«Система управления, обработки, хранения медицинских изображений и данных «Апикс» («Apix»)»

«Apix» System – PACS SERVER
HL7 Conformance Statement

2022

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APIX System - HL7 Conformance Statement

Company Name:	AITICO
Product Name:	*APIX System*
Version:	5.29.1
Date:	Dec 22, 2022

1. ISO Preamble

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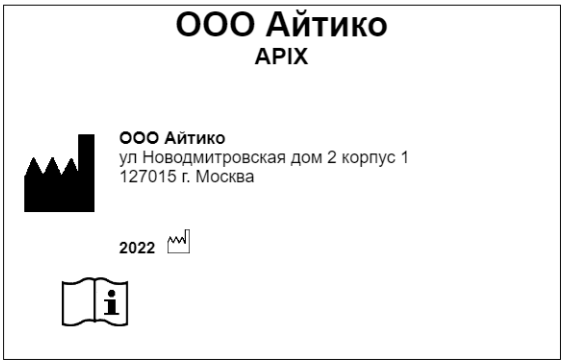

1.6. Revision Record for Document AEN-00039-0516.10

Table 1.1 Revision record for document AEN-00039-0516.10

Revision	Changes	Date	Author	Approved
1	Initial Version 5.20.0	20/12/2019	CH	JF
3	Update Version 5.21.0	28/02/2020	CH	JF
4	Update Version 5.22.0	12/03/2020	CH	JF
5	Update Version 5.23.0	14/12/2020	CH	JF
6	Update Version 5.24.0	06/08/2021	CH	JF
7	Update Version 5.25.0	14/12/2021	CH	JF
8	Update Version 5.26.0	23/03/2022	CH	JF

2. Table of Content

3. HL7 Conformance Statement Overview

APIX System is a networked computer system used for archiving DICOM objects. It allows external systems to send DICOM objects to it for permanent storage, retrieve information about such objects, and retrieve the DICOM objects themselves. It also provides services to maintain the consistency of patient and ordering information with external systems.

In order to offer these services *APIX System* utilizes and supports different medical communication standards. Apart from DICOM services, which are described in a dedicated Conformance Statement, *APIX System* uses HL7 V2 services to communicate with other medical systems.

Table 3.1 HL7 Network Services

HL7 message	HL7 version	Sender	Receiver
Patient Administration			
ADT/ACK - Admit/Visit Notification (Event A01)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Transfer a Patient (Event A02)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Discharge/End Visit (Event A03)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Register a Patient (Event A04)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Pre-Admit a Patient (Event A05)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Change an Outpatient to an Inpatient (Event A06)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Change an Inpatient to an Outpatient (Event A07)	2.3.1, 2.5, 2.5.1	No	Yes

HL7 message	HL7 version	Sender	Receiver
ADT/ACK - Update Patient Information (Event A08)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Cancel Admit/Visit Notification (Event A11)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Cancel Transfer (Event A12)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Cancel Discharge/End Visit (Event A13)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Add Person or Patient Information (Event A28)	2.5	Yes	Yes
ADT/ACK - Update Person Information (Event A31)	2.5	Yes	Yes
ADT/ACK - Cancel Pre-Admit (Event A38)	2.3.1, 2.5, 2.5.1	No	Yes
ADT/ACK - Merge Patient - Patient Identifier List (Event A40)	2.3.1, 2.5, 2.5.1	Yes	Yes
ADT/ACK - Change Patient Identifier List (Event A47)	2.5	Yes	Yes
Order Management			
ORM/ACK - General Order Message (Event O01)	2.3.1	No	Yes
OMG/ACK - General Clinical Order Message (Event O19)	2.5.1	Yes	Yes
OMI/ACK - Imaging Order Message (Event O23)	2.5.1	No	Yes
Report Management			
ORU/ACK - Unsolicited Observation Message (Event R01)	2.3.1	Yes	Yes
Appointment Notification			
SIU/ACK - Notification of new appointment booking (Event S12)	2.5.1	Yes	No
SIU/ACK - Notification of appointment rescheduling (Event S13)	2.5.1	Yes	No
SIU/ACK - Notification of appointment cancellation (Event S15)	2.5.1	Yes	No
Patient Demographics Query			
QBP/RSP - Find Candidates (Event Q22)	2.5.1	No	Yes
HL7 Forwarding			
arbitrary HL7 Message	2.x	Yes	Yes

4. Introduction

4.1. Revision History

Table 4.1 Revision History

Document Version	Date of Issue	Author	Description
5.29.1	Dec 22, 2022	gz	Initial Draft

4.2. Audience

This document is written for the people that need to understand how *APIX System* will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the HL7 features of the product. This document contains some basic HL7 definitions so that any reader may understand how this product implements HL7 features. However, integrators are expected to fully understand all the HL7 terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible HL7 features.

4.3. Remarks

The scope of this HL7 Conformance Statement is to facilitate integration between *APIX System* and other HL7 v2 products. The Conformance Statement should be read and understood in conjunction with the HL7 Standard. HL7 by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible HL7 functionality.

This Conformance Statement is not supposed to replace validation with other HL7 equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other HL7 conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible HL7 equipment, as established by the healthcare facility.
- *APIX System* has participated in an industry-wide testing program sponsored by Integrating the Healthcare Enterprise (IHE). The IHE Integration Statement for *APIX System*, together with the IHE Technical Framework, may facilitate the process of validation testing.

4.4. Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The HL7 Standard is the authoritative source for formal definitions of these terms.

General Acknowledgment message.

Admission, Discharge and Transfer.

Digital Imaging and Communications in Medicine.

DICOM Structured Reporting.

Health Level Seven (HL7) is an application protocol for electronic data exchange in health care environments.

An end point of a HL7 information exchange; i.e., the software that sends or receives HL7 messages. A single device may have multiple HL7 Applications.

The externally known name and facility used to identify a HL7 application to other HL7 applications on the network.

Minimal Lower Layer Protocol.

Modality Performed Procedure Step.

Modality Worklist.

General Order message.

Unsolicited Transmission of an Observation.

Unsolicited Notification of an Appointment.

5. Implementation Model

The core component of *APIX System* is a Java Enterprise Application deployed in WildFly AS, which provides DICOM services over the DICOM Upper Layer protocol (DUL) and HTTP, HL7 v2 services over the Minimal Lower Layer Protocol (MLLP), various proprietary RESTful services and a Web UI accessable by HTML 5 compliant web browsers.

Conceptually the HL7 network services may be modeled as the following separate HL7 applications, though they may share one HL7 Application name, or one HL7 Application may have multiple instances identified by different HL7 Application names, with different configuration.

- Patient Management Service, which processes ADT messages received from remote HL7 Applications, updating the patient information of archived DICOM objects, and send ADT messages to remote HL7 Applications on patient information changes initiated via the Web UI or proprietary RESTful services of *APIX System*.
- Procedure Management Service, which processes HL7 order messages from remote HL7 Applications, updating order information in the provided DICOM Modality Worklist and already archived DICOM objects, and send HL7 order messages to remote HL7 Applications on procedure status updates.
- Observation Reporting Management Service, which converts HL7 ORU messages received from remote HL7 Applications to DICOM Text SR objects, to make them accessible via the DICOM query/retrieve services.
- HL7 Forward Service, which forwards HL7 message received from one remote HL7 application to another remote HL7 application according configurable rules.

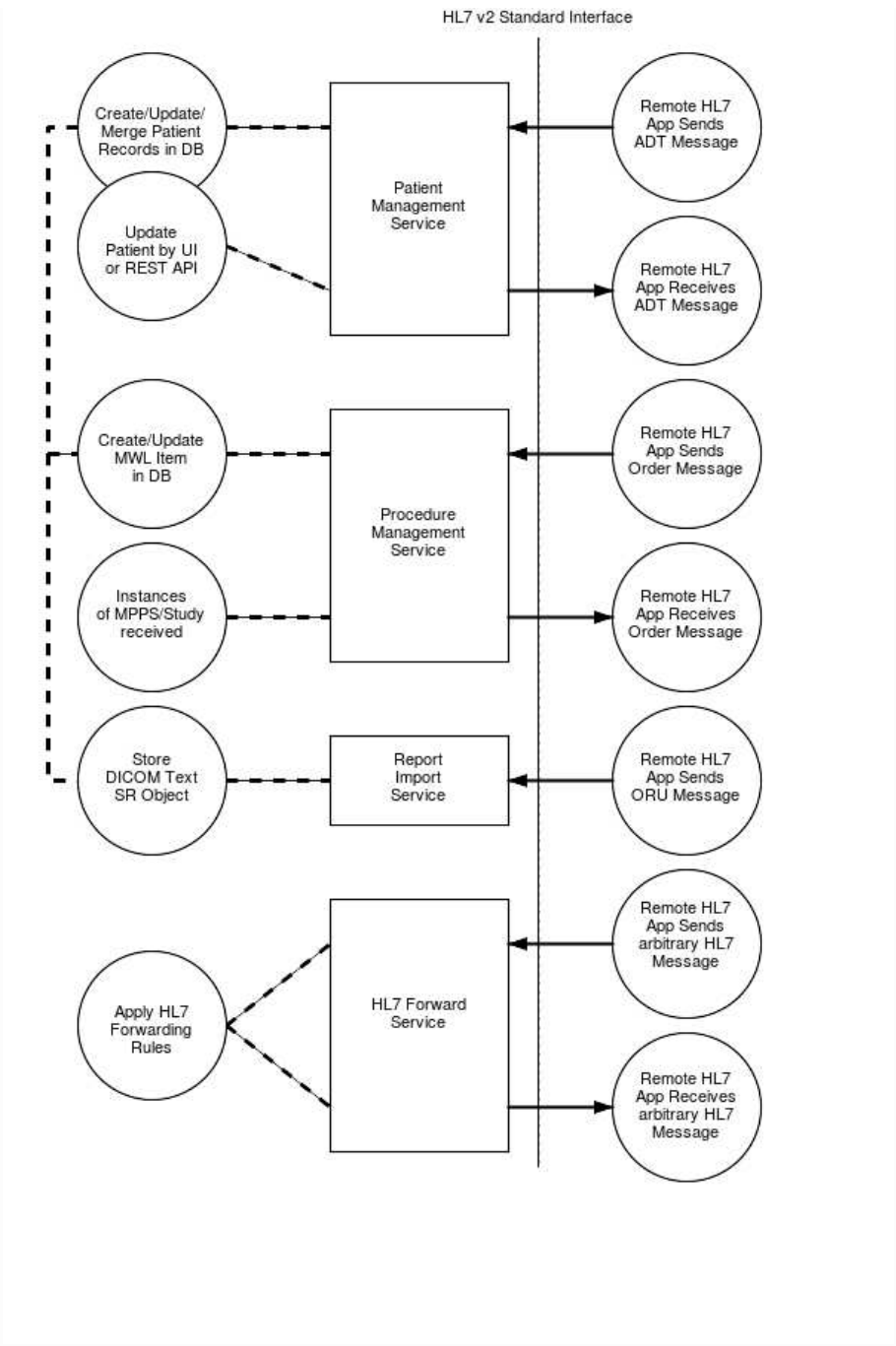

Fig. 5.1 Application Data Flow Diagram

6. HL7 Profiling Conventions

This document utilizes the HL7 Profiling Conventions specified in IHE Radiology Technical Framework, Volume 2, Section 2.3.

The HL7 tables included in this document have been modified from the corresponding HL7 standard documents. Such a modification is called a profile using static definitions as described for HL7 constrainable message profiles; refer to HL7 v2.5.1, Chapter 2, Section 2.12.6.

The static definition of a profiled message is represented within tables in this document. The message level table represents the profiled message structure with its list of usable segments.

The segment level table represents the profiled content of one segment with its usable fields.

6.1. Static definition - Segment level and Data Type level

The Segment table and the Data Type table each contain 8 columns (HL7 v2.3.1 messages use only 7 columns) as described below:

SEQ
Position (sequence) of the field within the segment.

LEN
Maximum length of the field.

Since version 2.5, the HL7 standard also defines the maximum length of each component with a field. Profiled HL7 messages shall conform to the HL7 standard if not otherwise stated in this document.

DT
Field Data Type

Usage
Usage of the field (column noted as OPT in HL7 v2.3.1 message static definition.)

The coded values used in this column are

R
Required: A compliant sending application shall populate all **R** elements with a non-empty value. A compliant receiving application may ignore the information conveyed by required elements. A compliant receiving application shall not raise an error due to the presence of a required element, but may raise an error due to the absence of a required element.

R+
Required as extension: This is a field optional in the original HL7 standard but required in the profiled messages. Only HL7 v2.3.1 messages use this notation to indicate the difference between OPT in the profiles and in the base HL7 standard.

RE
Required but may be empty. (**R2** in HL7 v2.3.1 messages)

The element may be missing from the message, but shall be sent by the sending application if there is relevant data. A conformant sending application shall be capable of providing all **RE** elements. If the conformant sending application knows a value for the element, then it shall send that value. If the conformant sending application does not know a value, then that element may be omitted. Receiving applications may ignore data contained in the element, but shall be able to successfully process the message if the element is omitted (no error message should be generated if the element is missing).

O
Optional. The usage for this field within the message is not defined. The sending application may choose to populate the field; the receiving application may choose to ignore the field.

C
Conditional. This usage has an associated condition predicate. (See HL7 v2.5.1, Chapter 2, Section 2.12.6.6, “Condition Predicate”.)

If the predicate is satisfied: A compliant sending application shall populate the element. A compliant receiving application may ignore data in the element. It may raise an error if the element is not present.

If the predicate is NOT satisfied: A compliant sending application shall NOT populate the element. A compliant receiving application shall NOT raise an error if the condition

predicate is false and the element is not present, though it may raise an error if the element IS present.

The condition predicate is not explicitly defined when it depends on functional characteristics of the system implementing the transaction and it does not affect data consistency.

CE

Conditional but may be empty. This usage has an associated condition predicate. (See HL7 Version 2.5, Chapter 2, Section 2.12.6.6, “Condition Predicate”.)

If the conforming sending application knows the required values for the element, then the application must populate the element. If the conforming sending application does not know the values required for this element, then the element shall be omitted.

The conforming sending application must be capable of populating the element (when the predicate is true) for all **CE** elements. If the element is present, the conformant receiving application may ignore the values of that element. If the element is not present, the conformant receiving application shall not raise an error due to the presence or absence of the element.

If the predicate is NOT satisfied: The conformant sending application shall not populate the element. The conformant receiving application may raise an application error if the element is present.

X

Not supported. For conformant sending applications, the element will not be sent.

Conformant receiving applications may ignore the element if it is sent, or may raise an application error.

Cardinality

Minimum and maximum number of occurrences for the field in the context of this Transaction.

This column is not used in profiled HL7 v2.3.1 message.

TBL#

Table reference (for fields using a set of defined values)

ITEM#

HL7 unique reference for this field

Element Name

Name of the field in a Segment table. / Component Name: Name of a subfield in a Data Type table.

Table 6.1 provides a sample profile for an imaginary HL7 segment. Tables for actual segments are copied from the corresponding HL7 standard versions with modifications made only to the OPT (Usage) column.

Table 6.1 Sample HL7 Profile

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	1	ST	R		xx001	Element 1
2	4	ST	O		xx002	Element 2
3	180	HD	R2		xx003	Element 3
4	180	HD	C		xx004	Element 4

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
5	180	HD	O		xx005	Element 5
6	180	HD	R		xx006	Element 6

Note

This sample table is made for HL7 v2.3.1 message definition in this document. For HL7 v2.5.1, one more column **Cardinality** will be added between columns **OPT** and **TBL#**.

The lengths of the fields specified in the **LEN** column of profiling tables shall be interpreted in accordance with HL7 standard, where it indicates the calculated length of the single occurrence of the field based on the expected maximum lengths of its individual components.

As such, *APIX System* requires that the receiving actors are able to properly process the fields where each occurrence is up to the maximum length specified in the HL7 profiling tables. Sending actors shall be able to generate messages where single occurrences of fields do not exceed maximum lengths specified in the profiling tables. Both receiving and sending actors shall take into account the mapping of values between HL7 and DICOM (see HL7 and DICOM Mapping Considerations) so that values of components that are mapped into DICOM do not exceed length limitations of that standard.

6.2. Static definition - Message level

The message table representing the static definition contains 5 columns (HL7 v2.3.1 messages use only 3 columns) as described below:

Segment
gives the segment name, and places the segment within the hierarchy of the message structure designed by HL7.

The beginning and end lines of a segment group (see HL7 v2.5.1, Chapter 2, Section 2.5.2 for definition) are designated in this column by — (3 dashes). The square brackets and braces that designate optionality and repeatability are hidden.

Meaning
Meaning of the segment as defined by HL7. The beginning of a segment group is designated by one line in this column giving the segment group name in all caps, prefixed by — (3 dashes), and followed by the keyword “begin”. The end of a segment group is designated by one line in this column giving the segment group name in all caps, prefixed by — (3 dashes), and followed by the keyword “end”.

Usage
Usage of the segment. Same coded values used in the segment level: **R**, **RE**, **O**, **C**, **CE** and **X** (see Static definition - Segment level and Data Type level)

This column is not used in HL7 v2.3.1 messages.

Cardinality
Minimum and maximum number of occurrences authorized for this segment in the context of the profiled HL7 message.

This column is not used in HL7 v2.3.1 messages.

HL7 chapter
Reference of the HL7 standard document chapter that describes this segment.

7. HL7 Implementation Notes

The HL7 Services provided by *APIX System* are compliant with the HL7 Implementation Notes specified in IHE Radiology Technical Framework, Volume 2, Section 2.4.

7.1. Common HL7 Message Implementation Requirements

7.1.1. Network Guidelines

The HL7 standards do not define a network communications protocol. The HL7 v2.1 standard defines lower layer protocols in an appendix. These definitions were moved to the Implementation Guide in 2.2 and subsequent versions, but are not HL7 requirements.

APIX System follows the recommendations made by the IHE Framework:

1. Applications shall use the Minimal Lower Layer Protocol (MLLP) defined in Appendix C of the HL7 Implementation Guide.
2. An application that wants to send a message (initiate a transaction) will initiate a network connection to start the transaction. The receiver application will respond with an acknowledgement or response to query but will not initiate new transactions on this network connection

7.1.2. Acknowledgement Mode

Applications that receive HL7 messages shall send acknowledgments using the HL7 Original Mode (versus Enhanced Acknowledgment Mode).

7.1.3. HL7 Versioning

The support of particular versions of HL7 v2 dependent on the HL7 message type by *APIX System* corresponds to the different versions of HL7 selected by the IHE Technical Framework for different IHE Domains. Particularly, the IHE Radiology Technical Framework specifies the use of HL7 v2.3.1 and optionally of HL7 v2.5.1, the IHE IT Infrastructure Technical Framework the use of HL7 v2.5 for HL7 based transactions.

APIX System comply with the message structure and contents defined by the specified version(s) of the HL7 standard as defined in the IHE transaction technical specification. It is acceptable if the HL7 standard version value (MSH-12) in a conformant message is higher than that specified in the IHE transaction as long as the message structure and contents meet the requirements of the specification.

7.2. HL7 v2.3.1 Message Implementation Requirements

7.2.1. Acknowledgement Message

Each HL7 message shall be acknowledged by the HL7 ACK message sent by the receiver of an HL7 message to its sender. The segments of the ACK message listed below are required, and their detailed descriptions are provided in the following subsections. The ERR segment is optional and will not be included in ACK messages sent by *APIX System*.

Table 7.1 Common ACK Message static definition

Segment	Meaning	Chapter in HL7 v2.3.1
MSH - MSH - Message Header segment (HL7 v2.3.1)	Message Header	2
MSA - MSA - Message Acknowledgement	Message Acknowledgement	2
[ERR] - ERR - Error Segment	Error	2

7.2.2. Message Control

The MSH (message header) segment contains control information set in the beginning of each message sent.

