Observation Result Status	
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	
14	26	TS	O	Date/Time of the Observation	
15	60	CE	O	Producer's ID	
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	

OBX SEGMENT (SR TEXT)

This is the OBX format for the SR Text message.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Incrementing value starting at 1.
2	3	ID	C	Value Type	Set to **TX, ST,** or **FT** to get text from OBX 5. Otherwise the segment is ignored. Typically other value is **RP**. The value must be a legal HL7 non-blank datatype or a negative acknowledgement is returned stating the field is in error.
3	80	CE	C	Observation Identifier	
4	20	ST	C	Observation Sub-ID	
5	x	*	C	Observation Value	Text line and/or lines separated by tildes (~). A blank field signifies a blank line in the text.
6	60	CE	O	Units	
7	60	ST	O	References Range	
8	5	ID	O	Abnormal Flags	
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	C	Observation Result Status	
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
14	26	TS	O	Date/Time of the Observation	
15	60	CE	O	Producer's ID	
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	

ZDS SEGMENT

This segment is required in an Order XO operation.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	200	RP	R	Study UID	Used to lookup study for XO operation. This segment is also optionally used to define the Study_UID for SR Result Messages (ORU).(See SR Results Messaging.)

Z01 SEGMENT

This segment is only used in an Image Delete message. It holds the Study or Series or Image UIDs to be deleted.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	20	RP	R	Study UID	Study UID in the form of UID^ **Study UID^Application^DICOM.** The last three subfields are fixed strings that must be used.
2	20	ST	R	Requested Action	Value one of **DELSTD**, **DELSER**, or **DELIMG.**
3	20	RP	O	Series Instance UID	Series UID in the form of UID^ **Series UID^Application^DICOM.** The last three subfields are fixed strings that must be used. Required if Requested Action is **DELSER** or **DELIMG**.
4	20	ST	O	SOP Instance UID	SOP Instance UID. Multiple SOPs can be specified using HL7 repeat (~). Required if Requested Action is **DELIMG**.

Output Segment Descriptions (from Synapse VNA)

TABLE CONVENTIONS

In the message profile tables that follow, the following conventions are used.

- Bold typeface is used for text constants.
- Shading is used to denote the following:

Synapse VNA Use	Shading
Not Used	
Optional	
Required	

The meaning of the column headings are defined below.

SEQ	LEN	DT	OPT

SEQ (Sequence within the segment): Ordinal position of the data field within the segment.

LEN (Length): Maximum number of characters that one occurrence of the data field may occupy.

DT (Data type): Describes restrictions on the contents of the data field. See Appendix A Data Types.

OPT (Optionality): Whether the field is required, optional or conditional in a segment.

- R - required
- O - optional
- C - conditional on the trigger event or on some other field(s).
- X - not used with this trigger event

B - left in for backward compatibility with previous versions of HL7.

MSH SEGMENT

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	1	ST	R	Field Separator	
2	4	ST	R	Encoding Characters	
3	180	HD	O	Sending Application	From SendingApplication attribute in the HL7Client object.
4	180	HD	O	Sending Facility	From Sending Facility attribute in the HL7Client object.
5	180	HD	O	Receiving Application	From Receiving Application attribute in the HL7Client object.
6	180	HD	O	Receiving Facility	From ReceivingFacility attribute in in the HL7Client object.
7	26	TS	O	Date/Time Of Message	
8	40	ST	O	Security	
9	7	CM	R	Message Type	Set to **ORU^R01.**
10	20	ST	R	Message Control ID	Set to incrementing number.
11	3	PT	R	Processing ID	Set to **P.**
12	60	VID	R	Version ID	**Set to 2.3 by default.** If a site jar is used to implement other protocol versions, that version is used here.
13	15	NM	O	Sequence Number	
14	180	ST	O	Continuation Pointer	
15	2	ID	O	Accept Acknowledgment Type	Set to **AL**
16	2	ID	O	Application Acknowledgment Type	Set to **NE**
17	2	ID	O	Country Code	
18	16	ID	O	Character Set	Starts with single byte decoding, if ISO-2022 is detected then marked as separate field entry.
19	60	CE	O	Principal Language Of Message	
20	20	ID	O	Alternate Character Set Handling Scheme	