Table 7.2 MSH - Message Header segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	1	ST	R		00001	**Field Separator**
2	4	ST	R		00002	**Encoding Characters**
3	180	HD	R+		00003	**Sending Application**
4	180	HD	R+		00004	**Sending Facility**
5	180	HD	R+		00005	**Receiving Application**
6	180	HD	R+		00006	**Receiving Facility**
7	26	TS	R		00007	Date/Time Of Message
8	40	ST	O		00008	Security
9	13	CM	R	0076/ 0003	00009	**Message Type**
10	20	ST	R		00010	**Message Control ID**
11	3	PT	R		00011	Processing ID
12	60	VID	R	0104	00012	Version ID
13	15	NM	X		00013	Sequence Number
14	180	ST	X		00014	Continuation Pointer
15	2	ID	X	0155	00015	Accept Acknowledgment Type
16	2	ID	X	0155	00016	Application Acknowledgment Type
17	3	ID	O	0399	00017	Country Code
18	16	ID	C	0211	00692	**Character Set**
19	250	CE	O		00693	Principal Language Of Message
20	20	ID	X	0356	01317	Alternate Character Set Handling Scheme

Element names in **bold** indicates that the field is used by *APIX System*.

APIX System only supports the HL7-recommended values for the fields *MSH-1-Field Separator* (= `|`) and *MSH-2-Encoding Characters* (= `^~\&`).

APIX System does not support the sequence number protocol (it does not make use of field *MSH-13-Sequence Number*).

Field *MSH-18-Character Set* contains the character set for the entire message. Refer to HL7 Table 0211 - Alternate character sets for valid values.

Examples of valid values:

`8859/1`
The printable characters from the ISO 8859/1 Character set used by Western Europe.

`ISO IR87`
Code for the Japanese Graphic Character set for information interchange (JIS X 0208-1990).

`GB 18030-2000`
Code for the Chinese Character Set (GB 18030-2000).

`UNICODE UTF-8`
UCS Transformation Format, 8-bit form.

MSH-18-Character Set shall only be valued if the message uses a character set other than the 7-bit ASCII character set. Though the field is repeatable in HL7, *APIX System* supports only one occurrence (i.e., one character set). The character set specified in this field is used for the encoding of all of the characters within the message.

MSH-20-Alternate Character Set Handling Scheme is not supported by *APIX System*.

7.2.3. Acknowledgement Modes

This segment contains information sent while acknowledging another message.

Table 7.3 MSA - Message Acknowledgement

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	2	ID	R	0008	00018	**Acknowledgment Code**
2	0	T	R		0010	**Message Control ID**
3	0	T	O		00020	**Text Message**
4	5	M	X		00021	Expected Sequence Number
5	1	ID	X	0102	00022	Delayed Acknowledgment Type
6	100	X	O		00023	Error Condition

Element names in **bold** indicates that the field is used by *APIX System*.

In case that *APIX System* does not recognize either the message type (MSH-9.1) or the trigger event (MSH-9.2) in a message, *MSA-1-Acknowledgement code* of the acknowledgement contain the value `AR`.

If the *MSA-1-Acknowledgement code* identifies an error condition, *APIX System* may provide an error message in *MSA-3-Text Message*.

7.2.4. Error Modes

This segment contains information sent while acknowledging another message in error cases. The segment is documented only for reference and backward compatibility. It is not used by the *APIX System*.

Table 7.4 ERR - Error Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	80	CM	R	Y		00024	Error Code and Location

7.3. HL7 v2.5 Message Implementation Requirements

7.3.1. Acknowledgement Message

Each HL7 message shall be acknowledged by the HL7 ACK message sent by the receiver of an HL7 message to its sender. The segments of the ACK message listed below are required, and their detailed descriptions are provided in the following subsections. The ERR segment is optional and will be included in ACK messages sent by *APIX System* from version 5.10.6 onwards.

Table 7.5 Common ACK Message static definition

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
MSA - MSA - Message Acknowledgement	Message Acknowledgement	R	[1..1]	2
[ERR] - ERR - Error Segment	Error	C	[0..*]	2

7.3.2. Message Control

The MSH (message header) segment contains control information set in the beginning of each message sent.

Table 7.6 MSH - Message Header segment (HL7 v2.5.1)

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	1	SI	R	[1..1]		00001	**Field Separator**
2	4	ST	R	[1..1]		00002	**Encoding Characters**
3	227	HD	R	[1..1]		00003	**Sending Application**
4	227	HD	R	[1..1]		00004	**Sending Facility**
5	227	HD	R	[1..1]		00005	**Receiving Application**

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
6	227	HD	R	[1..1]		00006	**Receiving Facility**
7	26	TS	R	[1..1]		00007	Date/Time of Message
8	40	ST	X	[0..0]		00008	Security
9	15	MSG	R	[1..1]		00009	**Message Type**
10	20	ST	R	[1..1]		00010	**Message Control Id**
11	3	PT	R	[1..1]		00011	Processing Id
12	60	VID	R	[1..1]		00012	Version ID
13	15	NM	X	[0..1]		00013	Sequence Number
14	180	ST	X	[0..0]		00014	Continuation Pointer
15	2	ID	X	[0..0]	0155	00015	Accept Acknowledgement Type
16	2	ID	X	[0..0]	0155	00016	Application Acknowledgement Type
17	3	ID	RE	[1..1]	0399	00017	Country Code
18	16	ID	C	[0..1]	0211	00692	**Character Set**
19	250	CE	RE	[1..1]		00693	Principal Language of Message
20	20	ID	X	[0..0]	0356	01317	Alternate Character Set Handling Scheme
21	427	EI	RE	[0..*]		01598	Message Profile Identifier

Element names in **bold** indicates that the field is used by *APIX System*.

APIX System only supports the HL7-recommended values for the fields *MSH-1-Field Separator* (= `|`) and *MSH-2-Encoding Characters* (= `^~\&`).

APIX System does not support the sequence number protocol (it does not make use of field *MSH-13-Sequence Number*).

Field *MSH-18-Character Set* contains the character set for the entire message. Refer to HL7 Table 0211 - Alternate character sets for valid values.

Examples of valid values:

`8859/1`
The printable characters from the ISO 8859/1 Character set used by Western Europe.

`ISO IR87`
Code for the Japanese Graphic Character set for information interchange (JIS X 0208-1990).

`GB 18030-2000`
Code for the Chinese Character Set (GB 18030-2000).

`UNICODE UTF-8`
UCS Transformation Format, 8-bit form.

MSH-18-Character Set shall only be valued if the message uses a character set other than the 7-bit ASCII character set. Though the field is repeatable in HL7, *APIX System* supports only one occurrence (i.e., one character set). The character set specified in this field is used for the encoding of all of the characters within the message.

MSH-20-Alternate Character Set Handling Scheme is not supported by *APIX System*.

7.3.3. Acknowledgement Modes

This segment contains information sent while acknowledging another message.

Table 7.7 MSA - Message Acknowledgement

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	2	ID	R	[1..1]	0008	00018	**Acknowledgement code**
2	20	ST	R	[1..1]		00010	**Message Control Id**
3	80	ST	O	[0..1]		00020	**Text Message**
4	15	NM	X	[0..0]		00021	Expected Sequence Number
5			X	[0..0]		00022	Delayed Acknowledgment Type
6	250	CE	X	[0..0]	0357	00023	Error Condition

Element names in **bold** indicates that the field is used by *APIX System*.

In case that *APIX System* does not recognize either the message type (MSH-9.1) or the trigger event (MSH-9.2) in a message, *MSA-1-Acknowledgement code* of the acknowledgement contain the value `AR`.

If the *MSA-1-Acknowledgement code* identifies an error condition, *APIX System* may provide an error message in *MSA-3-Text Message*.

7.3.4. Error Modes

This segment is used to add error codes and comments to acknowledgment messages.

Table 7.8 ERR - Error Segment

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	493	ELD	B	Y		00024	Error Code and Location
2	18	ERL	O	Y		01812	**Error Location**
3	705	CWE	R		0357	01813	**HL7 Error Code**
4	2	ID	R		0516	01814	**Severity**
5	705	CWE	O		0533	01815	Application Error Code
6	80	ST	O	Y/10		01816	Application Error Parameter
7	2048	TX	O			01817	Diagnostic Information
8	250	TX	O			01818	**User Message**
9	20	IS	O	Y	0517	01819	Inform Person Indicator
10	705	CWE	O		0518	01820	Override Type
11	705	CWE	O	Y	0519	01821	Override Reason Code

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
12	652	XTN	O	Y		01822	Help Desk Contact Point

Element names in **bold** indicates that the field is used by *APIX System*.

7.4. HL7 and DICOM Mapping Considerations

Field lengths are explicitly defined in the DICOM standard, but an HL7 element might consist of multiple components that do not have a defined maximum length. It is recognized that there are some HL7 component lengths that could be longer than the DICOM attribute lengths. Data values for mapped fields are required not to exceed the smaller of either the HL7 or the DICOM field length definitions. Systems supporting alternative character sets must take into account the number of bytes per character in such sets.

APIX System maps the value of *MSH-18-Character Set* to the corresponding code value of DICOM attribute *(0008,0005) Specific Character Set*:

Table 7.9 Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set

HL7 MSH-18	DICOM (0008,0005)	Character Set
8859/1	ISO_IR 100	Latin alphabet No. 1
8859/2	ISO_IR 101	Latin alphabet No. 2
8859/3	ISO_IR 109	Latin alphabet No. 3
8859/4	ISO_IR 110	Latin alphabet No. 4
8859/5	ISO_IR 144	Cyrillic
8859/6	ISO_IR 127	Arabic
8859/7	ISO_IR 126	Greek
8859/8	ISO_IR 138	Hebrew
8859/9	ISO_IR 148	Latin alphabet No. 5
ISO IR14	ISO_IR 13	Japanese (JIS X 0201-1976)
ISO IR87	ISO 2022 IR 87	Japanese (JIS X 0208-1990)
ISO IR159	ISO 2022 IR 159	Japanese (JIS X 0212-1990)
KS X 1001	ISO 2022 IR 149	Korean
CNS 11643-1992	ISO_IR 166	Thai
UNICODE UTF-8	ISO_IR 192	Unicode in UTF-8
GB 18030-2000	GB18030	Chinese Character Set (GB 18030-2000)

7.5. Error Codes Mapping

Following table gives an overview of error codes and messages sent by *APIX System* for incoming HL7 messages triggering error conditions.

Table 7.10 Error Codes Mapping and Usage

Error Code	Error Code Meaning	Error Location	User Message	Notes
101	Required Field Missing	MSH^1^3^1^1	Missing Sending Application	
		MSH^1^4^1^1	Missing Sending Facility	
		MSH^1^5^1^1	Missing Receiving Application	
		MSH^1^6^1^1	Missing Receiving Facility	
		MSH^1^7^1^1	Missing Date/Time of Message	
		MSH^1^9^1^1	Missing Message Type	
		MSH^1^10^1^1	Missing Message Control ID	
103	Table Value Not Found	MSH^1^3^1^1	Sending Application and/or Facility not recognized	
		MSH^1^5^1^1	Receiving Application and/or Facility not recognized	
200	Unsupported Message Type	MSH^1^9^1^1	Message Type - Message Code not supported	
201	Unsupported Event Code	MSH^1^9^1^2	Message Type - Trigger Event not supported	
207	Application Internal Error		No HL7 Message Listener configured	

[1] Caused by mismatch of Sending Application with Facility in incoming HL7 messages with configured list of *Accepted Sending Application(s) <https://dcm4chee-arc-cs.readthedocs.io/en/latest/networking/config/hl7Application.html#hl7acceptedsendingapplication>*

[2] Caused by misconfigured *Network Connection <https://dcm4chee-arc-cs.readthedocs.io/en/latest/networking/config/networkConnection.html>* of a *HL7 Application <https://dcm4chee-arc-cs.readthedocs.io/en/latest/networking/config/hl7Application.html>* in a device.

[3] Caused by incorrect HL7 application configuration or issues in HL7 service registry initialization in archive.

8. Patient Management Service

The Patient Management Service processes ADT messages received from remote HL7

Applications, updating the patient information of archived DICOM objects, and send ADT messages to remote HL7 Applications on patient information changes initiated via the Web UI or proprietary RESTful services of *APIX System*.

The functionality provided by the Patient Management Service of *APIX System* is compliant with the requirements for following IHE Integration Profiles and Actors with Option:

Integration Profile	Actor	Option
Patient Information Reconciliation	Image Manager/Image Archive	HL7 v2.5.1
Patient Administration Management	Patient Demographics Consumer	Merge
Patient Administration Management	Patient Demographics Source	Merge

as specified in the IHE Technical Frameworks for Radiology and IT Infrastructure.

8.1. Inbound

8.1.1. Inbound Messages

8.1.1.1. ADT/ACK - Admit/Visit Notification (Event A01)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.1.1. Trigger Event

A remote HL7 Application notifies that a patient has arrived at a healthcare facility for an episode of care in which the patient is assigned to an inpatient bed. Such an episode is commonly referred to as “inpatient” care.

Field *MSH-9 Message Type* shall be valued **ADT^A01^ADT_A01**. The third component is optional for HL7 v2.3.1.

8.1.1.1.2. Supported Segments

The following segments are processed from an incoming ADT^A01^ADT_A01 message:

Table 8.1 Supported segments of ADT^A01^ADT_A01 (HL7 v2.3.1)

Segment	Meaning	HL7 Chapter
MSH - MSH - Message Header segment (HL7 v2.3.1)	Message Header	2
PID - PID - Patient Identification segment (HL7 v2.3.1)	Patient Identification	3

Segment	Meaning	HL7 Chapter
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.3.1)	Notes and Comments (for PID)	2

Table 8.2 Supported segments of ADT^A01^ADT_A01 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2

8.1.1.1.3. Performed Actions

Patient IDs and other Patient Information are extracted from the PID segment of the received ADT message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of PID segment to DICOM Patient Attributes. If a Patient record with the extracted primary Patient ID already exists in the database, that Patient record will get updated. If there is no such Patient record a new Patient record will be inserted into the database .

On retrieve of DICOM objects, the potentially updated DICOM attributes from the Patient record of the DB will be merged with the original DICOM attributes of the stored DICOM objects, so the changes in the Patient information are reflected in the retrieved DICOM objects.

[1] *(1, 2, 3, 4, 5)* The creation of new Patient records will be suppressed for message types which are listed by configuration parameter *HL7 No Patient Create Message Type(s)* of *APIX System*.

8.1.1.2. ADT/ACK - Transfer a Patient (Event A02)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.2.1. Trigger Event

A remote HL7 Application notifies that a patient is being transferred from one location to another. The new location will be reflected in the institution's bed census.

Field *MSH-9 Message Type* shall be valued **ADT^A02^ADT_A02**. The third component is optional for HL7 v2.3.1.

8.1.1.2.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.2.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.3. ADT/ACK - Discharge/End Visit (Event A03)

Supported HL7 version: 2.3.1, 2.5.1 (ITI-31)

8.1.1.3.1. Trigger Event

A remote HL7 Application notifies that a patient's stay at a healthcare facility has ended. Inpatient encounters are generally closed by an A03. Outpatient encounters may or may not be closed by an A03, depending on the healthcare organization policies.

Field *MSH-9 Message Type* shall be valued **ADT^A03^ADT_A03**. The third component is optional for HL7 v2.3.1.

8.1.1.3.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.3.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.4. ADT/ACK - Register a Patient (Event A04)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.4.1. Trigger Event

A remote HL7 Application notifies that a patient has arrived at a healthcare facility for an episode of care in which the patient is not assigned to a bed. Examples of such episodes include outpatient visits, ambulatory care encounters, and emergency room visits.

Field *MSH-9 Message Type* shall be valued **ADT^A04^ADT_A01**. The third component is optional for HL7 v2.3.1.

8.1.1.4.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.4.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.5. ADT/ACK - Pre-Admit a Patient (Event A05)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.5.1. Trigger Event

A remote HL7 Application communicate information that has been collected about a patient to be admitted as an inpatient (or to be registered as an outpatient).

Field *MSH-9 Message Type* shall be valued **ADT^A05^ADT_A05**. The third component is optional for HL7 v2.3.1.

8.1.1.5.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.5.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.6. ADT/ACK - Change an Outpatient to an Inpatient (Event A06)

Supported HL7 version: 2.3.1, 2.5.1 (ITI-31)

8.1.1.6.1. Trigger Event

A remote HL7 Application notifies that it has been decided to admit a patient that was formerly in a non-admitted status, such as Emergency.

Field *MSH-9 Message Type* shall be valued **ADT^A06^ADT_A06**. The third component is optional for HL7 v2.3.1.

8.1.1.6.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.6.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.7. ADT/ACK - Change an Inpatient to an Outpatient (Event A07)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.7.1. Trigger Event

A remote HL7 Application notifies that a patient is no longer in an “admitted” status, but is still being seen for an episode of care..

Field *MSH-9 Message Type* shall be valued **ADT^A07^ADT_A06**. The third component is optional for HL7 v2.3.1.

8.1.1.7.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.7.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.8. ADT/ACK - Update Patient Information (Event A08)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.8.1. Trigger Event

A remote HL7 Application notifies that some non-movement-related information (such as address, date of birth, etc.) has changed for a patient. It is used when information about the patient has changed not related to any other trigger event.

Field *MSH-9 Message Type* shall be valued **ADT^A08^ADT_A01**. The third component is optional for HL7 v2.3.1.

8.1.1.8.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.8.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.9. ADT/ACK - Patient Arriving - Tracking (Event A10)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.9.1. Trigger Event

A remote HL7 Application sends this event when a patient arrives at a new location in the healthcare facility (inpatient or outpatient) (via trigger event A09).

Field *MSH-9 Message Type* shall be valued **ADT^A10^ADT_A09**. The third component is optional for HL7 v2.3.1.

8.1.1.9.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.9.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

Additionally, if configuration parameter *HL7 Patient Arrival Message Type* of *APIX System* is configured as *ADT^A10*, SPS Status of any MWL items (which are in **SCHEDULED** status) associated with this patient shall be changed to **ARRIVED**.

8.1.1.10. ADT/ACK - Cancel Admit/Visit Notification (Event A11)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.10.1. Trigger Event

A remote HL7 Application cancels a previous notification that a patient has been admitted for an inpatient stay (via trigger event A01) or registered for an outpatient visit (via trigger event A04).

Field *MSH-9 Message Type* shall be valued **ADT^A11^ADT_A09**. The third component is optional for HL7 v2.3.1.

8.1.1.10.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.10.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.11. ADT/ACK - Cancel Transfer (Event A12)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.11.1. Trigger Event

A remote HL7 Application cancels a previous notification (via trigger event A02) that a patient was being moved from one location to another.

Field *MSH-9 Message Type* shall be valued **ADT^A12^ADT_A12**. The third component is optional for HL7 v2.3.1.

8.1.1.11.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.11.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.12. ADT/ACK - Cancel Discharge/End Visit (Event A13)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.12.1. Trigger Event

A remote HL7 Application cancels a previous notification (via trigger event A03) that a patient's stay at a healthcare facility had ended.

Field *MSH-9 Message Type* shall be valued **ADT^A13^ADT_A01**. The third component is optional for HL7 v2.3.1.

8.1.1.12.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.12.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.13. ADT/ACK - Add Person or Patient Information (Event A28)

Supported HL7 version: 2.5 (ITI-30)

8.1.1.13.1. Trigger Event

A remote HL7 Application communicates the demographics of a new patient, as well as related information.

Field *MSH-9 Message Type* shall be valued **ADT^A28^ADT_A05**.

8.1.1.13.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.13.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.14. ADT/ACK - Update Person Information (Event A31)

Supported HL7 version: 2.5 (ITI-30)

8.1.1.14.1. Trigger Event

A remote HL7 Application updates the demographics of an existing patient.

Field *MSH-9 Message Type* shall be valued **ADT^A31^ADT_A05**.

8.1.1.14.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.14.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.15. ADT/ACK - Cancel Pre-Admit (Event A38)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-31)

8.1.1.15.1. Trigger Event

A remote HL7 Application cancels a previous notification (via trigger event A05) that a patient was to be updated to pre-admitted (or pre-registered) status.

Field *MSH-9 Message Type* shall be valued **ADT^A38^ADT_A38**. The third component is optional for HL7 v2.3.1.

8.1.1.15.2. Supported Segments

Same as specified in Section 8.1.1.1.2.

8.1.1.15.3. Performed Actions

Same as specified in Section 8.1.1.1.3.

8.1.1.16. ADT/ACK - Merge Patient - Patient Identifier List (Event A40)

Supported HL7 versions: 2.3.1, 2.5.1 (ITI-30)

8.1.1.16.1. Trigger Event

A remote HL7 Application notifies the merge of records for a patient that was incorrectly filed under two different identifiers. This message is only used to merge two patient identifiers of the same type, or two lists of patient identifiers. It is not used to update other patient demographics information. The A31 trigger event should be used for this purpose.

Field *MSH-9 Message Type* shall be valued **ADT^A40^ADT_A39**. The third component is optional for HL7 v2.3.1.

8.1.1.16.2. Supported Segments

The following segments are processed from an incoming ADT^A40^ADT_A39 message:

Table 8.3 Supported segments of ADT^A40^ADT_A39 (HL7 v2.3.1)

Segment	Meaning	HL7 Chapter
MSH - MSH - Message Header segment (HL7 v2.3.1)	Message Header	2
PID - PID - Patient Identification segment (HL7 v2.3.1)	Patient Identification	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.3.1)	Notes and Comments	2
MRG - MRG - Merge segment (HL7 v2.3.1)	Merge Information	3

Table 8.4 Supported segments of ADT^A40^ADT_A39 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments	O	[0..1]	2

Segment	Meaning	Usage	Card.	HL7 chapter
MRG - MRG - Merge segment (HL7 v2.5.1)	Merge Information	R	[1..1]	3

The “incorrect supplier identifier” identified in the MRG segment (*MRG-1 Prior Patient Identifier List*) is to be merged with the required “correct target identifier” in the PID segment (*PID-3 Patient Identifier List*). The “incorrect supplier identifier” would then logically never be referenced in future transactions.

8.1.1.16.3. Performed Actions

Patient IDs and other Patient Information for the dominant Patient record are extracted from the PID segment of the received ADT message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of PID segment to DICOM Patient Attributes. If a Patient record with the extracted primary Patient ID already exists in the database, that Patient record will get updated. If there is no such Patient record a new Patient record will be inserted into the database .

Patient ID and the Patient name for the old Patient record are extracted from the MRG segment of the received ADT message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of MRG segment to DICOM Patient Attributes. If a Patient record with the extracted primary Patient ID already exists in the database, all associated Study, MPPS and MWL records will be moved to the Patient record with the Patient ID from the PID segment. If there is no such Patient record a new Patient record will be inserted into the database . Therefore there will be always a Patient Record with the Patient ID from the MRG segment, which contains a reference to the *dominant* Patient Record with the Patient ID, marking them as *merged*.

Subsequently received HL7 messages referring a *merged* Patient by its Patient ID will be rejected, whereas DICOM objects to a *merged* Patient will be accepted. Particularly, if the Patient ID in the first received DICOM object of a Study matches the Patient ID of a *merged* Patient record in the database, the new Study record will be associated with the *dominant* Patient record, so the stale Patient Information in the received DICOM object will be replaced by the updated Patient Information in the *dominant* Patient record on retrieve of DICOM objects of that Study.

8.1.1.17. ADT/ACK - Change Patient Identifier List (Event A47)

Supported HL7 version: 2.5 (ITI-30)

8.1.1.17.1. Trigger Event

A remote HL7 Application notifies the change of a patient identifier list for a patient.

That is, a single *PID-3 patient identifier list value* has been found to be incorrect and has been changed. This message is not used to update other patient demographics information. The A31 trigger event should be used for this purpose.

Field *MSH-9 Mesage Type* shall be valued **ADT^A47^ADT_A30**.

8.1.1.17.2. Supported Segments

The following segments are processed from an incoming ADT^A47^ADT_A30 message:

Table 8.5 Supported Segments of ADT^A47^ADT_A30 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments	O	[0..1]	2
MRG - MRG - Merge segment (HL7 v2.5.1)	Merge Information	R	1..1]	3

The “incorrect supplier identifier” value is stored in the MRG segment (*MRG-1 Prior Patient Identifier List*) and is to be changed to the “correct target patient ID” value stored in the PID segment (*PID-3 Patient Identifier List*).

8.1.1.17.3. Performed Actions

The “correct” Patient IDs and other Patient Information for the Patient record are extracted from the PID segment of the received ADT message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of PID segment to DICOM Patient Attributes. If a Patient record with the extracted primary Patient ID already exists in the database, the message will be rejected.

The “incorrect” Patient ID and the prior Patient name are extracted from the MRG segment of the received ADT message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of MRG segment to DICOM Patient Attributes.

Further behavior depends on if *HL7 Track Changed Patient ID* is enabled/disabled by a correspondent configuration parameter of *APIX System*:

8.1.1.17.3.1. HL7 Track Changed Patient ID enabled

A new Patient record with Patient IDs and other Patient Information from the PID segment will be inserted into the database. If a Patient record with the prior Patient ID from the MRG segment already exists in the database, all associated Study, MPPS and MWL records will be moved to the Patient record with the Patient ID from the PID segment. If there is no such

Patient record a new Patient record will be inserted into the database . Therefore there will be always a Patient Record with the Patient ID from the MRG segment, which contains a reference to the *dominant* Patient Record with the Patient ID, marking them as *merged*.

Subsequently received HL7 messages referring a *merged* Patient by its Patient ID will be rejected, whereas DICOM objects to a *merged* Patient will be accepted. Particularly, if the Patient ID in the first received DICOM object of a Study matches the Patient ID of a *merged* Patient record in the database, the new Study record will be associated with the *dominant* Patient record, so the stale Patient Information in the received DICOM object will be replaced by the updated Patient Information in the *dominant* Patient record on retrieve of DICOM objects of that Study.

8.1.1.17.3.2. HL7 Track Changed Patient ID disabled

If a Patient record with the previous Patient ID from the MRG segment already exists in the database, it will be updated with the Patient IDs and other Patient Information from the PID segment. If there is no such Patient record a new Patient record with the Patient IDs and other Patient Information from the PID segment will be inserted into the database .

Consequently, subsequently received HL7 messages with the previous Patient ID will be accepted, causing the insert of a new Patient record in the database with the previous Patient ID. Also the receive of DICOM objects with the previous Patient ID will then cause the insert of a new Patient record, associated with the new received Study.

8.1.2. Inbound Message Segments

8.1.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.3.1) or MSH - Message Header segment (HL7 v2.5.1)

8.1.2.2. PID - Patient Identification segment

Table 8.6 PID - Patient Identification segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00104	SetID -Patient ID
2	20	CX	O		00105	**Patient ID**
3	20	CX	R		00106	**Patient Identifier List**
4	20	CX	O		00107	**Alternate Patient ID**
5	48	XPN	R		00108	**Patient Name**
6	48	XPN	O		00109	**Mother's Maiden Name**
7	26	TS	R2		00110	**Date/Time of Birth**
8	1	IS	R	0001	00111	**Sex**
9	48	XPN	O		00112	**Patient Alias**

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
10	80	CE	R2	0005	00113	Race
11	1	06	XAD	R2	00114	**Patient Address**
12	4	IS	O		00115	County Code
13	40	XTN	O		00116	Phone Number - Home
14	40	XTN	O		00117	Phone Number - Business
15	60	CE	O	0296	00118	Primary Language
16	1	IS	O	0002	00119	Marital Status
17	80	CE	O	0006	00120	Religion
18	20	CX	C		00121	**Patient Account Number**
19	16	ST	O		00122	SSN Number – Patient
20	25	DLN	O		00123	Driver's License Number - Patient
21	20	CX	O		00124	Mother's Identifier
22	80	CE	O	0189	00125	Ethnic Group
23	60	ST	O		00126	Birth Place
24	1	ID	O	0136	00127	Multiple Birth Indicator
25	2	NM	O		00128	Birth Order
26	80	CE	O	0171	00129	Citizenship
27	60	CE	O	0172	00130	Veterans Military Status
28	80	CE	O		00739	Nationality
29	26	TS	O		00740	Patient Death Date and Time
30	1	ID	O	0136	00741	Patient Death Indicator

Table 8.7 PID - Patient Identification segment (HL7 v2.5.1)

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	4	SI	O	[0..1]		00104	Set ID - PID
2	20	CX	O	[0..0]		00105	**Patient ID**
3	250	CX	R	[1..*]		00106	**Patient Identifier List**
4	20	CX	O	[0..0]		00107	**Alternate Patient ID - PID**
5	250	XPN	R	[1..*]		00108	**Patient Name**
6	250	XPN	O	[0..1]		00109	**Mother's Maiden Name**
7	26	TS	CE	[0..1]		00110	**Date/Time of Birth**
8	1	IS	CE	[1..1]	0001	00111	**Administrative Sex**
9	250	XPN	O	[0..1]		00112	Patient Alias
10	250	CE	O	[0..1]	0005	00113	Race
11	250	XAD	CE	[0..*]		00114	**Patient Address**
12	4	IS	X	[0..1]	0289	00115	County Code

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
13	250	XTN	O	[0..*]		00116	Phone Number - Home
14	250	XTN	O	[0..*]		00117	Phone Number - Business
15	250	CE	O	[0..1]	0296	00118	Primary Language
16	250	CE	O	[0..1]	0002	00119	Marital Status
17	250	CE	O	[0..1]	0006	00120	Religion
18	250	CX	C	[0..1]		00121	**Patient Account Number**
19	16	ST	X	[0..1]		00122	SSN Number - Patient
20	25	DLN	X	[0..1]		00123	Driver's License Number - Patient
21	250	CX	O	[0..*]		00124	Mother's Identifier
22	250	CE	O	[0..1]	0189	00125	Ethnic Group
23	250	ST	O	[0..1]		00126	Birth Place
24	1	ID	O	[0..1]	0136	00127	Multiple Birth Indicator
25	2	NM	O	[0..1]		00128	Birth Order
26	250	CE	O	[0..1]	0171	00129	Citizenship
27	250	CE	O	[0..1]	0172	00130	Veterans Military Status
28	250	CE	X	[0..0]	0212	00739	Nationality
29	26	TS	CE	[0..1]		00740	Patient Death Date and Time
30	1	ID	C	[0..1]	0136	00741	Patient Death Indicator
31	1	ID	CE	[0..1]	0136	01535	Identity Unknown Indicator
32	20	IS	CE	[0..*]	0445	01536	Identity Reliability Code
33	26	TS	CE	[0..1]		01537	Last Update Date/Time
34	241	HD	O	[0..1]		01538	Last Update Facility
35	250	CE	CE	[0..1]	0446	01539	**Species Code**
36	250	CE	C	[0..1]	0447	01540	**Breed Code**
37	80	ST	O	[0..1]		01541	Strain
38	250	CE	O	[0..2]		01542	Production Class Code
39	250	CWE	O	[0..*]		01840	Tribal Citizenship

Element names in **bold** indicates that the field is used by *APIX System*.

Patient IDs included in the PID-3 field shall include Assigning Authority (Component 4). The first subcomponent (namespace ID) of Assigning Authority shall be populated. If the second and third subcomponents (universal ID and universal ID type) are also populated, they shall reference the same entity as is referenced in the first subcomponent.

This field may be populated with various identifiers assigned to the patient by various assigning authorities.

8.1.2.3. NTE - Notes and Comments segment (for PID)

Table 8.8 NTE - Notes and Comments segment (for PID) (HL7 v2.3.1)

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM #	Element Name
1	4	SI	O			00096	SetID - NTE
2	4	ID	O		0105	00097	Source of Comment
3	64k	FT	O	Y		00098	**Comment**

Table 8.9 NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM #	Element Name
1	4	SI	O			00096	SetID - NTE
2	4	ID	O		0105	00097	Source of Comment
3	65536	FT	O	Y		00098	**Comment**
4	250	CE	O		0364	01318	Comment Type

Element names in **bold** indicates that the field is used by *APIX System*.

8.1.2.4. MRG - Merge segment

Table 8.10 MRG - Merge segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	20	CX	R		00211	**Prior Patient Identifier List**
2	20	CX	O		00212	Prior Alternate Patient ID
3	20	CX	O		00213	Prior Patient Account Number
4	20	CX	R2		00214	Prior Patient ID
5	20	CX	O		01279	Prior Visit Number
6	20	CX	O		01280	Prior Alternate Visit ID
7	48	XPN	R2		01281	**Prior Patient Name**

Table 8.11 MRG - Merge segment (HL7 v2.5.1)

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	250	CX	R	[1..*]		00211	**Prior Patient Identifier List**
2	250	CX	X	[0..0]		00212	Prior Alternate Patient ID
3	250	CX	O	[0..1]		00213	Prior Patient Account Number
4	250	CX	X		[0..0]	00214	Prior Patient ID
5	250	CX	X	[0..0]		01279	Prior Visit Number
6	250	CX	X	[0..0]		01280	Prior Alternate Visit ID

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
7	250	XPN	O	[0..*]		01281	**Prior Patient Name**

Element Names in **bold** indicates that the field is used by *APIX System*.

8.1.3. HL7 ADT to DICOM Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component / sub-component value is not listed if the HL7 element does not contain multiple components / sub-components.

Table 8.12 HL7 ADT mapping of PID segment to DICOM Patient Attributes

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	
Patient Identification					
Patient's Name	(0010, 0010)	Patient Name	00108	PID:5	
Patient ID	(0010, 0020)	Patient Identifier List	00106.1	PID:3.1	
Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00106.4.1	PID:3.4.1	
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Item	(FFFE, E000)				
>Universal Entity ID	(0040, 0032)	Patient Identifier List	00106.4.2	PID:3.4.2	
>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00106.4.3	PID:3.4.3	
Other Patient IDs Sequence	(0010, 1002)				
>Patient ID	(0010, 0020)	Patient ID	00105.1	PID:2.1	
>Issuer of Patient ID	(0010, 0021)	Patient ID	00105.4.1	PID:2.4.1	set to `CHIP`, if PID:2.4.1 empty
>Type of Patient ID	(0010, 0022)				set to `RFID`
>Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>>Universal Entity ID	(0040, 0032)	Patient Identifier List	00105.4.2	PID:2.4.2	
>>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00105.4.3	PID:2.4.3	
>Item	(FFFE, E000)				
>Patient ID	(0010, 0020)	Alternate Patient ID - PID	00107.1	PID:4.1	
>Issuer of Patient ID	(0010, 0021)	Alternate Patient ID - PID	00107.4.1	PID:4.4.1	set to `TATTOO`, if PID:4.4.1 empty
>Type of Patient ID	(0010, 0022)				set to `BARCODE`
>Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>>Universal Entity ID	(0040, 0032)	Patient Identifier List	00107.4.2	PID:4.4.2	
>>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00107.4.3	PID:4.4.3	
Patient's Mother's Birth Name	(0010, 1060)	Mother's Maiden Name	00109	PID:6	
Patient Demographic					
Patient's Birth Date	(0010, 0030)	Date/Time of Birth	00110	PID:7	
Patient's Sex	(0010, 0040)	Administrative Sex	00111.1	PID:8.1	
Responsible Person	(0010, 2297)	Patient Alias	00112	PID:9	
Responsible Person Role	(0010, 2298)				set to `OWNER`, if PID:9 is not empty
Patient's Address	(0010, 1040)	Patient Address	00114	PID:11	
Patient Species Description	(0010, 2201)	Species Code	01539.2	PID:35.2	
Patient Species Code Sequence	(0010, 2202)				
>Code Value	(0008, 0100)	Species Code	01539.1	PID:35.1	
>Coding Scheme Designator	(0008, 0102)	Species Code	01539.3	PID:35.3	
>Code Meaning	(0008, 0104)	Species Code	01539.2	PID:35.2	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Patient Breed Description	(0010, 2292)	Breed Code	01540.2	PID:36.2	
Patient Breed Code Sequence	(0010, 2293)				
>Code Value	(0008, 0100)	Breed Code	01540.1	PID:36.1	
>Coding Scheme Designator	(0008, 0102)	Breed Code	01540.3	PID:36.3	
>Code Meaning	(0008, 0104)	Breed Code	01540.2	PID:36.2	
Patient Comments	(0010, 4000)	Comment	00098	NTE:3	
Patient Medical					
Patient's Sex Neutered	(0010, 2203)	Administrative Sex	00111.2	PID:8.2	'Y'⇒'ALTERED', 'N'⇒'UNALTERED'

Table 8.13 HL7 ADT mapping of MRG segment to DICOM Patient Attributes

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	
Patient Identification					
Patient's Name	(0010, 0010)	Prior Patient Name	01281	MRG:7	
Patient ID	(0010, 0020)	Prior Patient Identifier List	00211.1	MRG:1.1	
Issuer of Patient ID	(0010, 0021)	Prior Patient Identifier List	00211.4.1	MRG:1.4.1	
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Universal Entity ID	(0040, 0032)	Prior Patient Identifier List	00211.4.2	MRG:1.4.2	
>Universal Entity ID Type	(0040, 0033)	Prior Patient Identifier List	00211.4.3	MRG:1.4.3	

8.1.4. HL7 ADT - Error Mapping

Following table gives an overview of error codes and messages sent by *APIX System* for incoming HL7 ADT messages triggering error conditions.

Table 8.14 Error Codes Mapping and Usage

Error Code	Error Code Meaning	Error Location	User Message	Notes
Error Common				
Same as Error Codes Mapping and Usage in Error Codes Mapping and Usage				
Patient Management specific				
101	Required Field Missing	PID^1^3^1^1	Missing patient identifier	
		MRG^1^1^1^1	Missing prior patient identifier	
204	Unknown Key Identifier	PID^1^3^1^1		
		MRG^1^1^1^1		
205	Duplicate Key Identifier	PID^1^3	Either previous or new Patient ID has missing issuer and change patient id tracking is enabled. Disable change patient id tracking feature and retry update	
		MRG^1^1^1^1	Prior patient identifier matches patient identifier	
207	Application Internal Error			

[2] *(1, 2)* HL7 DICOM Character Set if configured, is selected to specify Specific Character Set. Else, MSH-18 if present in the incoming HL7 message, Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set is selected to specify Specific Character Set. If MSH-18 is absent, then HL7 Default Character Set is selected to specify Specific Character Set.

[3] *(1, 2)* Message stating respective patient identifier refers to an already merged patient record. Depends on configured *HL7 Referred Merged Patient Policy <https://dcm4chee-arc-cs.readthedocs.io/en/latest/networking/config/archiveHL7Application.html#hl7referredmergedpatientpolicy>_*.

[4] User message in ERR:7 is set to exception message. This exception pertains to HL7 ADT message processing triggered internal application failure.

8.2. Outbound

The HL7 messages mentioned below are sent to other HL7 applications/receivers if the feature Synchronize External Receivers for Patient Updates has been configured in the archive.

8.2.1. Outbound Messages

8.2.1.1. ADT/ACK - Add Person or Patient Information (Event A28)

Supported HL7 version: 2.5.1 (ITI-30)

8.2.1.1.1. Trigger Event

This message is sent when a new patient is created in the archive by using archive UI and RESTful service. Patient IDs and other Patient Information for the new Patient record are sent in the PID segment of the outgoing ADT message mapped from corresponding DICOM attributes as defined in DICOM Patient Attributes to HL7 ADT mapping of PID segment.

8.2.1.1.2. Supported Segments

The following segments are sent in an outgoing ADT^A28^ADT_A05 message:

Table 8.15 Supported segments of ADT^A28^ADT_A05 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2

8.2.1.1.3. Expected Actions

HL7 Application/Receiver should have the ability to receive and process the demographics of a new patient, as well as related information. Field *MSH-9 Message Type* is valued as **ADT^A28^ADT_A05**. It is expected that the receiver shall create a new patient record for the patient identified if there is no current record for the Patient ID (defined by the field PID-3). This message shall not be used by the receiver to update information in an existing patient record.