PID SEGMENT

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PID	
2	20	CX	B	Patient ID	
3	20	CX	R	Patient Identifier List	From *PATIENT_ID_T.MEDICAL_ID* (subfield 3,1) and *PATIENT_ID_T.ID_TYPE* (subfield 3,4). If there are multiple patient ID', each is separated by a tilde (~).
4	20	CX	B	Alternate Patient ID - PID	
5	48	XPN	R	Patient Name	From *PATIENT_T.* *PATIENT_T.LAST_NAME^* *[PATIENT_T.FIRST_NAME]^* *[PATIENT_T.MIDDLE_NAME]^* *[PATIENT_T.SUFFIX]^* *[PATIENT_T.PREFIX]*
6	48	XPN	O	Mother's Maiden Name	
7	26	TS	O	Date/Time of Birth	From [*PATIENT_T.BIRTH_DATE*]
8	1	IS	O	Sex	From [*PATIENT_T.GENDER*]
9	48	XPN	O	Patient Alias	
10	80	CE	O	Race	From [*PATIENT_T.ETHNIC_ORIGIN*]

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
11	106	XAD	O	Patient Address	
12	4	IS	B	County Code	
13	40	XTN	O	Phone Number - Home	
14	40	XTN	O	Phone Number - Business	
15	60	CE	O	Primary Language	
16	80	CE	O	Marital Status	
17	80	CE	O	Religion	
18	20	CX	O	Patient Account Number	From *[ORDER_T.PATIENT_ACCOUNT_NUMBER],* if Order mapped for Study.
19	16	ST	B	SSN Number - Patient	
20	25	DLN	O	Driver's License Number - Patient	
21	20	CX	O	Mother's Identifier	
22	80	CE	O	Ethnic Group	
23	60	ST	O	Birth Place	
24	1	ID	O	Multiple Birth Indicator	
25	2	NM	O	Birth Order	
26	80	CE	O	Citizenship	
27	60	CE	O	Veterans Military Status	
28	80	CE	O	Nationality	
29	26	TS	O	Patient Death Date and Time	
30	1	ID	O	Patient Death Indicator	

OBR SEGMENT

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID -OBR	Set to **1.**
2	22	EI	C	Placer Order Number	From *ACCESSION_NUMBER_T.ACCESSION_NUMBER.*
3	22	EI	C	Filler Order Number	If Order mapped for Study, set fields to *ORDER_T.ORDER_ID.*
4	200	CE	R	Universal Service ID	If Order mapped for Study, set fields 4.1, 4.2 to *ORDER_T.EXAM_ID_DESCRIPTION* (which is in form of exam id^description^StudyDesc). Otherwise, set fields 4^1, 4^2 to ^*STUDY_T.DESCRIPTION* In either case, Synapse VNA always appends "^StudyDesc" as OBR-4, 3.
5	2	ID	X	Priority	
6	26	TS	X	Requested Date/Time	Set to *STUDY_T.PERFORMED_DATE_TIME.*
7	26	TS	C	Observation Date/Time #	Set to *STUDY_T.PERFORMED_DATE_TIME.*
8	26	TS	O	Observation End Date/Time #	
9	20	CQ	O	Collection Volume	
10	60	XCN	O	Collector Identifier	
11	1	ID	O	Specimen Action Code	
12	60	CE	O	Danger Code	
13	300	ST	O	Relevant Clinical Info.	
14	26	TS	C	Specimen Received Date/Time	
15	300	CM	O	Specimen Source	
16	80	XCN	O	Ordering Provider	Set to [*STUDY_T.REFERRING_PHYSICIAN*].
17	40	XTN	O	Order Callback Phone Number	
18	60	ST	O	Placer Field 1	
19	60	ST	O	Placer Field 2	
20	60	ST	O	Filler Field 1	
21	60	ST	O	Filler Field 2	
22	26	TS	C	Results Rpt/Status Chng - Date/Time	
23	40	CM	O	Charge to Practice	
24	10	ID	O	Diagnostic Serv Sect ID	Set to comma delimited list of series modalities – {*SERIES_T.MODALITY*}.
25	1	ID	C	Result Status	
26	400	CM	O	Parent Result	
27	200	TQ	O	Quantity/Timing	
28	150	XCN	O	Result Copies To	
29	200	CM	O	Parent	
30	20	ID	O	Transportation Mode	
31	300	CE	O	Reason for Study	
32	200	CM	O	Principal Result Interpreter	
33	200	CM	O	Assistant Result Interpreter	
34	200	CM	O	Technician	
35	200	CM	O	Transcriptionist	
36	26	TS	O	Scheduled Date/Time	
37	4	NM	O	Number of Sample Containers	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
38	60	CE	O	Transport Logistics of Collected Sample	
39	200	CE	O	Collector's Comment	
40	60	CE	O	Transport Arrangement Responsibility	
41	30	ID	O	Transport Arranged	
42	1	ID	O	Escort Required	
43	200	CE	O	Planned Patient Transport Comment	
44	80	CE	O	Procedure Code	
45	80	CE	O	Procedure Code Modifier	

PV1 SEGMENT (EPIC CSN)