8.2.1.2. ADT/ACK - Update Person Information (Event A31)

Supported HL7 version: 2.5.1 (ITI-30)

8.2.1.2.1. Trigger Event

This message is sent when an existing patient is updated in the archive by using archive UI and RESTful service. Patient IDs and other Patient Information for the updated Patient record are sent in the PID segment of the outgoing ADT message mapped from corresponding DICOM attributes as defined in DICOM Patient Attributes to HL7 ADT mapping of PID segment.

8.2.1.2.2. Supported Segments

Same as specified in Section 8.2.1.1.2.

8.2.1.2.3. Expected Actions

HL7 Application/Receiver should have the ability to receive and process the demographics of an updated patient. Field *MSH-9 Message Type* is valued as **ADT^A31^ADT_A05**. It is expected that the receiver shall update the patient information of an existing patient record for the patient identified by the Patient ID (defined by the field PID-3).

8.2.1.3. ADT/ACK - Merge Patient - Patient Identifier List (Event A40)

Supported HL7 version: 2.5.1 (ITI-30)

8.2.1.3.1. Trigger Event

This message is sent when a one or more patients are merged with a target patient in the archive by using archive UI and RESTful service. Patient IDs and other Patient Information for the target Patient record are sent in the PID segment of the outgoing ADT message mapped from corresponding DICOM attributes as defined in DICOM Patient Attributes to HL7 ADT mapping of PID segment. Patient ID and the Patient name for the old Patient record are sent in the MRG segment of the outgoing ADT message and mapped from corresponding DICOM attributes as defined in HL7 ADT mapping of MRG segment to DICOM Patient Attributes.

8.2.1.3.2. Supported Segments

The following segments are sent in an outgoing ADT^A40^ADT_A39 message:

Table 8.16 Supported segments of ADT^A40^ADT_A39 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2

Segment	Meaning	Usage	Card.	HL7 chapter
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
MRG - MRG - Merge segment (HL7 v2.5.1)	Merge Information	R	[1..1]	3

8.2.1.3.3. Expected Actions

HL7 Application/Receiver should have the ability to receive and process the demographics of merged patients, as well as related information. Field *MSH-9 Message Type* is valued as **ADT^A40^ADT_A39**. It is expected that after receiving a Patient Merge message (A40) the receiving system will perform updates to reflect the fact that two patient records have been merged into a single record. If the correct target patient was not known to the receiving system, it is expected that the receiving system will create a patient record using the patient identifiers and demographics from the available PID segment data.

If the receiving application is an Image Manager/Image Archive, it is the responsibility of the Image Manager and the Report Manager to ensure that the patient information has been updated in the diagnostic reports and evidence objects (e.g., images, Key Image Notes, Grayscale Softcopy Presentation States, Evidence Documents, etc.) they manage when they are retrieved.

8.2.1.4. ADT/ACK - Change Patient Identifier List (Event A47)

Supported HL7 version: 2.5.1 (ITI-30)

8.2.1.4.1. Trigger Event

This message is sent when an patient ID of an existing patient is updated in the archive by using archive UI and RESTful service. Patient IDs and other Patient Information for the Patient record with changed patient identifiers are sent in the PID segment of the outgoing ADT message mapped from corresponding DICOM attributes as defined in DICOM Patient Attributes to HL7 ADT mapping of PID segment.

8.2.1.4.2. Supported Segments

Same as specified in Section 8.2.1.3.2.

8.2.1.4.3. Expected Actions

HL7 Application/Receiver should have the ability to receive and process the change in patient identifiers list of a patient. Field *MSH-9 Message Type* is valued as **ADT^A47^ADT_A30**. It is expected that the receiver shall change the patient identifiers list of an existing patient record for the patient identified by the Patient ID (defined by the field PID-3).

8.2.2. Outbound Message Segments

8.2.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.5.1)

8.2.2.2. PID - Patient Identification Segment

Table 8.17 PID - Patient Identification segment (HL7 v2.5.1)

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	4	SI	O	[0..1]		00104	Set ID - PID
2	20	CX	O	[0..0]		00105	**Patient ID**
3	250	CX	R	[1..*]		00106	**Patient Identifier List**
4	20	CX	O	[0..0]		00107	**Alternate Patient ID - PID**
5	250	XPN	R	[1..*]		00108	**Patient Name**
6	250	XPN	O	[0..1]		00109	**Mother's Maiden Name**
7	26	TS	CE	[0..1]		00110	**Date/Time of Birth**
8	1	IS	CE	[1..1]	0001	00111	**Administrative Sex**
9	250	XPN	O	[0..1]		00112	**Patient Alias**
10	250	CE	O	[0..1]	0005	00113	Race
11	250	XAD	CE	[0..*]		00114	**Patient Address**
12	4	IS	X	[0..1]	0289	00115	County Code
13	250	XTN	O	[0..*]		00116	Phone Number - Home
14	250	XTN	O	[0..*]		00117	Phone Number - Business
15	250	CE	O	[0..1]	0296	00118	Primary Language
16	250	CE	O	[0..1]	0002	00119	Marital Status
17	250	CE	O	[0..1]	0006	00120	Religion
18	250	CX	C	[0..1]		00121	Patient Account Number
19	16	ST	X	[0..1]		00122	SSN Number - Patient
20	25	DLN	X	[0..1]		00123	Driver's License Number - Patient
21	250	CX	O	[0..*]		00124	Mother's Identifier
22	250	CE	O	[0..1]	0189	00125	Ethnic Group
23	250	ST	O	[0..1]		00126	Birth Place

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
24	1	ID	O	[0..1]	0136	00127	Multiple Birth Indicator
25	2	NM	O	[0..1]		00128	Birth Order
26	250	CE	O	[0..1]	0171	00129	Citizenship
27	250	CE	O	[0..1]	0172	00130	Veterans Military Status
28	250	CE	X	[0..0]	0212	00739	Nationality
29	26	TS	CE	[0..1]		00740	Patient Death Date and Time
30	1	ID	C	[0..1]	0136	00741	Patient Death Indicator
31	1	ID	CE	[0..1]	0136	01535	Identity Unknown Indicator
32	20	IS	CE	[0..*]	0445	01536	Identity Reliability Code
33	26	TS	CE	[0..1]		01537	Last Update Date/Time
34	241	HD	O	[0..1]		01538	Last Update Facility
35	250	CE	CE	[0..1]	0446	01539	**Species Code**
36	250	CE	C	[0..1]	0447	01540	**Breed Code**
37	80	ST	O	[0..1]		01541	Strain
38	250	CE	O	[0..2]		01542	Production Class Code
39	250	CWE	O	[0..*]		01840	Tribal Citizenship

Element names in **bold** indicates that the field is sent by *APIX System*.

8.2.2.3. NTE - Notes and Comments Segment (for PID)

Table 8.18 NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM #	Element Name
1	4	SI	O			00096	SetID - NTE
2	4	ID	O		0105	00097	Source of Comment
3	65536	FT	O	Y		00098	**Comment**
4	250	CE	O		0364	01318	Comment Type

Element names in **bold** indicates that the field is sent by *APIX System*.

8.2.2.4. MRG - Merge Segment

Table 8.19 MRG - Merge segment (HL7 v2.5.1)

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
1	250	CX	R	[1..*]		00211	**Prior Patient Identifier List**
2	250	CX	X	[0..0]		00212	Prior Alternate Patient ID

SEQ	LEN	DT	Usage	Card.	TBL#	ITEM #	Element Name
3	250	CX	O	[0..1]		00213	Prior Patient Account Number
4	250	CX	X		[0..0]	00214	Prior Patient ID
5	250	CX	X	[0..0]		01279	Prior Visit Number
6	250	CX	X	[0..0]		01280	Prior Alternate Visit ID
7	250	XPN	O	[0..*]		01281	**Prior Patient Name**

Element names in **bold** indicates that the field is sent by *APIX System*.

8.2.3. DICOM to HL7 ADT Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component/sub-component value is not listed if the HL7 element should not contain multiple components/sub-components.

Table 8.20 DICOM Patient Attributes to HL7 ADT mapping of PID segment

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set
Patient Identification					
Patient's Name	(0010, 0010)	Patient Name	00108	PID:5	
Patient ID	(0010, 0020)	Patient Identifier List	00106.1	PID:3.1	
Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00106.4.1	PID:3.4.1	
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Item	(FFFE, E000)				
>Universal Entity ID	(0040, 0032)	Patient Identifier List	00106.4.2	PID:3.4.2	
>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00106.4.3	PID:3.4.3	
Patient's Mother's Birth Name	(0010, 1060)	Mother's Maiden Name	00109	PID:6	
OtherPatientIDsSequence	(0010,1002)				
>Item # 1					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Patient ID	(0010, 0020)	Patient Identifier List	00105.1	PID:2.1	
>Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00105.4.1	PID:2.4.1	
>Item # 2					
>Patient ID	(0010, 0020)	Patient Identifier List	00107.1	PID:4.1	
>Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00107.4.1	PID:4.4.1	
Responsible Person	(0010, 2297)	Patient Alias	00112	PID:9	
Patient Species Description	(0010, 2201)	Species Code	01539.2	PID:35.2	
Patient Species Code Sequence	(0010, 2202)				
>Code Value	(0008, 0100)	Species Code	01539.1	PID:35.1	
>Code Scheme Designator	(0008, 0102)	Species Code	01539.3	PID:35.3	
>Code Meaning	(0008, 0103)	Species Code	01539.2	PID:35.2	
Patient Breed Description	(0010, 2292)	Breed Code	01540.2	PID:36.2	
Patient Breed Code Sequence	(0010, 2293)				
>Code Value	(0008, 0100)	Breed Code	01540.1	PID:36.1	
>Code Scheme Designator	(0008, 0102)	Breed Code	01540.3	PID:36.3	
>Code Meaning	(0008, 0103)	Breed Code	01540.2	PID:36.2	
Patient Demographic					
Patient's Birth Date	(0010, 0030)	Date/Time of Birth	00110	PID:7	
Patient's Sex	(0010, 0040)	Administrative Sex	00111.1	PID:8.1	
Patient Comments	(0010, 4000)	Comment	00098	NTE:3	
Patient Medical					
Patient's Sex Neutered	(0010, 2203)	Administrative Sex	00111.2	PID:8.2	
Patient's Address	(0010, 1040)	Patient Address	00114	PID:11	

Table 8.21 HL7 ADT mapping of MRG segment to DICOM Patient Attributes

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set
Patient Identification					
Patient's Name	(0010, 0010)	Prior Patient Name	01281	MRG:7	
Patient ID	(0010, 0020)	Prior Patient Identifier List	00211.1	MRG:1.1	
Issuer of Patient ID	(0010, 0021)	Prior Patient Identifier List	00211.1.1	MRG:1.1.1	
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Universal Entity ID	(0040, 0032)	Prior Patient Identifier List	00211.1.2	MRG:1.1.2	
>Universal Entity ID Type	(0040, 0033)	Prior Patient Identifier List	00211.1.3	MRG:1.1.3	

[1] If the Patient Species Code Sequence is present in the attributes, then the value is taken from the Code Meaning of the sequence else if only the Patient Species Description is present then the description value is used in component 2 of this field.

[2] If the Patient Breed Code Sequence is present in the attributes, then the value is taken from the Code Meaning of the sequence else if only the Patient Breed Description is present then the description value is used in component 2 of this field.

[3] This field value, if available, shall be present only in HL7 messages sent out of the archive for HL7 Forwarding case and IOCM triggered HL7 messages. For External Archive HL7 services case, this field value shall not be present in HL7 messages sent out of the archive.

9. Procedure Management Service

The Procedure Management Service processes HL7 order messages from remote HL7 applications, updating order information in the provided DICOM Modality Worklist and already archived DICOM objects, and send HL7 order messages to remote HL7 applications on procedure status updates.

9.1. Inbound

9.1.1. Inbound Messages

9.1.1.1. ORM - General Order Message (Event O01)

Supported HL7 version: 2.3.1 both for RAD-4 and RAD-13

9.1.1.1.1. Trigger Event

The Department System Scheduler/Order Filler determines procedures which need to be performed to fill the order, what Procedure Steps need to be performed for each Procedure, and timing and necessary resources. Note: This transaction shall be used the first time a particular Study Instance UID is sent from the Department System Scheduler/Order Filler to the Image Manager or Report Manager. If the Study Instance UID has been sent previously, then Procedure Updated (Transaction RAD-13) shall be used.

9.1.1.1.2. Supported Segments

The following segments are processed from an incoming ORM^O01^ORM_O01 message:

Table 9.1 Supported segments of ORM^O01^ORM_O01 (HL7 v2.3.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.3.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.3.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.3.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - Patient Visit segment (HL7 v2.3.1)	Patient Visit	R	[1..1]	3
ORC - Order Control segment - (HL7 v2.3.1)	Common Order	R	[1..*]	4
OBR - Observation Request segment - (HL7 v2.3.1)	Order Detail	R	[1..*]	4

Segment	Meaning	Usage	Card.	HL7 chapter
NTE - Notes and Comments (for Detail) segment	Notes and Comments (for Detail)	O	[0..*]	4
ZDS - Z segment (HL7 v2.3.1 & Eyecare)	Additional identification information	C	[0..1]	
OBX - Observation / Results segment	Observation / Result	O	[0..*]	7

9.1.1.1.3. Performed Actions

Patient Demographic Information are extracted from the PID and PV1 segments of the received message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of PID segment to DICOM Patient Attributes. Optionally, if the received message also contains OBX segments, then patient demographic attributes are checked in these segments as well . If a Patient record with the extracted primary Patient ID already exists in the database, that Patient record will get updated. If there is no such Patient record a new Patient record will be inserted into the database . Based on the information received in the ORC and OBR segments, Modality Worklist Item is created/updated in the archive for the created/updated patient. If the message contains ZDS segment, the specified Study Instance UID will be used else system will generate a Study Instance UID for the Modality Worklist Item attributes.

[1] The creation of new Patient records will be suppressed for message types which are listed by configuration parameter *HL7 No Patient Create Message Type(s)* of *APIX System*.

9.1.1.2. OMG - General Clinical Order Message (Event O19)

Supported HL7 version: 2.5.1 (EYECARE-21 and EYECARE-22)

9.1.1.2.1. Trigger Event

Same as specified in Section 9.1.1.1.1. This message is sent for eyecare profile.

9.1.1.2.2. Supported Segments

Table 9.2 Supported segments of OMG^O19^OMG_O19 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2

Segment	Meaning	Usage	Card.	HL7 chapter
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - Patient Visit segment (HL7 v2.5.1)	Patient Visit	R	[1..1]	3
ORC - Order Control segment - (HL7 v2.5.1)	Common Order	R	[1..*]	4
TQ1 - Timing/Quantity segment - (HL7 v2.5.1 & Eyecare)	Timing/Quantity	R	[1..*]	4
OBR - Observation Request segment - (HL7 v2.5.1)	Order Detail	R	[1..*]	4
NTE - Notes and Comments (for Detail) segment	Notes and Comments (for Detail)	O	[0..*]	4
ZDS - Z segment (HL7 v2.3.1 & Eyecare)	Additional identification information	C*	[0..*]	
OBX - Observation / Results segment	Observation / Result	O	[0..*]	7

9.1.1.2.3. Performed Actions

Same as specified in Section 9.1.1.1.3.

9.1.1.3. OMI - Imaging Order Message (Event O23)

Supported HL7 version: 2.5.1 (RAD-4 and RAD-13)

9.1.1.3.1. Trigger Event

Same as specified in Section 9.1.1.1.1.

9.1.1.3.2. Supported Segments

Table 9.3 Supported segments of OMI^O23^OMI_O23 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - Patient Visit segment (HL7 v2.5.1)	Patient Visit	R	[1..1]	3
ORC - Order Control segment - (HL7 v2.5.1)	Common Order	R	[1..*]	4
TQ1 - Timing/Quantity segment - (HL7 v2.5.1 & Eyecare)	Timing/Quantity	R	[1..1]	4
OBR - Observation Request segment - (HL7 v2.5.1)	Order Detail	R	[1..*]	4
NTE - Notes and Comments (for Detail) segment	Notes and Comments (for Detail)	O	[0..*]	4
IPC - Imaging Procedure Control segment (HL7 v2.5.1)	Imaging Procedure Control	R	[1..*]	4
OBX - Observation / Results segment	Observation / Result	O	[0..*]	7

9.1.1.3.3. Performed Actions

Same as specified in Section 9.1.1.1.3, with the exception that Study Instance UID will be taken from IPC segment.

9.1.2. Inbound Message Segments

9.1.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.3.1) or MSH - Message Header segment (HL7 v2.5.1)

9.1.2.2. PID - Patient Identification segment

Same as specified in PID - Patient Identification segment (HL7 v2.3.1) or PID - Patient Identification segment (HL7 v2.5.1)

9.1.2.3. NTE - Notes and Comments segment (for PID)

Same as specified in NTE - Notes and Comments segment (for PID) (HL7 v2.3.1) or NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

9.1.2.4. PV1 - Patient Visit segment

Table 9.4 Patient Visit segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00131	Set ID - PV1
2	1	IS	R	0004	00132	Patient Class
3	80	PL	C		00133	Assigned Patient Location
4	2	IS	O	0007	00134	Admission Type
5	20	CX	O		00135	Preadmit Number
6	80	PL	O		00136	Prior Patient Location
7	60	XCN	C	0010	00137	Attending Doctor
8	60	XCN	C	0010	00138	**Referring Doctor**
9	60	XCN	R2	0010	00139	Consulting Doctor
10	3	IS	C	0069	00140	Hospital Service
11	80	PL	O		00141	Temporary Location
12	2	IS	O	0087	00142	Preadmit Test Indicator
13	2	IS	O	0092	00143	Readmission Indicator
14	3	IS	O	0023	00144	Admit Source
15	2	IS	C	0009	00145	**Ambulatory Status**
16	2	IS	O	0099	00146	VIP Indicator
17	60	XCN	C	0010	00147	Admitting Doctor
18	2	IS	O	0018	00148	Patient Type
19	20	CX	C		00149	**Visit Number**
20	50	FC	O	0064	00150	Financial Class

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
21	2	IS	O	0032	00151	Charge Price Indicator
22	2	IS	O	0045	00152	Courtesy Code
23	2	IS	O	0046	00153	Credit Rating
24	2	IS	O	0044	00154	Contract Code
25	8	DT	O		00155	Contract Effective Date
26	12	NM	O		00156	Contract Amount
27	3	NM	O		00157	Contract Period
28	2	IS	O	0073	00158	Interest Code
29	1	IS	O	0110	00159	Transfer to Bad Debt Code
30	8	DT	O		00160	Transfer to Bad Debt Date
31	10	IS	O	0021	00161	Bad Debt Agency Code
32	12	NM	O		00162	Bad Debt Transfer Amount
33	12	NM	O		00163	Bad Debt Recovery Amount
34	1	IS	O	0111	00164	Delete Account Indicator
35	8	DT	O		00165	Delete Account Date
36	3	IS	O	0112	00166	Discharge Disposition
37	25	CM	O	0113	00167	Discharge to Location
38	80	CE	O	0114	00168	Diet Type
39	2	IS	O	0115	00169	Servicing Facility
40	1	IS	O	0116	00170	Bed Status
41	2	IS	O	0117	00171	Account Status
42	80	PL	O		00172	Pending Location
43	80	PL	O		00173	Prior Temporary Location
44	26	TS	O		00174	Admit Date/Time
45	26	TS	O		00175	Discharge Date/Time
46	12	NM	O		00176	Current Patient Balance
47	12	NM	O		00177	Total Charges
48	12	NM	O		00178	Total Adjustments
49	12	NM	O		00179	Total Payments
50	20	CX	O	0203	00180	Alternate Visit ID
51	1	IS	C	0326	01226	Visit Indicator
52	60	XCN	O	0010	01224	Other Healthcare Provider

Table 9.5 Patient Visit segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00131	Set ID - PV1
2	1	IS	R	0004	00132	Patient Class