This segment shows information about the folder (EPIC CSN)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PV1	
2	1	IS	R	Patient Class	
3	80	PL	O	Assigned Patient Location	
4	2	IS	O	Admission Type	
5	250	CX	O	Preadmit Number	
6	80	PL	O	Prior Patient Location	
7	250	XCN	O	Attending Doctor	
8	250	XCN	O	Referring Doctor	
9	250	XCN	B	Consulting Doctor	
10	3	IS	O	Hospital Service	
11	80	PL	O	Temporary Location	
12	2	IS	O	Preadmit Test Indicator	
13	2	IS	O	Re-admission Indicator	
14	6	IS	O	Admit Source	
15	2	IS	O	Ambulatory Status	
16	2	IS	O	VIP Indicator	
17	250	XCN	O	Admitting Doctor	
18	2	IS	O	Patient Type	
19	250	CX	O	Visit Number	Set to FOLDER_T.EPIC_CSN or **Not Specified** if field is null.
20	50	FC	O	Financial Class	
21	2	IS	O	Charge Price Indicator	
22	2	IS	O	Courtesy Code	
23	2	IS	O	Credit Rating	
24	2	IS	O	Contract Code	
25	8	DT	O	Contract Effective Date	
26	12	NM	O	Contract Amount	
27	3	NM	O	Contract Period	
28	2	IS	O	Interest Code	
29	1	IS	O	Transfer to Bad Debt Code	
30	8	DT	O	Transfer to Bad Debt Date	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
31	10	IS	O	Bad Debt Agency Code	
32	12	NM	O	Bad Debt Transfer Amount	
33	12	NM	O	Bad Debt Recovery Amount	
34	1	IS	O	Delete Account Indicator	
35	8	DT	O	Delete Account Date	
36	3	IS	O	Discharge Disposition	
37	25	CM	O	Discharged to Location	
38	250	CE	O	Diet Type	
39	2	IS	O	Servicing Facility	
40	1	IS	B	Bed Status	
41	2	IS	O	Account Status	
42	80	PL	O	Pending Location	
43	80	PL	O	Prior Temporary Location	
44	26	TS	O	Admit Date/Time	
45	26	TS	O	Discharge Date/Time	
46	12	NM	O	Current Patient Balance	
47	12	NM	O	Total Charges	
48	12	NM	O	Total Adjustments	
49	12	NM	O	Total Payments	
50	250	CX	O	Alternate Visit ID	
51	1	IS	O	Visit Indicator	
52	250	XCN	B	Other Healthcare Provider	

TXA SEGMENT (STUDY)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	R	Set ID -OBR	Set to **1.**
2	30	IS	R	Document Type	**STUDY**
3	2	ID	C	Document Content Presentation	**FT**
4	26	TS	O	Activity Date/Time	Set to *STUDY_T.PERFORMED_DATE_TIME.*
5	60	XCN	C	Primary Activity Provider Code/Name	**99999**
6	26	TS	O	Origination Date/Time	Set to *STUDY _T.PERFORMED_DATE_TIME.*
7	26	TS	C	Transcription Date/Time	
8	26	TS	O	Edit Date/Time	
9	60	XCN	O	Originator Code/Name	
10	60	XCN	O	Assigned Document Authenticator	
11	48	XCN	C	Transcriptionist Code/Name	
12	30	EI	R	Unique Document Number	12.3 set to *STUDY_T.STUDY_UID*
13	30	ST	C	Parent Document Number	
14	22	EI	O	Placer Order Number	
15	22	EI	O	Filler Order Number	
16	30	ST	O	Unique Document File Name	
17	2	ID	R	Document Completion Status	**DI**
18	2	ID	O	Document Confidentiality Status	**U**
19	2	ID	O	Document Availability Status	**AV**
20	2	ID	O	Document Storage Status	
21	30	ST	C	Document Change Reason	
22	60	CM	C	Authentication Person, Time Stamp	
23	60	XCN	O	Distributed Copies	

TXA SEGMENT (NON-DICOM)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	R	Set ID -OBR	Set to **1.**
2	30	IS	R	Document Type	**NONDICOM**
3	2	ID	C	Document Content Presentation	**FT**
4	26	TS	O	Activity Date/Time	Set to *FOLDER_T.CREATED_DATE_TIME.*
5	60	XCN	C	Primary Activity Provider Code/Name	**99999**
6	26	TS	O	Origination Date/Time	Set to *FOLDER_T.CREATED_DATE_TIME.*
7	26	TS	C	Transcription Date/Time	
8	26	TS	O	Edit Date/Time	
9	60	XCN	O	Originator Code/Name	
10	60	XCN	O	Assigned Document Authenticator	
11	48	XCN	C	Transcriptionist Code/Name	
12	30	EI	R	Unique Document Number	12.3 Set to *FOLDER_T.UNIQUE_ID* for folder-based notification or *NON_DICOM_INSTANCE_T.UUID* for instance-based notification.
13	30	ST	C	Parent Document Number	
14	22	EI	O	Placer Order Number	
15	22	EI	O	Filler Order Number	
16	30	ST	O	Unique Document File Name	
17	2	ID	R	Document Completion Status	**DI**
18	2	ID	O	Document Confidentiality Status	**U**
19	2	ID	O	Document Availability Status	**AV**
20	2	ID	O	Document Storage Status	
21	30	ST	C	Document Change Reason	
22	60	CM	C	Authentication Person, Time Stamp	
23	60	XCN	O	Distributed Copies	

OBX SEGMENT (STUDY)

There is an OBX Segment for each series in the Study.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Incrementing value starting at one.
2	3	ID	C	Value Type	Set to **RP.**
3	80	CE	R	Observation Identifier	Set to *STUDY_T.STUDY_UID*^**StudyUID^DICOM** [^*STUDY_T.*STUDY_ID^**StudyID^DICOM].**
4	20	ST	C	Observation Sub-ID	Set to *SERIES_T.SERIES_NUMBER.*
5	x	*	C	Observation Value	Set to *SERIES_T.SERIES_UID*^AE_TITLE^**SeriesUID^DICOM**^*SOP_INSTANCE_T(0).SOP CUID*^**SOPClass^DICOM,**
6	60	CE	O	Units	Set to number of images.
7	60	ST	O	References Range	[Set to series description].
8	5	ID	O	Abnormal Flags	[Set to series body part].
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	R	Observation Result Status	Set to **A** if study is complete; **C** if study is updated.
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	Set to **ONLINE** if study stored using online storage policy. Set to **NEARLINE** if study stored using a nearline storage policy.
14	26	TS	O	Date/Time of the Observation	[Set to series created time].
15	60	CE	O	Producer's ID	[Set to series station name].
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	Set to [*SERIES_T.MODALITY*].

OBX SEGMENT (IMAGE DELETE)

There is an OBX Segment for each series in the Study that is deleted.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Increment value starting at one.
2	3	ID	C	Value Type	**RP**
3	80	CE	R	Observation Identifier	Set to *STUDY_T.STUDY_UID*^**StudyUID^DICOM** [^*STUDY_T.*STUDY_ID^**StudyID^DICOM].**
4	20	ST	C	Observation Sub-ID	1
5	X	*	C	Observation Value	Set to *SERIES_T.SERIES_UID*^^**SeriesUID^DICOM^ ^SOPClass^DICOM.**
6	60	CE	O	Units	
7	60	ST	O	References Range	
8	5	ID	O	Abnormal Flags	
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	R	Observation Result Status	Set to **D** for delete notification.
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	
14	26	TS	O	Date/Time of the Observation	
15	60	CE	O	Producer's ID	
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	

OBX SEGMENT (EMR AND NON-DICOM ORU)

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - OBX	Set to 1.
2	3	ID	C	Value Type	Set to **RP** if configured to send EMR URL or **TX** if no URL.
3	80	CE	R	Observation Identifier	
4	20	ST	C	Observation Sub-ID	
5	x	*	C	Observation Value	Set to configured EMR Viewer. One of the variations below must be picked or a new defined directly by a customer site jar. **Note**: the two Study Key choices require that that Study Key option is enabled.
6	60	CE	O	Units	
7	60	ST	O	References Range	
8	5	ID	O	Abnormal Flags	
9	5	NM	O	Probability	
10	2	ID	O	Nature of Abnormal Test	
11	1	ID	R	Observation Result Status	Set to **F**, or **D** for non-DICOM cancel message**.**
12	26	TS	O	Date Last Obs Normal Values	
13	20	ST	O	User Defined Access Checks	
14	26	TS	O	Date/Time of the Observation	
15	60	CE	O	Producer's ID	
16	80	XCN	O	Responsible Observer	
17	60	CE	O	Observation Method	

Custom URLs can be generated when creating notifications. These create URLs specific to third-party viewers and products.

The following URLs are generated by selection from the user interface page for Univision.