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
3	80	PL	C		00133	Assigned Patient Location
4	2	IS	O	0007	00134	Admission Type
5	250	CX	O		00135	Preadmit Number
6	80	PL	C		00136	Prior Patient Location
7	250	XCN	O	0010	00137	Attending Doctor
8	250	XCN	O	0010	00138	**Referring Doctor**
9	250	XCN	X	0010	00139	Consulting Doctor
10	3	IS	O	0069	00140	Hospital Service
11	80	PL	C		00141	Temporary Location
12	2	IS	O	0087	00142	Preadmit Test Indicator
13	2	IS	O	0092	00143	Readmission Indicator
14	6	IS	O	0023	00144	Admit Supplier
15	2	IS	C	0009	00145	**Ambulatory Status**
16	2	IS	O	0099	00146	VIP Indicator
17	250	XCN	O	0010	00147	Admitting Doctor
18	2	IS	O	0018	00148	Patient Type
19	250	CX	C		00149	**Visit Number**
20	50	FC	O	0064	00150	Financial Class
21	2	IS	O	0032	00151	Charge Price Indicator
22	2	IS	O	0045	00152	Courtesy Code
23	2	IS	O	0046	00153	Credit Rating
24	2	IS	O	0044	00154	Contract Code
25	8	DT	O		00155	Contract Effective Date
26	12	NM	O		00156	Contract Amount
27	3	NM	O		00157	Contract Period
28	2	IS	O	0073	00158	Interest Code
29	4	IS	O	0110	00159	Transfer to Bad Debt Code
30	8	DT	O		00160	Transfer to Bad Debt Date
31	10	IS	O	0021	00161	Bad Debt Agency Code
32	12	NM	O		00162	Bad Debt Transfer Amount
33	12	NM	O		00163	Bad Debt Recovery Amount
34	1	IS	O	0111	00164	Delete Account Indicator
35	8	DT	O		00165	Delete Account Date
36	3	IS	O	0112	00166	Discharge Disposition
37	47	DLD	O	0113	00167	Discharge to Location
38	250	CE	O	0114	00168	Diet Type
39	2	IS	O	0115	00169	Servicing Facility

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
40	1	IS	X	0116	00170	Bed Status
41	2	IS	O	0117	00171	Account Status
42	80	PL	C		00172	Pending Location
43	80	PL	O		00173	Prior Temporary Location
44	26	TS	RE		00174	Admit Date/Time
45	26	TS	RE		00175	Discharge Date/Time
46	12	NM	O		00176	Current Patient Balance
47	12	NM	O		00177	Total Charges
48	12	NM	O		00178	Total Adjustments
49	12	NM	O		00179	Total Payments
50	250	CX	O	0203	00180	Alternate Visit ID
51	1	IS	C	0326	01226	Visit Indicator
52	250	XCN	X	0010	01274	Other Healthcare Provider

9.1.2.5. ORC - Order Control segment

Table 9.6 Order Control segment - (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name	Note
1	2	ID	R	0119	00215	**Order Control**	
2	22	EI	R		00216	**Placer Order Number**	
3	22	EI	O		00217	**Filler Order Number**	
4	22	EI	C		00218	Placer Group Number	
5	2	ID	O	0038	00219	**Order Status**	
6	1	ID	O	0121	00220	Response Flag	
7	200	TQ	R		00221	**Quantity/Timing**	
8	200	CM	C		00222	Parent	
9	26	TS	R		00223	Date/Time of Transaction	
10	120	XCN	R2		00224	Entered By	
11	120	XCN	O		00225	Verified By	
12	120	XCN	R		00226	Ordering Provider	
13	80	PL	O		00227	Enterer's Location	
14	40	XTN	R2		00228	Callback Phone Number	
15	26	TS	O		00229	Order Effective Date/Time	
16	200	CE	O		00230	Order Control Code Reason	
17	60	CE	R		00231	Entering Organization	
18		CE	O		00232	**Entering Device**	

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name	Note
19	120	XCN	O		00233	Action By	

9.1.2.6. ORC - Order Control segment

Table 9.7 Order Control segment - (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	2	ID	R	0119	00215	**Order Control**
2	22	EI	R		00216	**Placer Order Number**
3	22	EI	X		00217	**Filler Order Number**
4	22	EI	C		00218	Placer Group Number
5	2	ID	O	0038	00219	**Order Status**
6	1	ID	O	0121	00220	Response Flag
7	200	TQ	X		00221	Quantity/Timing
8	200	EIP	C		00222	Parent
9	26	TS	R		00223	Date/Time of Transaction
10	250	XCN	R2		00224	Entered By
11	250	XCN	O		00225	Verified By
12	250	XCN	R		00226	Ordering Provider
13	80	PL	O		00227	Enterer's Location
14	250	XTN	R2		00228	Callback Phone Number
15	26	TS	O		00229	Order Effective Date/Time
16	250	CE	O		00230	Order Control Code Reason
17	250	CE	R		00231	Entering Organization
18	250	CE	O		00232	Entering Device
19	250	XCN	O		00233	Action By
20	250	CE	O	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	O		01311	Ordering Facility Name
22	250	XAD	O		01312	Ordering Facility Address
23	250	XTN	O		01313	Ordering Facility Phone Number
24	250	XAD	O		01314	Ordering Provider Address
25	250	CWE	O		01473	Order Status Modifier
26	60	CWE	C	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	O		01642	Filler's Expected Availability Date/Time
28	250	CWE	O	0177	00615	Confidentiality Code
29	250	CWE	O	0482	01643	Order Type
30	250	CNE	O	0483	01644	Enterer Authorization Mode

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
31	250	CWE	O		02286	Parent Universal Service Identifier

9.1.2.7. TQ1 - Timing/Quantity segment

Table 9.8 Timing/Quantity segment - (HL7 v2.5.1 & Eyecare)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		01627	Set ID - TQ1
2	20	CQ	O		01628	Quantity
3	540	RPT	O	0335	01629	Repeat Pattern
4	20	TM	O		01630	Explicit Time
5	20	CQ	O		01631	Relative Time and Units
6	20	CQ	O		01632	Service Duration
7	26	TS	R		01633	**Start Date/Time**
8	26	TS	O		01634	End Date/Time
9	250	CWE	O	0485	01635	**Priority**
10	250	TX	O		01636	Condition Text
11	250	TX	O	0065	01637	Text Instruction
12	10	ID	C	0472	01638	Conjunction
13	20	CQ	O		01639	Occurrence Duration
14	10	NM	O		01640	Total Occurrences

9.1.2.8. OBR - Observation Request segment

Table 9.9 Observation Request segment - (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	75	EI	R		00216	Placer Order Number
3	75	EI	O		00217	Filler Order Number
4	200	CE	R		00238	**Universal Service ID**
5	2	ID	O		00239	Priority
6	26	TS	O		00240	Requested Date/Time
7	26	TS	O		00241	Observation Date/Time
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	60	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
12	60	CE	R2		00246	**Danger Code**
13	300	ST	C		00247	**Relevant Clinical Info**
14	26	TS	O		00248	Specimen Received Date/Time
15	300	CM	C	0070	00249	Specimen Source
16	80	XCN	R		00226	**Ordering Provider**
17	40	XTN	O		00250	Order Callback Phone Number
18	60	ST	O		00251	**Placer Field 1**
19	60	ST	O		00252	**Placer Field 2**
20	60	ST	O		00253	**Filler Field 1**
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time
23	40	CM	O		00256	Charge to Practice
24	10	ID	O	0074	00257	**Diagnostic Service Sect ID**
25	1	ID	O	0123	00258	Result Status
26	400	CM	O		00259	Parent Result
27	200	TQ	R		00221	Quantity/Timing
28	150	XCN	O		00260	Result Copies To
29	150	CM	C		00261	Parent
30	20	ID	R2	0124	00262	**Transportation Mode**
31	300	CE	R2		00263	**Reason For Study**
32	200	CM	O		00264	Principal Result Interpreter
33	200	CM	O		00265	Assistant Result Interpreter
34	200	CM	O		00266	**Technician**
35	200	CM	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time
37	4	NM	O		01028	Number of Sample Containers
38	60	CE	O		01029	Transport Logistics of Collected Sample
39	200	CE	O		01030	Collector's Comment
40	60	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	R2	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	200	CE	O		01034	Planned Patient Transport Comment
44	80	CE	O	0088	00393	**Procedure Code**
45	80	CE	O	0340	01036	Procedure Code Modifier

9.1.2.9. OBR - Observation Request segment

Table 9.10 Observation Request segment - (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	22	EI	R		00216	Placer Order Number
3	22	EI	O		00217	Filler Order Number
4	250	CE	R		00238	Universal Service ID
5	2	ID	O		00239	Priority
6	26	TS	O		00240	Requested Date/Time
7	26	TS	O		00241	Observation Date/Time
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	250	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code
12	250	CE	R2		00246	**Danger Code**
13	300	ST	C		00247	**Relevant Clinical Info**
14	26	TS	X		00248	Specimen Received Date/Time
15	300	SPS	X	0070	00249	Specimen Source
16	250	XCN	R		00226	**Ordering Provider**
17	250	XTN	O		00250	Order Callback Phone Number
18	60	ST	O		00251	Placer Field 1
19	60	ST	O		00252	**Placer Field 2**
20	60	ST	O		00253	Filler Field 1
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time
23	40	MOC	O		00256	Charge to Practice
24	10	ID	O	0074	00257	Diagnostic Service Sect ID
25	1	ID	O	0123	00258	Result Status
26	400	PRL	O		00259	Parent Result
27	200	TQ	X		00221	Quantity/Timing
28	250	XCN	O		00260	Result Copies To
29	200	EIP	C		00261	Parent
30	20	ID	R2	0124	00262	**Transportation Mode**
31	250	CE	R2		00263	**Reason For Study**
32	200	NDL	O		00264	Principal Result Interpreter
33	200	NDL	O		00265	Assistant Result Interpreter
34	200	NDL	O		00266	**Technician**
35	200	NDL	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
37	4	NM	O		01028	Number of Sample Containers
38	250	CE	O		01029	Transport Logistics of Collected Sample
39	250	CE	O		01030	Collector's Comment
40	250	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	R2	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	250	CE	O		01034	Planned Patient Transport Comment
44	250	CE	O	0088	00393	**Procedure Code**
45	250	CE	O	0340	01036	Procedure Code Modifier
46	250	CE	R2	0411	01474	Placer Supplemental Service Information
47	250	CE	R2	0411	01475	Filler Supplemental Service Information
48	250	CWE	R2	0476	01646	Medically Necessary Duplicate Procedure Reason
49	2	IS	O	0507	01647	Result Handling
50	250	CWE	O		02286	Parent Universal Service Identifier

9.1.2.10. NTE - Notes and Comments (for Detail) segment

Table 9.11 Notes and Comments (for Detail) segment

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00096	Set ID - NTE
2	8	ID	R2	0105	00097	Source of Comment
3	10240	FT	R		00098	**Comment**
4	60	CE	0		01318	Comment Type

9.1.2.11. ZDS - Z segment

Table 9.12 Z segment (HL7 v2.3.1 & Eyecare)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	200	RP	R		Z0001	**Study Instance UID**

9.1.2.12. IPC - Imaging Procedure Control segment

Table 9.13 Imaging Procedure Control segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name	Note
1	80	EI	R		00237	**Accession Identifier**	

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name	Note
2	22	EI	R		00216	**Requested Procedure ID**	
3	70	EI	R		00217	**Study Instance UID**	
4	22	EI	R		00238	**Scheduled Procedure Step ID**	
5	16	CE	R+		00239	**Modality**	
6	250	CE	R2		00246	**Protocol Code**	
7		EI	O		01663	**Scheduled Station Name**	
8	250	CE	O		01664	**Scheduled Procedure Step Location**	
9		ST	O		01665	**Scheduled Station AE Title**	

9.1.2.13. OBX - Observation / Results segment

Table 9.14 Observation / Results segment

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00569	Set ID - OBX
2	2	ID	C	0125	00570	Value Type
3	250	CE	R		00571	**Observation Identifier**
4	20	ST	C		00572	Observation Sub-ID
5	99999[1]	varies	C		00573	**Observation Value**

Element names in **bold** indicates that the field is used by *APIX System*.

9.1.3. HL7 Order to DICOM MWL Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component / sub-component value is not listed if the HL7 element does not contain multiple components / sub-components.

9.1.3.1. ORM - HL7 order mapping to DICOM Modality Worklist Attributes

Table 9.15 HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.3.1 and v2.5.1)

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Patient Identification					
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Demographic					
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient's Weight	(0010, 1030)	Observation Value	00573	OBX:5	
Patient's Size	(0010, 1020)	Observation Value	00573	OBX:5	
Patient Medical					
Patient State	(0038, 0500)	Danger Code	00246	OBR:12	
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15	
Medical Alerts	(0010, 2000)	Relevant Clinical Info	00247	OBR:13	
Patient's Sex Neutered	(0010, 2203)	Administrative Sex	00111.2	PID:8.2	'Y'='ALTERED', 'N'='UNALTERED'
Scheduled Procedure Step					
Scheduled Procedure Step Sequence	(0040, 0100)				
>Scheduled Station AE Title	(0040, 0001)				
>Scheduled Procedure Step Start Date	(0040, 0002)	Quantity/Timing	00221.4	ORC:7.4	
>Scheduled Procedure Step Start Time	(0040, 0003)	Quantity/Timing	00221.4	ORC:7.4	
>Modality	(0008, 0060)	Diagnostic Serv Sect ID	00257	OBR:24	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Scheduled Performing Physician's Name	(0040, 0006)	Technician	00266	OBR:34.1	
>Scheduled Procedure Step Description	(0040, 0007)	Universal Service ID	00238.4.5	OBR:4.5	
>Scheduled Station Name	(0040, 0010)				
>Scheduled Protocol Code Sequence	(0040, 0008)				
>>Code Value	(0008, 0100)	Universal Service ID	00238.4.4	OBR:4.4	
>>Code Scheme Designator	(0008, 0102)	Universal Service ID	00238.4.6	OBR:4.6	
>>Code Meaning	(0008, 0104)	Universal Service ID	00238.4.5	OBR:4.5	
>Scheduled Procedure Step ID	(0040, 0009)	Filler Field 1	00253	OBR:20	
>Scheduled Procedure Step Status	(0040, 0020)	Order Control, Order Status	00215, 00219	ORC:1, ORC:5	
Requested Procedure					
Requested Procedure ID	(0040, 1001)	Placer field 2	00252	OBR:19	
Reason for Requested Procedure	(0040, 1002)	Reason for Study	00263.2	OBR:31.2	
Reason for Requested Procedure Code Sequence	(0040, 100A)				
>Code Value	(0008, 0100)	Reason for Study	00263.1	OBR:31.1	
>Code Scheme Designator	(0008, 0102)	Reason for Study	00263.3	OBR:31.3	
>Code Meaning	(0008, 0104)	Reason for Study	00263.2	OBR:31.2	
Requested Procedure Description	(0032, 1060)	Procedure Code	00393.2	OBR:44.2	
Requested Procedure Code Sequence	(0032, 1064)				
>Code Value	(0008, 0100)	Procedure Code	00393.1	OBR:44.1	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Code Scheme Designator	(0008, 0102)	Procedure Code	00393.3	OBR:44.3	
>Code Meaning	(0008, 0104)	Procedure Code	00393.2	OBR:44.2	
Study Instance UID	(0020, 000D)	Study Instance UID	Z0001.1	ZDS:1.1	
Requested Procedure Priority	(0040, 1003)	Quantity/Timing	00221.6	ORC:7.6	
Patient Transport Arrangements	(0040, 1004)	Transportation Mode	00262	OBR:30	
Imaging Request					
Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16	
Referring Physician's Name	(0008, 0090)	Referring Doctor	00138	PV1:8	
Placer Issuer and Number	(0040, 2016)	Placer Order	00216.1	ORC:2.1	
Order Placer Identifier Sequence	(0040, 0026)				
>Item	(FFFE, E000)				
>Local Namespace Entity ID	(0040, 0031)	Placer Order	00216.2	ORC:2.2	
>Universal Entity ID	(0040, 0032)	Placer Order	00216.3	ORC:2.3	
>Universal Entity ID Type	(0040, 0033)	Placer Order	00216.4	ORC:2.4	
Filler Issuer and Number	(0040, 2017)	Filler Order	00217.1	ORC:3.1	
Order Filler Identifier Sequence	(0040, 0027)				
>Item	(FFFE, E000)				
>Local Namespace Entity ID	(0040, 0031)	Filler Order	00217.2	ORC:3.2	
>Universal Entity ID	(0040, 0032)	Filler Order	00217.3	ORC:3.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order	00217.4	ORC:3.4	
Visit Identification					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Route of Admissions	(0038, 0016)	Patient Class	00132	PV1:2	
Admission ID	(0038, 0010)	Visit Number	00149.1 or 00121.1	PV1:19.1 or PID:18.1	
Issuer of Admission ID Sequence	(0038, 0014)				
>Item	(FFFE, E000)				
>Local Namespace Entity ID	(0040, 0031)	Visit Number	00149.4.1 or 00121.4.1	PV1:19.4.1 or PID:18.4.1	
>Universal Entity ID	(0040, 0032)	Visit Number	00149.4.2 or 00121.4.2	PV1:19.4.2 or PID:18.4.2	
>Universal Entity ID Type	(0040, 0033)	Visit Number	00149.4.3 or 00121.4.3	PV1:19.4.3 or PID:18.4.3	
Institution Name	(0008, 0080)	Entering Organization	00231.2	ORC:17.2	
Institution Code Sequence	(0008, 0082)				
>Item	(FFFE, E000)				
>Code Value	(0008, 0100)	Institution Code	00231.1	ORC:17.1	
>Code Scheme Designator	(0008, 0102)	Institution Code	00231.3	ORC:17.3	
>Code Meaning	(0008, 0104)	Institution Code	00231.2	ORC:17.2	
Institution Address	(0008, 0081)	Ordering Facility Address	01312	ORC:22	

9.1.3.2. OMI - HL7 order mapping to DICOM Modality Worklist Attributes

Table 9.16 HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.5.1)