All URLs start as follows:

`http[s]::CFG1_UI_T.EMR_HOST:CFG1_UI_T.EMR_PORT/contentview`

EMR (URL Decode = UID)

`/study&studyUID=STUDY_T.STUDY_UID`

EMR (URL Decode = Study Key)

`/study&studykey=EXTERNAL_KEY_T.EXTERNAL_KEY`

EMR (URL Decode = Study Key and UID)

`/study?studykey=EXTERNAL_KEY_T.EXTERNAL_KEY&studyUID=STUDY_T.STUDY_UID`

EMR (URL Decode = Patient EMR Key)

`/patient?emrkey=PATIENT_EMR_KEY_T.EMR_KEY&studyUID=STUDY_T.STUDY_UID`

Patient Folder

`/patientfolder?patientID=PATIENT_ID_T.MEDICAL_ID&idType=PATIENT_ID_T.ID_TYPE &folderName=NON_DICOM_FOLDER_T=FOLDER_NAME`

Study Folder

/studyfolder&folderName=*NON_DICOM_FOLDER_T=FOLDER_NAME*

QRD SEGMENT

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	26	TS	R	Query Date/Time	
2	1	ID	R	Query Format Code	Set to R.
3	1	ID	R	Query Priority	Set to I.
4	10	ST	R	Query ID	Set to 1.
5	1	ID	O	Deferred Response Type	
6	26	TS	O	Deferred Response Date/Time	
7	10	CQ	R	Quantity Limited Request	Set to 1.
8	60	XCN	R	Who Subject Filter	PATIENT_ID_T.MEDICAL_ID^ *PATIENT_T.LAST_NAME^* *[PATIENT_T.FIRST_NAME]^* *[PATIENT_T.MIDDLE_NAME[^* *[PATIENT_T.SUFFIX]^* *PATIENT_T.PREFIX]^* ^^^^^ PATIENT_ID_T.ID_TYPE.
9	60	CE	R	What Subject Filter	
10	60	CE	R	What Department Data Code	*ACCESSION_NUMBER_T.ACCESSION_NUMBER [^STUDY_T.STUDYUID].*
11	20	CM	O	What Data Code Value Qual.	
12	1	ID	O	Query Results Level	

SR HL7 to DICOM Mapping

The following tables show how the HL7 fields are stored into a DICOM Simple SR image.

PID-DICOM MAPPING

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PID	
2	20	CX	B	Patient ID	(0010,1000)
3	20	CX	R	Patient Identifier List	(0010,0020), (0010,0021)
4	20	CX	B	Alternate Patient ID - PID	
5	48	XPN	R	Patient Name	(00010,0010)
6	48	XPN	O	Mother's Maiden Name	
7	26	TS	O	Date/Time of Birth	(0010,0030)
8	1	IS	O	Sex	(0010,0040)
9	48	XPN	O	Patient Alias	
10	80	CE	O	Race	(0010,2160)
11	106	XAD	O	Patient Address	
12	4	IS	B	County Code	
13	40	XTN	O	Phone Number - Home	
14	40	XTN	O	Phone Number - Business	
15	60	CE	O	Primary Language	
16	80	CE	O	Marital Status	
17	80	CE	O	Religion	
18	20	CX	O	Patient Account Number	
19	16	ST	B	SSN Number - Patient	
20	25	DLN	O	Driver's License Number - Patient	
21	20	CX	O	Mother's Identifier	
22	80	CE	O	Ethnic Group	
23	60	ST	O	Birth Place	
24	1	ID	O	Multiple Birth Indicator	
25	2	NM	O	Birth Order	
26	80	CE	O	Citizenship	
27	60	CE	O	Veterans Military Status	
28	80	CE	O	Nationality	
29	26	TS	O	Patient Death Date and Time	
30	1	ID	O	Patient Death Indicator	

PV1-DICOM MAPPING

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID - PV1	
2	1	IS	R	Patient Class	
3	80	PL	O	Assigned Patient Location	
4	2	IS	O	Admission Type	
5	250	CX	O	Preadmit Number	
6	80	PL	O	Prior Patient Location	
7	250	XCN	O	Attending Doctor	
8	250	XCN	O	Referring Doctor	(0008,0090) Referring physician
9	250	XCN	B	Consulting Doctor	
10	3	IS	O	Hospital Service	
11	80	PL	O	Temporary Location	
12	2	IS	O	Preadmit Test Indicator	
13	2	IS	O	Re-admission Indicator	
14	6	IS	O	Admit Source	
15	2	IS	O	Ambulatory Status	
16	2	IS	O	VIP Indicator	
17	250	XCN	O	Admitting Doctor	
18	2	IS	O	Patient Type	
19	250	CX	O	Visit Number	
20	50	FC	O	Financial Class	
21	2	IS	O	Charge Price Indicator	
22	2	IS	O	Courtesy Code	
23	2	IS	O	Credit Rating	
24	2	IS	O	Contract Code	
25	8	DT	O	Contract Effective Date	
26	12	NM	O	Contract Amount	
27	3	NM	O	Contract Period	
28	2	IS	O	Interest Code	
29	1	IS	O	Transfer to Bad Debt Code	
30	8	DT	O	Transfer to Bad Debt Date	
31	10	IS	O	Bad Debt Agency Code	
32	12	NM	O	Bad Debt Transfer Amount	
33	12	NM	O	Bad Debt Recovery Amount	
34	1	IS	O	Delete Account Indicator	
35	8	DT	O	Delete Account Date	
36	3	IS	O	Discharge Disposition	
37	25	CM	O	Discharged to Location	
38	250	CE	O	Diet Type	
39	2	IS	O	Servicing Facility	
40	1	IS	B	Bed Status	
41	2	IS	O	Account Status	
42	80	PL	O	Pending Location	
43	80	PL	O	Prior Temporary Location	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
44	26	TS	O	Admit Date/Time	
45	26	TS	O	Discharge Date/Time	
46	12	NM	O	Current Patient Balance	
47	12	NM	O	Total Charges	
48	12	NM	O	Total Adjustments	
49	12	NM	O	Total Payments	
50	250	CX	O	Alternate Visit ID	
51	1	IS	O	Visit Indicator	
52	250	XCN	B	Other Healthcare Provider	

OBR-DICOM MAPPING

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	4	SI	O	Set ID -OBR	
2	22	EI	C	Placer Order Number	
3	22	EI	C	Filler Order Number	(0008,0050)
4	200	CE	R	Universal Service ID	(0008,1030) from 4,1
5	2	ID	X	Priority	
6	26	TS	X	Requested Date/Time	(0008,0020) study date (0008,0030) study time (0008,0021) series date (0008,0031) series time (0008,0023) content date (0008,0033) content time
7	26	TS	C	Observation Date/Time #	
8	26	TS	O	Observation End Date/Time #	
9	20	CQ	O	Collection Volume	
10	60	XCN	O	Collector Identifier	
11	1	ID	O	Specimen Action Code	
12	60	CE	O	Danger Code	
13	300	ST	O	Relevant Clinical Info.	
14	26	TS	C	Specimen Received Date/Time	
15	300	CM	O	Specimen Source	
16	80	XCN	O	Ordering Provider	(0032,1032) requesting physician
17	40	XTN	O	Order Callback Phone Number	
18	60	ST	O	Placer Field 1	
19	60	ST	O	Placer Field 2	
20	60	ST	O	Filler Field 1	
21	60	ST	O	Filler Field 2	
22	26	TS	C	Results Rpt/Status Chng - Date/Time	
23	40	CM	O	Charge to Practice	
24	10	ID	O	Diagnostic Serv Sect ID	
25	1	ID	C	Result Status	
26	400	CM	O	Parent Result	
27	200	TQ	O	Quantity/Timing	
28	150	XCN	O	Result Copies To	
29	200	CM	O	Parent	
30	20	ID	O	Transportation Mode	
31	300	CE	O	Reason for Study	
32	200	CM	O	Principal Result Interpreter	
33	200	CM	O	Assistant Result Interpreter	
34	200	CM	O	Technician	
35	200	CM	O	Transcriptionist	
36	26	TS	O	Scheduled Date/Time	
37	4	NM	O	Number of Sample Containers	
38	60	CE	O	Transport Logistics of Collected Sample	

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
39	200	CE	O	Collector's Comment	
40	60	CE	O	Transport Arrangement Responsibility	
41	30	ID	O	Transport Arranged	
42	1	ID	O	Escort Required	
43	200	CE	O	Planned Patient Transport Comment	
44	80	CE	O	Procedure Code	
45	80	CE	O	Procedure Code Modifier	

ZDS SEGMENT

This segment is optional for an SR Results message.

SEQ	LEN	DT	OPT	ELEMENT NAME	SYNAPSE VNA USAGE
1	200	RP	R	Study UID	Used to lookup study for XO operation.