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	
Patient Identification					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Demographic					
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Medical					
Patient State	(0038, 0500)	Danger Code	00246	OBR:12	
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15	
Medical Alerts	(0010, 2000)	Relevant Clinical Info	00247	OBR:13	
Patient's Sex Neutered	(0010, 2203)	Administrative Sex	00111.2	PID:8.2	'Y'='ALTERED', 'N'='UNALTERED'
Scheduled Procedure Step					
Scheduled Procedure Step Sequence	(0040, 0100)				
>Scheduled Station AE Title	(0040, 0001)	Scheduled Station AE Title	01665	IPC:9	
>Scheduled Procedure Step Start Date	(0040, 0002)	Start Date/Time	01633	TQ1:7	
>Scheduled Procedure Step Start Time	(0040, 0003)	Start Date/Time	01633	TQ1:7	
>Modality	(0008, 0060)	Modality	00239	IPC:5	
>Scheduled Performing Physician's Name	(0040, 0006)	Technician	00266	OBR:34.1	
>Scheduled Procedure Step Description	(0040, 0007)	Protocol Code	00246.2	IPC:6.2	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Scheduled Station Name	(0040, 0010)	Scheduled Station Name	01663	IPC:7	
>Scheduled Procedure Step Location	(0040, 0011)	Scheduled Procedure Step Location	01664	IPC:8	
>Scheduled Protocol Code Sequence	(0040, 0008)				
>>Code Value	(0008, 0100)	Protocol Code	00246.1	IPC:6.1	
>>Code Scheme Designator	(0008, 0102)	Protocol Code	00246.3	IPC:6.3	
>>Code Meaning	(0008, 0104)	Protocol Code	00246.2	IPC:6.2	
>Scheduled Procedure Step ID	(0040, 0009)	Scheduled Procedure Step ID	00238	IPC:4	
>Scheduled Procedure Step Status	(0040, 0020)	Order Control, Order Status	00215, 00219	ORC:1, ORC:5	
Requested Procedure					
Requested Procedure ID	(0040, 1001)	Requested Procedure ID	00216	IPC:2	
Reason for Requested Procedure	(0040, 1002)	Reason for Study	00263.2	OBR:31.2	
Reason for Requested Procedure Code Sequence	(0040, 100A)				
>Code Value	(0008, 0100)	Reason for Study	00263.1	OBR:31.1	
>Code Scheme Designator	(0008, 0102)	Reason for Study	00263.3	OBR:31.3	
>Code Meaning	(0008, 0104)	Reason for Study	00263.2	OBR:31.2	
Requested Procedure Description	(0032, 1060)	Procedure Code	00393.2	OBR:44.2	
Requested Procedure Code Sequence	(0032, 1064)				
>Code Value	(0008, 0100)	Procedure Code	00393.1	OBR:44.1	
>Code Scheme Designator	(0008, 0102)	Procedure Code	00393.3	OBR:44.3	
>Code Meaning	(0008, 0104)	Procedure Code	00393.2	OBR:44.2	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Study Instance UID	(0020, 000D)	Study Instance UID	00217	IPC:3	
Requested Procedure Priority	(0040, 1003)	Start Date/Time	01633	TQ1:9	
Patient Transport Arrangements	(0040, 1004)	Transportation Mode	00262	OBR:30	
Imaging Request					
Accession Number	(0008, 0050)	Accession Identifier	01330	IPC:1	
Issuer Of Accession Number Sequence	(0008, 0051)				
>Local Namespace Entity ID	(0040, 0031)	Accession Identifier	01330.2	IPC:1.2	
>Universal Entity ID	(0040, 0032)	Accession Identifier	01330.2	IPC:1.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order #	01330.2	IPC:1.4	
Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16	
Referring Physician's Name	(0008, 0090)	Referring Doctor	00138	PV1:8	
Placer Issuer and Number	(0040, 2016)	Placer Order #	00216.1	ORC:2.1	
Order Placer Identifier Sequence	(0040, 0026)				
>Local Namespace Entity ID	(0040, 0031)	Placer Order #	00216.2	ORC:2.2	
>Universal Entity ID	(0040, 0032)	Placer Order #	00216.3	ORC:2.3	
>Universal Entity ID Type	(0040, 0033)	Placer Order #	00216.4	ORC:2.4	
Filler Issuer and Number	(0040, 2017)	Filler Order #	00217.1	ORC:3.1	
Order Filler Identifier Sequence	(0040, 0027)				
>Local Namespace Entity ID	(0040, 0031)	Filler Order #	00217.2	ORC:3.2	
>Universal Entity ID	(0040, 0032)	Filler Order #	00217.3	ORC:3.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order #	00217.4	ORC:3.4	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Visit Identification					
Route of Admissions	(0038, 0016)	Patient Class	00132	PV1:2	
Admission ID	(0038, 0010)	Visit Number	00149.1 or 00121.1	PV1:19.1 or PID:18.1	
Issuer of Admission ID Sequence	(0038, 0014)				
>Item	(FFFE, E000)				
>Local Namespace Entity ID	(0040, 0031)	Visit Number	00149.4.1 or 00121.4.1	PV1:19.4.1 or PID:18.4.1	
>Universal Entity ID	(0040, 0032)	Visit Number	00149.4.2 or 00121.4.2	PV1:19.4.2 or PID:18.4.2	
>Universal Entity ID Type	(0040, 0033)	Visit Number	00149.4.3 or 00121.4.3	PV1:19.4.3 or PID:18.4.3	
Institution Name	(0008, 0080)	Entering Organization	00231.2	ORC:17.2	
Institution Code Sequence	(0008, 0082)				
>Item	(FFFE, E000)				
>Code Value	(0008, 0100)	Institution Code	00231.1	ORC:17.1	
>Code Scheme Designator	(0008, 0102)	Institution Code	00231.3	ORC:17.3	
>Code Meaning	(0008, 0104)	Institution Code	00231.2	ORC:17.2	
Institution Address	(0008, 0081)	Ordering Facility Address	01312	ORC:22	

9.1.3.3. OMG - HL7 order mapping to DICOM Modality Worklist Attributes

Table 9.17 HL7 order mapping to DICOM Modality Worklist Attributes for Eyecare

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	
Patient Identification					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Demographic					
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Medical					
Patient State	(0038, 0500)	Danger Code	00246	OBR:12	
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15	
Medical Alerts	(0010, 2000)	Relevant Clinical Info	00247	OBR:13	
Patient's Sex Neutered	(0010, 2203)	Administrative Sex	00111.2	PID:8.2	'Y'='ALTERED', 'N'='UNALTERED'
Scheduled Procedure Step					
Scheduled Procedure Step Sequence	(0040, 0100)				
>Scheduled Station AE Title	(0040, 0001)				
>Scheduled Procedure Step Start Date	(0040, 0002)	Start Date/Time	01633	TQ1:7	
>Scheduled Procedure Step Start Time	(0040, 0003)	Start Date/Time	01633	TQ1:7	
>Modality	(0008, 0060)	Diagnostic Serv Sect ID	00257	OBR:24	
>Scheduled Performing Physician's Name	(0040, 0006)	Technician	00266	OBR:34.1	
>Scheduled Procedure Step Description	(0040, 0007)	Universal Service ID	00238.4.5	OBR:4.5	
>Scheduled Station Name	(0040, 0010)				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Scheduled Protocol Code Sequence	(0040, 0008)				
>>Code Value	(0008, 0100)	Universal Service ID	00238.4.4	OBR:4.4	
>>Code Scheme Designator	(0008, 0102)	Universal Service ID	00238.4.6	OBR:4.6	
>>Code Meaning	(0008, 0104)	Universal Service ID	00238.4.5	OBR:4.5	
>Scheduled Procedure Step ID	(0040, 0009)	Filler Field 1	00253	OBR:20	
>Scheduled Procedure Step Status	(0040, 0020)	Order Control, Order Status	00215, 00219	ORC:1, ORC:5	
Requested Procedure					
Requested Procedure ID	(0040, 1001)	Placer field 2	00252	OBR:19	
Reason for Requested Procedure	(0040, 1002)	Reason for Study	00263.2	OBR:31.2	
Reason for Requested Procedure Code Sequence	(0040, 100A)				
>Code Value	(0008, 0100)	Reason for Study	00263.1	OBR:31.1	
>Code Scheme Designator	(0008, 0102)	Reason for Study	00263.3	OBR:31.3	
>Code Meaning	(0008, 0104)	Reason for Study	00263.2	OBR:31.2	
Requested Procedure Description	(0032, 1060)	Procedure Code	00393.2	OBR:44.2	
Requested Procedure Code Sequence	(0032, 1064)				
>Code Value	(0008, 0100)	Procedure Code	00393.1	OBR:44.1	
>Code Scheme Designator	(0008, 0102)	Procedure Code	00393.3	OBR:44.3	
>Code Meaning	(0008, 0104)	Procedure Code	00393.2	OBR:44.2	
Study Instance UID	(0020, 000D)	Study Instance UID	Z0001.1	ZDS:1.1	
Requested Procedure Priority	(0040, 1003)	Start Date/Time	01633	TQ1:9	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Requested Procedure Comments	(0040, 1400)	Comment	00098	NTE:3	
Patient Transport Arrangements	(0040, 1004)	Transportation Mode	00262	OBR:30	
Imaging Request					
Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16	
Referring Physician's Name	(0008, 0090)	Referring Doctor	00138	PV1:8	
Placer Issuer and Number	(0040, 2016)	Placer Order #	00216.1	ORC:2.1	
Order Placer Identifier Sequence	(0040, 0026)				
>Local Namespace Entity ID	(0040, 0031)	Placer Order #	00216.2	ORC:2.2	
>Universal Entity ID	(0040, 0032)	Placer Order #	00216.3	ORC:2.3	
>Universal Entity ID Type	(0040, 0033)	Placer Order #	00216.4	ORC:2.4	
Filler Issuer and Number	(0040, 2017)	Filler Order #	00217.1	ORC:3.1	
Order Filler Identifier Sequence	(0040, 0027)				
>Local Namespace Entity ID	(0040, 0031)	Filler Order #	00217.2	ORC:3.2	
>Universal Entity ID	(0040, 0032)	Filler Order #	00217.3	ORC:3.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order #	00217.4	ORC:3.4	
Visit Identification					
Route of Admissions	(0038, 0016)	Patient Class	00132	PV1:2	
Admission ID	(0038, 0010)	Visit Number	00149.1 or 00121.1	PV1:19.1 or PID:18.1	
Issuer of Admission ID Sequence	(0038, 0014)				
>Item	(FFFE, E000)				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Local Namespace Entity ID	(0040, 0031)	Visit Number	00149.4.1 or 00121.4.1	PV1:19.4.1 or PID:18.4.1	
>Universal Entity ID	(0040, 0032)	Visit Number	00149.4.2 or 00121.4.2	PV1:19.4.2 or PID:18.4.2	
>Universal Entity ID Type	(0040, 0033)	Visit Number	00149.4.3 or 00121.4.3	PV1:19.4.3 or PID:18.4.3	
Institution Name	(0008, 0080)	Entering Organization	00231.2	ORC:17.2	
Institution Code Sequence	(0008, 0082)				
>Item	(FFFE, E000)				
>Code Value	(0008, 0100)	Institution Code	00231.1	ORC:17.1	
>Code Scheme Designator	(0008, 0102)	Institution Code	00231.3	ORC:17.3	
>Code Meaning	(0008, 0104)	Institution Code	00231.2	ORC:17.2	
Institution Address	(0008, 0081)	Ordering Facility Address	01312	ORC:22	

Table 9.18 HL7 status mapping to DICOM status

HL7 Status	DICOM Status
S - STAT	STAT
A - ASAP	HIGH
R - Routine	ROUTINE
P - Pre-op	HIGH
C - Callback	HIGH
T - Timing	MEDIUM

9.1.4. HL7 ORM - Error Mapping

Following table gives an overview of error codes and messages sent by *APIX System* for incoming HL7 ADT messages triggering error conditions.

Table 9.19 Error Codes Mapping and Usage

Error Code	Error Code Meaning	Error Location	User Message	Notes
Error Common				

Error Code	Error Code Meaning	Error Location	User Message	Notes
Same as Error Codes Mapping and Usage in Error Codes Mapping and Usage				
Patient Management specific				
Same as Error Codes Mapping and Usage in Error Codes Mapping and Usage specific to PID segment.				
Procedure Management specific				
101	Required Field Missing	ORC^1^1^1^1	Invalid order control in field 1 and/or invalid order status in field 5	
		ZDS^1^1^1^1	Missing study instance uid	
		IPC^1^3^1^1	Missing study instance uid	
		OBR^1^18^1^1	Missing accession number	
		IPC^1^1^1^1	Missing accession number	
		PV1^1^19^1^1	Missing admission ID	
102	Data Type Error	ORC^1^7^1^4	Invalid scheduled procedure step start date and/or time	
		TQ1^1^7^1^1	Invalid scheduled procedure step start date and/or time	

[2] *(1, 2, 3)* Only the suggested values of the HL7 Priority component of Quantity/Timing. These values shall be mapped to the DICOM enumerated fields for Priority. See HL7 status mapping to DICOM status

[3] *(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24)* Attributes (0040,2016) and (0040, 2017) are designed to incorporate the HL7 components of Placer Issuer and Number, and Filler Issuer and Number. In a healthcare enterprise with multiple issuers of patient identifiers, both the issuer name and number are required to guarantee uniqueness.

[4] *(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12)* either field PID-18 Patient Account Number or field PV1-19 Visit Number or both may be valued depending on the specific national requirements. Whenever field PV1-19 Visit Number in an order message is valued, its components shall be used to populate Admission ID (0038,0010) and Issuer of Admission ID (0038,0011) attributes in the MWL responses. In the case where field PV1-19 Visit Number is not valued, these attributes shall be valued from components of field PID-18 Patient Account Number. This requires that Visit Numbers be unique across all account numbers.

[5] *(1, 2, 3)* For : HL7 v2.3.1 and v2.5.1 : Field OBR-34 Technician in ORM or OMG message is repeatable. Its data type is CM, with the following components: <name (CN)> ^ <start date/time (TS)> ^ <end date/time (TS)> ^ <point of care (IS)> ^ <room(IS)> ^ <bed (IS)> ^ <facility (HD)> ^ <location status (IS)> ^ <patient location type (IS)> ^ <building (IS)> ^ <floor (IS)>. - Thus, in mapping value to the DICOM attribute Scheduled Performing Physician (0040,0006), only sub-components of the first component of the first repetition of that field shall be used.

[6] *(1, 2)* Populated only if matching hl7OrderScheduledStation found in configured hl7OrderScheduledStation in archive device.

[7] *(1, 2, 3)* Maybe either a code or text value; if a code, then the code meaning (display name) should be used; see also (0040,100A)

[8] *(1, 2, 3)* OBR:31 may be either a code or text value; if a text value, then the DSS may map it to a code to use in the DICOM attribute; see also (0040,1002).

[9] *(1, 2, 3)* “B6” must be mapped to DICOM. Enumerated value “3” (definitely pregnant)

[10] *(1, 2, 3)* The values present in ORC fields 1 and 5 decide the Scheduled Procedure Step Status that is applied to the MWL. The enumerated combinations of values in fields 1 and 5 of ORC segment currently supported by the archive are NW_SC, NW_IP, CA_CA, DC_CA, XO_SC, XO_CM where the first two letters eg. “NW” represent value in field 1 and the next letter(s) after the “_” eg. “SC” represent value in field 5. These combinations can be mapped to different Scheduled Procedure Step Status supported by archive : SCHEDULED, ARRIVED, READY, STARTED, DEPARTED, CANCELLED, DISCONTINUED, COMPLETED. One can map multiple combinations of ORC:1_ORC:5 to a scheduled procedure step status.

[11] *(1, 2, 3, 4)* Alternatively, it may be read from OBR:4 Components 1 to 3 by configuring it as hl7scheduledprotocolcodeinorder on Archive device level or as hl7scheduledprotocolcodeinorder on Archive HL7 Application Extension level. Then it implies that Scheduled Procedure Step Description & Code Meaning in Scheduled Protocol Code Sequence will be read from component 2, Code Value and Code Scheme Designator in Scheduled Protocol Code Sequence will be read from components 1 and 3 respectively.

[12] *(1, 2, 3, 4, 5, 6)* Although OBR:44 field is optional in HL7 order message, it is required to be supported by the archive which acts as a SCP when queried for Modality Worklist entries. Refer Attributes for the Modality Worklist Information Model. Currently archive does not set any default value to these attributes when this field is missing in HL7 order message.

[13] Although IPC:9 field is optional in HL7 order message, it is required to be supported by the archive which acts as a SCP when queried for Modality Worklist entries. Refer Attributes for the Modality Worklist Information Model. Currently if this field is missing in HL7 order message, the Scheduled Station AE Title is selected according configured rule Default Scheduled Station configured on archive device level. One must note that, if this configuration is deleted as well by the user then no value will be set for Scheduled Station AE Title by the archive.

[14] *(1, 2)* This attribute may be configured to be read from field 18 of ORC segment for HL7 v3 and eyecare messages. The configuration can be done as hl7ScheduledStationAETInOrder on Archive device level or as hl7ScheduledStationAETInOrder on Archive HL7 Application Extension level. Currently if not configured as explained above or if this field is missing in HL7 order message, then the Scheduled Station AE Title is selected according configured rule Default Scheduled Station configured on archive device level. One must note that, if this default configuration is deleted as well by the user then no value will be set for Scheduled Station AE Title by the archive.

[15] *(1, 2, 3)* This field may contain multiple values encoded as HL7 repeating field despite current HL7v2 not allowing multiple values for this field.

[16] *(1, 2, 3)* HL7 DICOM Character Set if configured, is selected to specify Specific Character Set. Else, MSH-18 if present in the incoming HL7 message, Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set is selected to specify Specific Character Set. If MSH-18 is absent, then HL7 Default Character Set is selected to specify Specific Character Set.

[17] *(1, 2, 3)* If OBX:6 = "kg" and OBX:3.2 = "Body Weight", then OBX:5 is mapped to DICOM attribute Patient's Weight. If OBX:6 = "m" and OBX:3.2 = "Body Height", then OBX:5 is mapped to DICOM attribute Patient's Size.

[18] *(1, 2, 3)* Route of Admissions (0038, 0016) DICOM attribute shall be mapped to value present in PV1:2. If this field is absent, default "U" (denoting Patient Class as Unknown) shall be used.

[19] *(1, 2, 3)* Applicable only for HL7 v2.3 ORM^O01 or OMG^O19 messages

[20] *(1, 2, 3)* Applicable only for HL7 v2.5 OMI^O23 messages

9.2. Outbound

The General Clinical Order Message HL7 message is sent to other HL7 applications/receivers if HL7 receivers are to be notified about procedure status updates or *on receive of studies without any MWL items associated to it <https://github.com/dcm4che/dcm4chee-arc-light/issues/2372>*. This notification can be triggered for :

Updates to MWL items in archive, on :

- Receive of MPPS : Study referenced in MPPS is also associated with an existing MWL item in archive
- Receive of studies : Study is associated with an existing MWL item in archive

Receive of studies either by :

- DICOM Studies stored conforming to Storage AE Specification
- DICOM Studies / Bulkdata stored using STOW-RS Services
- Reports stored by HL7 ORU

9.2.1. Outbound Messages

9.2.1.1. OMG - General Clinical Order Message (Event O19)

Supported HL7 version: 2.5.1 (EYECARE-22)

9.2.1.1.1. Trigger Event

This message is sent out by the archive : - when study received by the archive has modality worklist entries referencing it in the archive - on receive of MPPS (Modality Performed Procedure

Step).

9.2.1.1.2. Supported Segments

The following segments are sent in an outgoing OMG^O19^OMG_O19 message:

Table 9.20 Supported segments of OMG^O19^OMG_O19 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	O	[0..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - PV1 - Patient Visit segment (HL7 v2.5.1)	Patient Visit	O	[0..1]	3
ORC - ORC - Order Control segment (HL7 v2.5.1)	Common Order	R	[1..1]	4
TQ1 - TQ1 - Timing/Quantity segment (HL7 v2.5.1)	Timing and Quantity	R	[1..1]	4
OBR - OBR - Observation Request segment (HL7 v2.5.1)	Order Detail	R	[1..1]	7

9.2.1.1.3. Expected Actions

The DSS/Order Filler shall process the order status based upon the internal application (such as the procedure is completed and is ready for interpretation). The DSS/Order Filler is recommended to convey the order status to the user of the system.