SAMPLE HL7 SR MESSAGE

Below is a sample SR Text message and the resulting DICOM tags created from this message.

```
MSH|^~\&|SRTEXT|RAD|CAI|RAD|20080429221736|ECH0710|ORU^R01|791597|P|2.3

PID|1|E15000aaa|E15000yxz^^^TC||DOE^JOHN^JACOB^^^||19510703|M||WHITE|Address^^Anytown^WI^00000-
0000^USA^^^Anytown|Anytown|(555)555-5555|||M||987654321|123456789|

ORC|RE||EC999999||FINAL||^^^200804290345^^STAT^^||200804292217|someID^Doe^Jane^^^^^||anotherID^Doe^Jeff
|1528^^^1500^^^^^|(888)888-8888|||

OBR|1||EC999999|X1004^X ABDOMEN FLAT KUB AND UPRIGHT VWS^^^X ABDOMEN
AP||200804290357|200804290357|||||||||28904^DONNE^DOMINIC^^^^|(888)888-
8888|EC48837371^EPIC||||200804292217|||FINAL||^|||||someID^Doe^Jane^C||200804290345|

OBX|1|ST||1|VIEW OF THE ABDOMEN |
OBX|2|ST||1||
OBX|3|ST||1|HISTORY:  Shortness of breath.  Question ileus. |
OBX|4|ST||1||
OBX|5|ST||1|FINDINGS:  Views of the abdomen are seen.  Abnormal aeration is seen at |
OBX|6|ST||1|the lung bases with bilateral pleural effusions, better seen on chest |
OBX|7|ST||1|x-ray.  Surgical clips are seen in the right upper quadrant.  A drain, |
OBX|8|ST||1|likely a surgical drain projecting over the right hemiabdomen.  There is |
OBX|9|ST||1|a large amount of stool in the colon.  Some gas-filled loops of small |
OBX|10|ST||1|bowel are also present.  No definite free intraperitoneal gas.  |
OBX|11|ST||1||
OBX|12|ST||2|Large amount of stool in the colon and some mildly distended gas-filled |
OBX|13|ST||2|loops of small bowel.  Findings are consistent with ileus.  Follow-up |
OBX|14|ST||2|recommended.|
OBX|15|ST||2||
OBX|16|ST||2|This exam was interpreted at the office of Medical Team of
OBX|17|ST||2|Anywhere, USA. |
OBX|18|ST||1||
OBX|19|ST||1|Dictated by:              Jane Doe|
OBX|20|ST||1|Electronically Signed by: Jane Doe|
```

The translation from HL7 to DICOM Text SR is easiest to show by looking at the HL7 message and the resulting DICOM image.

Tag		Value	Description	Source
0002,0002	UI	1.2.840.10008.5.1.4.1.1.88.11	Media Storage SOP Class UID	constant
0002,0003	UI	1.2.840.114302.2886781273.1266960738264.144.30003	Media Storage SOP Instance UID	constant
0002,0010	UI	1.2.840.10008.1.2.1	Transfer Syntax UID	constant
0002,0012	UI	1.2.40.0.13.1.1	Implementation Class UID	constant
0002,0013	SH	dcm4che-1.4.17	Implementation Version Name	constant
0008,0005	CS	ISO_IR 100	Specific Character Set	constant
0008,0016	UI	1.2.840.10008.5.1.4.1.1.88.11	SOP Class UID	constant
0008,0018	UI	1.2.840.114302.2886781273.1266960738264.144.30003	SOP Instance UID	generated
0008,0020	DA	20080429	Study Date	OBR 6 (YYYYMMDDxxxx)
0008,0021	DA	20080429	Series Date	OBR 6 (YYYYMMDDxxxx)
0008,0023	DA	20080429	Content Date	OBR 6 (YYYYMMDDxxxx)
0008,0030	TM	0357	Study Time	OBR 6 (xxxxxxxxHHMM)
0008,0031	TM	0357	Series Time	OBR 6 (xxxxxxxxHHMM)
0008,0033	TM	0357	Content Time	OBR 6 (xxxxxxxxHHMM)
0008,0050	SH	EC9999999	Accession Number	OBR 3
0008,0060	CS	SR	Modality	constant
0008,0070	LO	na	Modality	constant
0008,0090	PN	Doe^Jeff^^^	Referring Physician's Name	ORC 12
0008,1030	LO	X ABDOMEN FLAT KUB AND UPRIGHT VWS	Study Description	OBR 4,2
0010,0010	PN	DOE^JOHN^JACOB^^	Patient's Name	PID 5
0010,0020	LO	E15000yxz	Patient ID	PID 3,1
0010,0021	LO	TC	Issuer of Patient ID	PID 3,4
0010,0030	DA	19510703	Patient's Birth Date	PID 7
0010,0040	CS	M	Patient's Sex	PID 8

Tag		Value	Description	Source
0010,1000	LO	E15000aaa	Other Patient IDs	PID 2,1
0010,2160	SH	WHITE	Ethnic Group	PID 10
0020,000d	UI	1.2.840.114302.2886781273.1266960738154.144.10001	Study Instance UID	generated
0020,000e	UI	1.2.840.114302.2886781273.1266960738264.144.20002	Series Instance UID	generated
0020,0011	IS	1	Series Number	constant
0020,0013	IS	1	Instance Number	constant
0040,a040	CS	CONTAINER	Value Type	constant
0040,a043 >BEGIN ITEM 1 >0008,0100 >0008,0102 >0008,0104 >END ITEM 1	SQ SH SH LO	 11528-7 LN Radiology Report	Concept Name Code Sequence Code Value Coding Scheme Designator Code Meaning	 constant constant constant
0040,a050	CS	SEPARATE	Continuity Of Content	constant
0040,a370 >BEGIN ITEM 1 >0008,0050 >0032,1060	SQ SH LO	 EC999999 X ABDOMEN FLAT KUB AND UPRIGHT VWS	Referenced Request Sequence Accession Number Requested Procedure Description	 OBR 3 OBR 4,2
>0032,1064 >>BEGIN ITEM 2 >>0008,0100 >>0008,0102 >>0008,0104 >>END ITEM 2	SQ SH SH LO	 X1004 null X ABDOMEN FLAT KUB AND UPRIGHT VWS	Requested Procedure Code Seq. Code Value Coding Scheme Designator Code Meaning	 OBR 4,1 OBR 4,2
>0040,1001 >0040,2016 >0040,2017 >0040,a370 >END ITEM 1	SH LO LO SQ	na #Requested Procedure ID na #Placer Order Number/Imaging Service Request na #Filler Order Number/Imaging Service Request na #Referenced Request Sequence	coded in stylesheet coded in stylesheet coded in stylesheet coded in stylesheet	

Tag		Value	Description	Source
0040,a372	SQ	na #Performed Procedure Code Sequence	coded in stylesheet	
0040,a491	CS	COMPLETE	Completion Flag	
0040,a493	CS	VERIFIED	Verification Flag	
0040,a730 >BEGIN ITEM 1 >0040,a010 >0040,a040 >0040,a043 >>BEGIN ITEM 2 >>0008,0100 >>0008,0102 >>0008,0104 >>END ITEM 2	SQ CS CS SQ SH SH LO	 CONTAINS CONTAINER 121071 DCM Findings	Content Sequence Relationship Type Value Type Concept Name Code Sequence Code Value Coding Scheme Designator Code Meaning	
>0040,a050	CS	SEPARATE	Continuity Of Content	
>0040,a730 >>BEGIN ITEM 2 >>0040,a010 >>0040,a040 >>0040,a043 >>>BEGIN ITEM 3 >>>0008,0100 >>>0008,0102 >>>0008,0104 >>>END ITEM 3	SQ CS CS SQ SH SH LO	 CONTAINS TEXT 121071 DCM Finding	Content Sequence coded in stylesheet coded in stylesheet Concept Name Code Sequence Code Value Coding Scheme Designator Code Meaning	
>>0040,a160	UT	VIEW OF THE ABDOMEN HISTORY: Shortness of breath. Question ileus. FINDINGS: Views of the abdomen are seen ... This exam was interpreted at the office of Medical Team of the Anywhere, USA.	From OBX 5 segments	

Tag		Value	Description	Source
>>END ITEM 2		Dictated by: Jane Doe Electronically Signed by: Jane Doe		
>END ITEM 1				

Appendix A Data Types

The data types definitions are taken from Health Level 7 version 2.3.1.

Data Type Category/ Data type	Data Type Name
Alphanumeric	
ST	String
TX	Text data
FT	Formatted text
Numerical	
CQ	Composite quantity with units
MO	Money
NM	Numeric
SI	Sequence ID
SN	Structured numeric
Identifier	
ID	Coded values for HL7 tables
IS	Coded value for user-defined tables
VID	Version identifier
HD	Hierarchic designator
EI	Entity identifier
RP	Reference pointer
PL	Person location

Data Type Category/ Data type	Data Type Name
PT	Processing type

Date/Time	
DT	Date
TM	Time
TS	Time stamp
Code Values	
CE	Coded element
CNE	Coded with no exceptions
CWE	Coded with exceptions
CF	Coded element with formatted values
CK	Composite ID with check digit
CN	Composite ID number and name
CX	Extended composite ID with check digit
XCN	Extended composite ID number and name
Generic	
CM	Composite
Demographics	
AD	Address
PN	Person name

Data Type Category/ Data type	Data Type Name
TN	Telephone number
XAD	Extended address
XON	Extended composite name and ID number for organizations
XTN	Extended telecommunications number
Specialty/Chapter Specific	
Waveform	
CD	Channel definition
MA	Multiplexed array
NA	Numeric array
ED	Encapsulated data
Price Data	
CP	Composite price
Patient Administration/Financial Information	
FC	Financial class
Extended Queries	
QSC	Query selection criteria
QIP	Query input parameter list
RCD	Row column definition

Data Type Category/ Data type	Data Type Name
Master Files	
DLN	Driver's license number
JCC	Job code/class
VH	Visiting hours
Medical Records/Information Management	
PPN	Performing person time stamp
Time Series	
DR	Date/time range
RI	Repeat interval
SCV	Scheduling class value pair
TQ	Timing/quantity