9.2.2. Outbound Message Segments

9.2.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.5.1)

9.2.2.2. PID - Patient Identification segment

Same as specified in PID - Patient Identification segment (HL7 v2.5.1)

9.2.2.3. NTE - Notes and Comments segment for (PID)

Same as specified in NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

9.2.2.4. PV1 - Patient Visit segment

Table 9.21 PV1 - Patient Visit segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		01627	Set ID - PV1
2	1	IS	R		00132	**Patient Class**
3	80	PL	C		00133	Assigned Patient Location
4	2	IS	O	0007	00134	Admission Type
5	20	CX	O		00135	Preadmit Number
6	80	PL	O		00136	Prior Patient Location
7	60	XCN	C	0010	00137	Attending Doctor
8	60	XCN	C	0010	00138	Referring Doctor
9	60	XCN	R2	0010	00139	Consulting Doctor
10	3	IS	C	0069	00140	Hospital Service
11	80	PL	O		00141	Temporary Location
12	2	IS	O	0087	00142	Preadmit Test Indicator
13	2	IS	O	0092	00143	Readmission Indicator
14	3	IS	O	0023	00144	Admit Source
15	2	IS	C	0009	00145	Ambulatory Status
16	2	IS	O	0099	00146	VIP Indicator
17	60	XCN	C	0010	00147	Admitting Doctor
18	2	IS	O	0018	00148	Patient Type
19	20	CX	C		00149	Visit Number
20	50	FC	O	0064	00150	Financial Class
21	2	IS	O	0032	00151	Charge Price Indicator
22	2	IS	O	0045	00152	Courtesy Code
23	2	IS	O	0046	00153	Credit Rating
24	2	IS	O	0044	00154	Contract Code
25	8	DT	O		00155	Contract Effective Date
26	12	NM	O		00156	Contract Amount

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
27	3	NM	O		00157	Contract Period
28	2	IS	O	0073	00158	Interest Code
29	1	IS	O	0110	00159	Transfer to Bad Debt Code
30	8	DT	O		00160	Transfer to Bad Debt Date
31	10	IS	O	0021	00161	Bad Debt Agency Code
32	12	NM	O		00162	Bad Debt Transfer Amount
33	12	NM	O		00163	Bad Debt Recovery Amount
34	1	IS	O	0111	00164	Delete Account Indicator
35	8	DT	O		00165	Delete Account Date
36	3	IS	O	0112	00166	Discharge Disposition
37	25	CM	O	0113	00167	Discharge to Location
38	80	CE	O	0114	00168	Diet Type
39	2	IS	O	0115	00169	Servicing Facility
40	1	IS	O	0116	00170	Bed Status
41	2	IS	O	0117	00171	Account Status
42	80	PL	O		00172	Pending Location
43	80	PL	O		00173	Prior Temporary Location
44	26	TS	O		00174	Admit Date/Time
45	26	TS	O		00175	Discharge Date/Time
46	12	NM	O		00176	Current Patient Balance
47	12	NM	O		00177	Total Charges
48	12	NM	O		00178	Total Adjustments
49	12	NM	O		00179	Total Payments
50	20	CX	O	0203	00180	Alternate Visit ID
51	1	IS	C	0326	01226	Visit Indicator
52	60	XCN	O	0010	01224	Other Healthcare Provider

9.2.2.5. ORC - Order Control segment

Table 9.22 ORC - Order Control segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	2	ID	R	0119	00215	**Order Control**
2	22	EI	R		00216	**Placer Order Number**
3	22	EI	X		00217	**Filler Order Number**
4	22	EI	C		00218	Placer Group Number
5	2	ID	O	0038	00219	**Order Status**

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
6	1	ID	O	0121	00220	Response Flag
7	200	TQ	X		00221	Quantity/Timing
8	200	EIP	C		00222	Parent
9	26	TS	O		00223	Date/Time of Transaction
10	250	XCN	O		00224	Entered By
11	250	XCN	O		00225	Verified By
12	250	XCN	O		00226	Ordering Provider
13	80	PL	O		00227	Enterer's Location
14	250	XTN	O		00228	Callback Phone Number
15	26	TS	O		00229	Order Effective Date/Time
16	250	CE	O		00230	Order Control Code Reason
17	250	CE	O		00231	Entering Organization
18	250	CE	O		00232	Entering Device
19	250	XCN	O		00233	Action By
20	250	CE	O	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	O		01311	Ordering Facility Name
22	250	XAD	O		01312	Ordering Facility Address
23	250	XTN	O		01313	Ordering Facility Phone Number
24	250	XAD	O		01314	Ordering Provider Address
25	250	CWE	O		01473	Order Status Modifier
26	60	CWE	C	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	O		01642	Filler's Expected Availability Date/Time
28	250	CWE	O	0177	00615	Confidentiality Code
29	250	CWE	O	0482	01643	Order Type
30	250	CNE	O	0483	01644	Enterer Authorization Mode
31	250	CWE	O		02286	Parent Universal Service Identifier

9.2.2.6. TQ1 - Timing/Quantity segment

Table 9.23 TQ1 - Timing/Quantity segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		01627	Set ID - TQ1
2	20	CQ	O		01628	Quantity
3	540	RPT	O	0335	01629	Repeat Pattern
4	20	TM	O		01630	Explicit Time
5	20	CQ	O		01631	Relative Time and Units

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
6	20	CQ	O		01632	Service Duration
7	26	TS	R		01633	**Start Date/Time**
8	26	TS	O		01634	End Date/Time
9	250	CWE	O	0485	01635	Priority
10	250	TX	O		01636	Condition Text
11	250	TX	O	0065	01637	Text Instruction
12	10	ID	C	0472	01638	Conjunction
13	20	CQ	O		01639	Occurrence Duration
14	10	NM	O		01640	Total Occurrences

9.2.2.7. OBR - Observation Request segment

Table 9.24 OBR - Observation Request segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	22	EI	R		00216	**Placer Order Number**
3	22	EI	O		00217	**Filler Order Number**
4	250	CE	O		00238	Universal Service ID
5	2	ID	O		00239	Priority
6	26	TS	O		00240	Requested Date/Time
7	26	TS	O		00241	Observation Date/Time
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	250	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code
12	250	CE	O		00246	Danger Code
13	300	ST	C		00247	Relevant Clinical Info
14	26	TS	X		00248	Specimen Received Date/Time
15	300	SPS	X	0070	00249	Specimen Source
16	250	XCN	O		00226	Ordering Provider
17	250	XTN	O		00250	Order Callback Phone Number
18	60	ST	O		00251	**Placer Field 1**
19	60	ST	O		00252	**Placer Field 2**
20	60	ST	O		00253	Filler Field 1
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
23	40	MOC	O		00256	Charge to Practice
24	10	ID	O	0074	00257	Diagnostic Service Sect ID
25	1	ID	O	0123	00258	Result Status
26	400	PRL	O		00259	Parent Result
27	200	TQ	X		00221	Quantity/Timing
28	250	XCN	O		00260	Result Copies To
29	200	EIP	C		00261	Parent
30	20	ID	O	0124	00262	Transportation Mode
31	250	CE	O		00263	Reason For Study
32	200	NDL	O		00264	Principal Result Interpreter
33	200	NDL	O		00265	Assistant Result Interpreter
34	200	NDL	O		00266	Technician
35	200	NDL	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time
37	4	NM	O		01028	Number of Sample Containers
38	250	CE	O		01029	Transport Logistics of Collected Sample
39	250	CE	O		01030	Collector's Comment
40	250	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	O	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	250	CE	O		01034	Planned Patient Transport Comment
44	250	CE	O	0088	00393	Procedure Code
45	250	CE	O	0340	01036	Procedure Code Modifier
46	250	CE	O	0411	01474	Placer Supplemental Service Information
47	250	CE	O	0411	01475	Filler Supplemental Service Information
48	250	CWE	O	0476	01646	Medically Necessary Duplicate Procedure Reason
49	2	IS	O	0507	01647	Result Handling
50	250	CWE	O		02286	Parent Universal Service Identifier

Element names in **bold** indicates that the field is used by *APIX System*.

9.2.3. DICOM to HL7 Order Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component/sub-component value is not listed if the HL7 element should not contain multiple components/sub-components.

9.2.3.1. OMG - HL7 order mapping to DICOM Modality Worklist Attributes

Table 9.25 DICOM Modality Worklist Attributes to HL7 order mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set
Patient Identification					
Patient's Name	(0010, 0010)	Patient Name	00108	PID:5	
Patient ID	(0010, 0020)	Patient Identifier List	00106.1	PID:3.1	
Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00106.4.1	PID:3.4.1	
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Item	(FFFE, E000)				
>Universal Entity ID	(0040, 0032)	Patient Identifier List	00106.4.2	PID:3.4.2	
>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00106.4.3	PID:3.4.3	
Patient Demographic					
Patient's Birth Date	(0010, 0030)	Date/Time of Birth	00110	PID:7	
Patient's Sex	(0010, 0040)	Administrative Sex	00111.1	PID:8.1	
Patient Comments	(0010, 4000)	Comment	00098	NTE:3	
Visit Identification					
Route of Admissions	(0038, 0016)	Patient Class	00132	PV1:2	
Admission ID	(0038, 0010)	Visit Number	00149.1	PV1:19.1	
Issuer of Admission ID Sequence	(0038, 0014)				
>Item	(FFFE, E000)				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
>Local Namespace Entity ID	(0040, 0031)	Visit Number	00149.4.1	PV1:19.4.1	
>Universal Entity ID	(0040, 0032)	Visit Number	00149.4.2	PV1:19.4.2	
>Universal Entity ID Type	(0040, 0033)	Visit Number	00149.4.3	PV1:19.4.3	
Scheduled Procedure Step					
		Order Control	00215	ORC:1	Set to SC
		Order Status	00219	ORC:5	
		Start Date/Time	01633	TQ1:7	
		Start Date/Time	01633	TQ1:7	
Requested Procedure					
Requested Procedure ID	(0040, 1001)	Placer field 2	00252	OBR:19	
Imaging Request					
Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
Issuer of Accession Number Sequence	(0008, 0051)				
>Local Namespace Entity ID	(0040, 0031)	Placer Field 1 #	00251.2	OBR:18.2	
>Universal Entity ID	(0040, 0032)	Placer Field 1 #	00251.3	OBR:18.3	
>Universal Entity ID Type	(0040, 0033)	Placer Field 1 #	00251.4	OBR:18.4	
Placer Issuer and Number	(0040, 2016)	Placer Order #	00216.1	ORC:2.1	
Order Placer Identifier Sequence	(0040, 0026)				
>Local Namespace Entity ID	(0040, 0031)	Placer Order #	00216.2	ORC:2.2	
>Universal Entity ID	(0040, 0032)	Placer Order #	00216.3	ORC:2.3	
>Universal Entity ID Type	(0040, 0033)	Placer Order #	00216.4	ORC:2.4	
Filler Issuer and Number	(0040, 2017)	Filler Order #	00217.1	ORC:3.1	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Order Filler Identifier Sequence	(0040, 0027)				
>Local Namespace Entity ID	(0040, 0031)	Filler Order #	00217.2	ORC:3.2	
>Universal Entity ID	(0040, 0032)	Filler Order #	00217.3	ORC:3.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order #	00217.4	ORC:3.4	

[1] If the Procedure Status Update is triggered by MPPS, and the MPPS was received with status DISCONTINUED or IN_PROGRESS, then the value set is DC or IP respectively. If the Procedure Status Update is triggered by MPPS, and the MPPS was received with status COMPLETED or if the Procedure Status Update is triggered by a Study then the value set is CM.

[2] *(1, 2)* If the Procedure Status Update is triggered by MPPS, this value is populated from the *Performed Procedure Step Start Date and Time* of MPPS attributes. Alternatively, if the Procedure Status Update is triggered when a Study (which has MWL entries referencing it) is completely received, then this value is populated from the created time of the task. (The *task* here refers to a task created in database for sending out the HL7 notification.) Refer Synchronize external HL7 receivers on updates of Requested Procedures

[3] Route of Admissions (0038, 0016) DICOM attribute, if present, shall be mapped to PV1:2. If this DICOM attribute is absent, default “U” (denoting Patient Class as Unknown) shall be used.

10. Observation Reporting Management Service

The Observation Reporting Management Service converts HL7 ORU messages received from remote HL7 applications to DICOM Text SR / Encapsulated CDA / Encapsulated PDF objects, to make them accessible via the DICOM query/retrieve services. It can also be configured to send out HL7 ORU notifications on availability of imaging results i.e. DICOM studies.

10.1. Inbound

10.1.1. Inbound Messages

10.1.1.1. ORU - Unsolicited Observation Result Message (Event R01)

Supported HL7 version: 2.3.1 (RAD-28), 2.5.1 (RAD-128)

10.1.1.1.1. Trigger Event

When DICOM Structured Reports are verified and finalized by the Report Manager, the Report Manager sends unsolicited ORU transactions to the Image Manager. Image Manager creates/updates the study with the referenced Structured Report in the HL7 message.

10.1.1.1.2. Supported Segments

The following segments are processed from an incoming ORU^R01^ORU_R01 message:

Table 10.1 Supported segments of ORU^R01^ORU_R01 (HL7 versions 2.3.1)

Segment	Meaning	HL7 Chapter
MSH - MSH - Message Header segment (HL7 v2.3.1)	Message Header	2
PID - PID - Patient Identification segment (HL7 v2.3.1)	Patient Identification	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.3.1)	Notes and Comments (for PID)	2
PV1 - Patient Visit segment (HL7 v2.3.1)	Patient Visit	3
OBR - OBR - Observation Request segment (HL7 v2.3.1)	Order Detail	4
OBX - OBX - Observation/Result segment (HL7 v2.3.1)	Observation Results	7

Table 10.2 Supported segments of ORU^R01^ORU_R01 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - Patient Visit segment (HL7 v2.5.1)	Patient Visit	O	[0..1]	3
OBR - OBR - Observation Request segment (HL7 v2.5.1)	Order Detail	R	[1..*]	4
OBX - OBX - Observation/Result segment (HL7 v2.5.1)	Order Detail	R	[1..*]	4

10.1.1.1.3. Performed Actions

Patient Demographic Information are extracted from the PID segment of the received message and mapped into corresponding DICOM attributes as defined in HL7 ADT mapping of PID segment to DICOM Patient Attributes. If a Patient record with the extracted primary Patient ID already exists in the database, that Patient record will get updated. If there is no such Patient record a new Patient record will be inserted into the database [1]. Based on the information received in the OBR and OBX segments, a SR / PDF / CDA object is stored to the study.

[1] The creation of new Patient records will be suppressed for message types which are listed by configuration parameter *HL7 No Patient Create Message Type(s)* of *APIX System*.

10.1.2. Inbound Message Segments

10.1.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.3.1) or MSH - Message Header segment (HL7 v2.5.1)

10.1.2.2. PID - Patient Identification segment

Same as specified in PID - Patient Identification segment (HL7 v2.3.1) or PID - Patient Identification segment (HL7 v2.5.1)

10.1.2.3. NTE - Notes and Comments segment (for PID)

Same as specified in NTE - Notes and Comments segment (for PID) (HL7 v2.3.1) or NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

10.1.2.4. PV1 - Patient Visit segment

Same as specified in Patient Visit segment (HL7 v2.3.1) or Patient Visit segment (HL7 v2.5.1)

10.1.2.5. OBR - Observation Request segment

Table 10.3 OBR - Observation Request segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	75	EI	R		00216	**Placer Order Number**
3	75	EI	O		00217	**Filler Order Number**
4	200	CE	R		00238	**Universal Service ID**
5	2	ID	O		00239	Priority
6	26	TS	O		00240	Requested Date/Time

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
7	26	TS	O		00241	**Observation Date/Time**
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	60	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code
12	60	CE	R2		00246	Danger Code
13	300	ST	C		00247	Relevant Clinical Info
14	26	TS	O		00248	Specimen Received Date/Time
15	300	CM	C	0070	00249	Specimen Source
16	80	XCN	R		00226	Ordering Provider
17	40	XTN	O		00250	Order Callback Phone Number
18	60	ST	O		00251	**Placer Field 1**
19	60	ST	O		00252	Placer Field 2
20	60	ST	O		00253	Filler Field 1
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time
23	40	CM	O		00256	Charge to Practice
24	10	ID	O	0074	00257	Diagnostic Service Sect ID
25	1	ID	O	0123	00258	**Result Status**
26	400	CM	O		00259	Parent Result
27	200	TQ	R		00221	Quantity/Timing
28	150	XCN	O		00260	Result Copies To
29	150	CM	C		00261	Parent
30	20	ID	R2	0124	00262	Transportation Mode
31	300	CE	R2		00263	Reason For Study
32	200	CM	O		00264	**Principal Result Interpreter**
33	200	CM	O		00265	Assistant Result Interpreter
34	200	CM	O		00266	Technician
35	200	CM	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time
37	4	NM	O		01028	Number of Sample Containers
38	60	CE	O		01029	Transport Logistics of Collected Sample
39	200	CE	O		01030	Collector’s Comment
40	60	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	R2	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	200	CE	O		01034	Planned Patient Transport Comment

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
44	80	CE	O	0088	00393	Procedure Code
45	80	CE	O	0340	01036	Procedure Code Modifier

Table 10.4 OBR - Observation Request segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	22	EI	R		00216	**Placer Order Number**
3	22	EI	O		00217	**Filler Order Number**
4	250	CE	R		00238	**Universal Service ID**
5	2	ID	O		00239	Priority
6	26	TS	O		00240	Requested Date/Time
7	26	TS	O		00241	**Observation Date/Time**
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	250	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code
12	250	CE	R2		00246	Danger Code
13	300	ST	C		00247	Relevant Clinical Info
14	26	TS	X		00248	Specimen Received Date/Time
15	300	SPS	X	0070	00249	Specimen Source
16	250	XCN	R		00226	Ordering Provider
17	250	XTN	O		00250	Order Callback Phone Number
18	60	ST	O		00251	**Placer Field 1**
19	60	ST	O		00252	Placer Field 2
20	60	ST	O		00253	Filler Field 1
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time
23	40	MOC	O		00256	Charge to Practice
24	10	ID	O	0074	00257	Diagnostic Service Sect ID
25	1	ID	O	0123	00258	**Result Status**
26	400	PRL	O		00259	Parent Result
27	200	TQ	X		00221	Quantity/Timing
28	250	XCN	O		00260	Result Copies To
29	200	EIP	C		00261	Parent
30	20	ID	R2	0124	00262	Transportation Mode
31	250	CE	R2		00263	Reason For Study
32	200	NDL	O		00264	**Principal Result Interpreter**

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
33	200	NDL	O		00265	Assistant Result Interpreter
34	200	NDL	O		00266	Technician
35	200	NDL	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time
37	4	NM	O		01028	Number of Sample Containers
38	250	CE	O		01029	Transport Logistics of Collected Sample
39	250	CE	O		01030	Collector's Comment
40	250	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	R2	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	250	CE	O		01034	Planned Patient Transport Comment
44	250	CE	O	0088	00393	Procedure Code
45	250	CE	O	0340	01036	Procedure Code Modifier
46	250	CE	R2	0411	01474	Placer Supplemental Service Information
47	250	CE	R2	0411	01475	Filler Supplemental Service Information
48	250	CWE	R2	0476	01646	Medically Necessary Duplicate Procedure Reason
49	2	IS	O	0507	01647	Result Handling
50	250	CWE	O		02286	Parent Universal Service Identifier

10.1.2.6. OBX - Observation Request segment

Table 10.5 OBX - Observation/Result segment (HL7 v2.3.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00569	SetID - OBX
2	3	ID	C	0125	00570	Value Type
3	80	CE	R		00571	**Observation Identifier**
4	20	ST	C		00572	Observation Sub-ID
5	65536[3]	•	C		00573	**Observation Value**
6	60	CE	O		00574	Units
7	60	ST	O		00575	References Range
8	5	ID	O	0078	00576	Abnormal Flags
9	5	NM	O		00577	Probability
10	2	ID	O	0080	00578	Nature of Abnormal Test
11	1	ID	R	0085	00579	Observation Result Status
12	26	TS	O		00580	Date Last Obs Normal Values

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
13	20	ST	O		00581	User Defined Access Checks
14	26	TS	O		00582	Date/Time of the Observation
15	60	CE	O		00583	Producer's ID
16	80	XCN	O		00584	Responsible Observer
17	60	CE	O		00936	Observation Method

Table 10.6 OBX - Observation/Result segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00569	SetID - OBX
2	2	ID	C	0125	00570	Value Type
3	250	CE	R		00571	**Observation Identifier**
4	20	ST	C		00572	Observation Sub-ID
5	99999	Varies	C		00573	**Observation Value**
6	250	CE	O		00574	Units
7	60	ST	O		00575	References Range
8	5	IS	O	0078	00576	Abnormal Flags
9	5	NM	O		00577	Probability
10	2	ID	O	0080	00578	Nature of Abnormal Test
11	1	ID	R	0085	00579	Observation Result Status
12	26	TS	O		00580	Effective Date of Reference Range
13	20	ST	O		00581	User Defined Access Checks
14	26	TS	O		00582	Date/Time of the Observation
15	250	CE	O		00583	Producer's ID
16	250	XCN	O		00584	Responsible Observer
17	250	CE	O		00936	Observation Method
18	22	EI	O		01479	Equipment Instance Identifier
19	26	TS	O		01480	Date/Time of Analysis
20	0	ST	X			Reserved for harmonization with V2.6
21	0	ST	X			Reserved for harmonization with V2.6
22	0	ST	X			Reserved for harmonization with V2.6
23	567	XON	O			**Performing Organization Name**
24	631	XAD	O			Performing Organization Address
25	3002	XCN	O			Performing Organization Medical Director

Element names in **bold** indicates that the field is used by *APIX System*.

10.1.3. HL7 ORU to DICOM Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component / sub-component value is not listed if the HL7 element does not contain multiple components / sub-components.

10.1.3.1. HL7 ORU Text Report to DICOM SR Mapping (RAD-28)

Inverse of the mapping specified by IHE Transaction Structured Report Export [RAD-28] has been used.

10.1.3.1.1. Mapping of HL7 ORU Text Report to DICOM SR Attributes

Table 10.7 HL7 ORU Text Report to DICOM Structured Report Attributes mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
SOP Common					
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	
Patient Identification					
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Demographic					
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes					
Patient Visit					
Same as Visit Identification in HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.3.1 and v2.5.1)					
Patient Medical					
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
Structured Report					
Content Date	(0008, 0023)	Observation Date/Time	00241	OBR:7	
Content Time	(0008, 0033)	Observation Date/Time	00241	OBR:7	
Accession Number	(0008, 0050)	Placer field 1	00251	OBR:18	
SOP Class UID	(0008, 0016)				1.2.840.10008.5.1.4.1.1.88.1
Request Attributes Sequence	(0040, 0275)				
>Study Instance UID	(0020, 000D)			OBX[1]:5	
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16	
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19	
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2	
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID			
>>Code Value	(0008, 0100)		00238.1	OBR:4.1	
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3	
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2	
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2	
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3	
Modality	(0008, 0060)				SR
Institution Name	(0008, 0080)	Performing Organization Name or Sending Facility		OBX:23 or MSH:4	
SOP Instance UID	(0008, 0018)			OBX[1]:5	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
Study Instance UID	(0020, 000D)			OBX[2]:5	
Series Instance UID	(0020, 000E)			OBX[3]:5	
Instance Number	(0020, 0013)				1
Value Type	(0040, A040)				CONTAINER
Continuity Of Content	(0040, A050)				SEPARATE
Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				11528-7
>>Code Scheme Designator	(0008, 0102)				LN
>>Code Meaning	(0008, 0104)				Radiology Report
Verifying Observer Sequence	(0040, A073)				
>Verifying Organization	(0040, A027)				Default Value : Verifying Organization
>Verifying Observer Name	(0040, A075)	Principal Result Interpreter	00264	OBR:32.1	
>Verification DateTime	(0040, A030)	Observation Date/Time	00241	OBR:7	
Referenced Request Sequence	(0040, A370)				
>Study Instance UID	(0020, 000D)			OBX[1]:5	
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16	
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19	
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2	
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID			
>>Code Value	(0008, 0100)		00238.1	OBR:4.1	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3	
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2	
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2	
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3	
Completion Flag	(0040, A491)	Result Status	00258	OBR:25	
Verification Flag	(0040, A493)	Result Status	00258	OBR:25	
Content Sequence	(0040, A730)				
Item 1					
>Relationship Type	(0040, A010)				HAS CONCEPT MOD
>Value Type	(0040, A040)				CODE
>Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				121049
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				Language of Content Item an Descendants
>Concept Code Sequence	(0040, A168)				
>>Code Value	(0008, 0100)				eng
>>Code Scheme Designator	(0008, 0102)				ISO639_2
>>Code Meaning	(0008, 0104)				English
Item 2					
>Relationship Type	(0040, A010)				HAS OBS CONTEXT
>Value Type	(0040, A040)				PNAME
>Concept Name Code Sequence	(0040, A043)				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
>>Code Value	(0008, 0100)				121008
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				Person Observer Name
>Person Name	(0040, A123)	Principal Result Interpreter	00264	OBR:32.1	
Item 3					
>Relationship Type	(0040, A010)				HAS OBS CONTEXT
>Value Type	(0040, A040)				CODE
>Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				121023
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				Procedure Code
>Concept Code Sequence	(0040, A168)				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1	
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3	
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2	
Item 4					
>Relationship Type	(0040, A010)				CONTAINS
>Value Type	(0040, A040)				CONTAINER
>Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				121060
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				History

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
>Continuity Of Content	(0040, A050)				SEPARATE
>Content Sequence	(0040, A730)				
>>Relationship Type	(0040, A010)				CONTAINS
>>Value Type	(0040, A040)				TEXT
>>Concept Name Code Sequence	(0040, A043)				
>>>Code Value	(0008, 0100)				121060
>>>Code Scheme Designator	(0008, 0102)				DCM
>>>Code Meaning	(0008, 0104)				History
>>Text Value	(0040, A160)			OBX:3/component='SR Text'	
Item 5					
>Relationship Type	(0040, A010)				CONTAINS
>Value Type	(0040, A040)				CONTAINER
>Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				121070
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				Findings
>Continuity Of Content	(0040, A050)				SEPARATE
>Content Sequence	(0040, A730)				
>>Relationship Type	(0040, A010)				CONTAINS
>>Value Type	(0040, A040)				TEXT
>>Concept Name Code Sequence	(0040, A043)				
>>>Code Value	(0008, 0100)				121071
>>>Code Scheme Designator	(0008, 0102)				DCM

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values
>>>Code Meaning	(0008, 0104)				Finding
>>Text Value	(0040, A160)			OBX:3/component='SR Text'	
Item 6					
>Relationship Type	(0040, A010)				CONTAINS
>Value Type	(0040, A040)				CONTAINER
>Concept Name Code Sequence	(0040, A043)				
>>Code Value	(0008, 0100)				121076
>>Code Scheme Designator	(0008, 0102)				DCM
>>Code Meaning	(0008, 0104)				Conclusions
>Continuity Of Content	(0040, A050)				SEPARATE
>Content Sequence	(0040, A730)				
>>Relationship Type	(0040, A010)				CONTAINS
>>Value Type	(0040, A040)				TEXT
>>Concept Name Code Sequence	(0040, A043)				
>>>Code Value	(0008, 0100)				121077
>>>Code Scheme Designator	(0008, 0102)				DCM
>>>Code Meaning	(0008, 0104)				Conclusion
>>Text Value	(0040, A160)			OBX:3/component='SR Text'	

10.1.3.2. HL7 ORU Report to DICOM Mapping (RAD-128)

Inverse of the mapping specified by IHE Transaction Send Imaging Result [RAD-128] has been used.

10.1.3.2.1. Mapping of HL7 ORU Text Report to DICOM SR Attributes

Table 10.8 HL7 ORU Text Report to DICOM Structured Report Attributes mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
SOP Common						
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18		
Patient Identification						
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Demographic						
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Visit						
Same as Visit Identification in HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.3.1 and v2.5.1)						
Patient Medical						
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15		
Structured Report						
Content Date	(0008, 0023)	Observation Date/Time	00241	OBR:7		
Content Time	(0008, 0033)	Observation Date/Time	00241	OBR:7		
Accession Number	(0008, 0050)	Placer field 1	00251	OBR:18		
SOP Class UID	(0008, 0016)				1.2.840.10008.5.1.4.1.1.88.11	
Request Attributes Sequence	(0040, 0275)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Modality	(0008, 0060)				SR	
Institution Name	(0008, 0080)	Performing Organization Name or Sending Facility		OBX:23 or MSH:4		
Study Instance UID	(0020, 000D)			OBX[2]:5		
Instance Number	(0020, 0013)				1	
Value Type	(0040, A040)				CONTAINER	
Continuity Of Content	(0040, A050)				SEPARATE	
Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				11528-7	
>>Code Scheme Designator	(0008, 0102)				LN	
>>Code Meaning	(0008, 0104)				Radiology Report	
Verifying Observer Sequence	(0040, A073)					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Verifying Organization	(0040, A027)				Default Value : Verifying Organization	
>Verifying Observer Name	(0040, A075)	Principal Result Interpreter	00264	OBR:32.1		
>Verification DateTime	(0040, A030)	Observation Date/Time	00241	OBR:7		
Referenced Request Sequence	(0040, A370)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Completion Flag	(0040, A491)	Result Status	00258	OBR:25		
Verification Flag	(0040, A493)	Result Status	00258	OBR:25		
Content Sequence	(0040, A730)					
Item 1						
>Relationship Type	(0040, A010)				HAS CONCEPT MOD	
>Value Type	(0040, A040)				CODE	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121049	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Language of Content Item and Descendants	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)				eng	
>>Code Scheme Designator	(0008, 0102)				ISO639_2	
>>Code Meaning	(0008, 0104)				English	
Item 2						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				PNAME	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121008	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Person Observer Name	
>Person Name	(0040, A123)	Principal Result Interpreter	00264	OBR:32.1		
Item 3						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				CODE	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121023	
>>Code Scheme Designator	(0008, 0102)				DCM	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>Code Meaning	(0008, 0104)				Procedure Code	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
Item 4						
>Relationship Type	(0040, A010)				CONTAINS	
>Value Type	(0040, A040)				CONTAINER	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>Continuity Of Content	(0040, A050)				SEPARATE	
>Content Sequence	(0040, A730)					
>>Relationship Type	(0040, A010)				CONTAINS	
>>Value Type	(0040, A040)				TEXT or CODE	
>>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>>Text Value	(0040, A160)			OBX:5		
>>Concept Code Sequence	(0040, A168)					

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>>Code Value	(0008, 0100)				OBX:5.1	
>>>Code Scheme Designator	(0008, 0102)				OBX:5.3	
>>>Code Meaning	(0008, 0104)				OBX:5.2	

10.1.3.2.2. Mapping of HL7 ORU containing CDA to Encapsulated CDA DICOM SR Attributes

Table 10.9 HL7 ORU containing CDA to Encapsulated CDA DICOM Structured Report Attributes mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
SOP Common						
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18		
Patient Identification						
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Demographic						
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Visit						
Same as Visit Identification in HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.3.1 and v2.5.1)						
Patient Medical						
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15		
Structured Report						

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
Content Date	(0008, 0023)	Observation Date/Time	00241	OBR:7		
Content Time	(0008, 0033)	Observation Date/Time	00241	OBR:7		
Accession Number	(0008, 0050)	Placer field 1	00251	OBR:18		
SOP Class UID	(0008, 0016)				1.2.840.10008.5.1.4.1.1.104.2	
Request Attributes Sequence	(0040, 0275)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Modality	(0008, 0060)				SR	
Institution Name	(0008, 0080)	Performing Organization Name or Sending Facility		OBX:23 or MSH:4		
Conversion Type	(0008, 0064)				WSD	
Burned In Annotation	(0028, 0301)				NO	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
Encapsulated Document	(0042, 0011)				OBX:5.5	
MIME Type of Encapsulated Document	(0042, 0012)				text/xml	
Study Instance UID	(0020, 000D)			OBX[2]:5		
Instance Number	(0020, 0013)				1	
Value Type	(0040, A040)				CONTAINER	
Continuity Of Content	(0040, A050)				SEPARATE	
Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				11528-7	
>>Code Scheme Designator	(0008, 0102)				LN	
>>Code Meaning	(0008, 0104)				Radiology Report	
Verifying Observer Sequence	(0040, A073)					
>Verifying Organization	(0040, A027)				Default Value : Verifying Organization	
>Verifying Observer Name	(0040, A075)	Principal Result Interpreter	00264	OBR:32.1		
>Verification DateTime	(0040, A030)	Observation Date/Time	00241	OBR:7		
Referenced Request Sequence	(0040, A370)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Completion Flag	(0040, A491)	Result Status	00258	OBR:25		
Verification Flag	(0040, A493)	Result Status	00258	OBR:25		
Content Sequence	(0040, A730)					
Item 1						
>Relationship Type	(0040, A010)				HAS CONCEPT MOD	
>Value Type	(0040, A040)				CODE	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121049	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Language of Content Item and Descendants	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)				eng	
>>Code Scheme Designator	(0008, 0102)				ISO639_2	
>>Code Meaning	(0008, 0104)				English	
Item 2						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				PNAME	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121008	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Person Observer Name	
>Person Name	(0040, A123)	Principal Result Interpreter	00264	OBR:32.1		
Item 3						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				CODE	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121023	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Procedure Code	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
Item 4						
>Relationship Type	(0040, A010)				CONTAINS	
>Value Type	(0040, A040)				CONTAINER	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>Continuity Of Content	(0040, A050)				SEPARATE	
>Content Sequence	(0040, A730)					
>>Relationship Type	(0040, A010)				CONTAINS	
>>Value Type	(0040, A040)				TEXT or CODE	
>>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>>Text Value	(0040, A160)			OBX:5		
>>Concept Code Sequence	(0040, A168)					
>>>Code Value	(0008, 0100)				OBX:5.1	
>>>Code Scheme Designator	(0008, 0102)				OBX:5.3	
>>>Code Meaning	(0008, 0104)				OBX:5.2	

10.1.3.2.3. Mapping of HL7 ORU containing PDF to Encapsulated PDF DICOM Attributes

Table 10.10 HL7 ORU containing PDF to Encapsulated PDF DICOM Attributes mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
SOP Common						
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18		
Patient Identification						

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
Same as Patient Identification in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Demographic						
Same as Patient Demographic in HL7 ADT mapping of PID segment to DICOM Patient Attributes						
Patient Visit						
Same as Visit Identification in HL7 order mapping to DICOM Modality Worklist Attributes for (HL7 v2.3.1 and v2.5.1)						
Patient Medical						
Pregnancy Status	(0010, 21C0)	Ambulatory Status	00145	PV1:15		
Structured Report						
Content Date	(0008, 0023)	Observation Date/Time	00241	OBR:7		
Content Time	(0008, 0033)	Observation Date/Time	00241	OBR:7		
Accession Number	(0008, 0050)	Placer field 1	00251	OBR:18		
SOP Class UID	(0008, 0016)				1.2.840.10008.5.1.4.1.1.104.1	
Request Attributes Sequence	(0040, 0275)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Modality	(0008, 0060)				DOC	
Institution Name	(0008, 0080)	Performing Organization Name or Sending Facility		OBX:23 or MSH:4		
Conversion Type	(0008, 0064)				SD	
Burned In Annotation	(0028, 0301)				NO	
Encapsulated Document	(0042, 0011)				OBX:5.5	
MIME Type of Encapsulated Document	(0042, 0012)				application/pdf	
Study Instance UID	(0020, 000D)			OBX[2]:5		
Instance Number	(0020, 0013)				1	
Value Type	(0040, A040)				CONTAINER	
Continuity Of Content	(0040, A050)				SEPARATE	
Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				11528-7	
>>Code Scheme Designator	(0008, 0102)				LN	
>>Code Meaning	(0008, 0104)				Radiology Report	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
Verifying Observer Sequence	(0040, A073)					
>Verifying Organization	(0040, A027)				Default Value : Verifying Organization	
>Verifying Observer Name	(0040, A075)	Principal Result Interpreter	00264	OBR:32.1		
>Verification DateTime	(0040, A030)	Observation Date/Time	00241	OBR:7		
Referenced Request Sequence	(0040, A370)					
>Study Instance UID	(0020, 000D)			OBX[1]:5		
>Requesting Physician	(0032, 1032)	Ordering Provider	00226	OBR:16		
>Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18		
>Requested Procedure ID	(0040, 1001)	Placer Field 2	00252	OBR:19		
>Requested Procedure Description	(0032, 1060)	Universal Service ID	00238	OBR:4.2		
>Requested Procedure Code Sequence	(0032, 1064)	Universal Service ID				
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
>Placer Order Number Imaging Service Request	(0040, 2016)	Placer Order Number	00216	OBR:2		
>Filler Order Number Imaging Service Request	(0040, 2017)	Filler Order Number	00217	OBR:3		
Completion Flag	(0040, A491)	Result Status	00258	OBR:25		
Verification Flag	(0040, A493)	Result Status	00258	OBR:25		
Content Sequence	(0040, A730)					
Item 1						
>Relationship Type	(0040, A010)				HAS CONCEPT MOD	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>Value Type	(0040, A040)				CODE	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121049	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Language of Content Item and Descendants	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)				eng	
>>Code Scheme Designator	(0008, 0102)				ISO639_2	
>>Code Meaning	(0008, 0104)				English	
Item 2						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				PNAME	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121008	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Person Observer Name	
>Person Name	(0040, A123)	Principal Result Interpreter	00264	OBR:32.1		
Item 3						
>Relationship Type	(0040, A010)				HAS OBS CONTEXT	
>Value Type	(0040, A040)				CODE	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				121023	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>Code Scheme Designator	(0008, 0102)				DCM	
>>Code Meaning	(0008, 0104)				Procedure Code	
>Concept Code Sequence	(0040, A168)					
>>Code Value	(0008, 0100)		00238.1	OBR:4.1		
>>Code Scheme Designator	(0008, 0102)		00238.3	OBR:4.3		
>>Code Meaning	(0008, 0104)		00238.2	OBR:4.2		
Item 4						
>Relationship Type	(0040, A010)				CONTAINS	
>Value Type	(0040, A040)				CONTAINER	
>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>Continuity Of Content	(0040, A050)				SEPARATE	
>Content Sequence	(0040, A730)					
>>Relationship Type	(0040, A010)				CONTAINS	
>>Value Type	(0040, A040)				TEXT or CODE	
>>Concept Name Code Sequence	(0040, A043)					
>>Code Value	(0008, 0100)				OBX:3.1	
>>Code Scheme Designator	(0008, 0102)				OBX:3.3	
>>Code Meaning	(0008, 0104)				OBX:3.2	
>>Text Value	(0040, A160)			OBX:5		

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Notes/Default values	
>>Concept Code Sequence	(0040, A168)					
>>>Code Value	(0008, 0100)				OBX:5.1	
>>>Code Scheme Designator	(0008, 0102)				OBX:5.3	
>>>Code Meaning	(0008, 0104)				OBX:5.2	

10.1.4. HL7 ORU - Error Mapping

Following table gives an overview of error codes and messages sent by *APIX System* for incoming HL7 ADT messages triggering error conditions.

Table 10.11 Error Codes Mapping and Usage

Error Code	Error Code Meaning	Error Location	User Message	Notes
Error Common				
Same as Error Codes Mapping and Usage in Error Codes Mapping and Usage				
Patient Management specific				
Same as Error Codes Mapping and Usage in Error Codes Mapping and Usage specific to PID segment.				
Observation Reporting Management specific				
101	Required Field Missing	OBX^1^5^1^2	Invalid encoding of encapsulated document in components 2 and/or 3 and/or 4 of field 5”	
		OBX^1^5^1^5	Encapsulated document data missing	
		OBX^1^5^1^1	Missing study instance uid	
		OBR^1^18^1^1	Missing accession number	

Error Code	Error Code Meaning	Error Location	User Message	Notes
		PV1^1^19^1^1	Missing admission ID	
206	Application Record Locked		No HL7 Message Listener configured	

[2] *(1, 2, 3, 4)* If the value of this field is P, then CompletionFlag is set to PARTIAL. In all other cases it is set to COMPLETE

[3] *(1, 2, 3, 4)* If the value of this field is P or F, then VerificationFlag is set to VERIFIED. In all other cases it is set to UNVERIFIED

[4] *(1, 2, 3, 4, 5)* This sequence is present only if Field 32 (i.e. Principal Result Interpreter) is present in OBR segment.

[5] *(1, 2, 3, 4, 5, 6, 7, 8, 9)* If OBX field[3] component 1 is **Study Instance UID**, then value is taken from OBX:5; else value is system generated.

[6] If OBX field[3] component 1 is **Series Instance UID**, then value is taken from OBX:5; else value is system generated.

[7] If OBX field[3] component 1 is **SR Instance UID**, then value is taken from OBX:5; else value is system generated.

[8] *(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)* If the Placer and/or Filler order number are not provided by the Referenced Request Sequence, it is assumed that the Report Manager is able to obtain values.

[9] *(1, 2, 3, 4)* If absent “UNKNOWN” is used.

[10] *(1, 2, 3, 4)* HL7 DICOM Character Set if configured, is selected to specify Specific Character Set. Else, MSH-18 if present in the incoming HL7 message, Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set is selected to specify Specific Character Set. If MSH-18 is absent, then HL7 Default Character Set is selected to specify Specific Character Set.

[11] *(1, 2, 3)* If OBX field[3] component 1 is **DICOM Study**, then value is taken from OBX:5; else value is system generated.

[12] *(1, 2, 3)* If OBX:2 is **TX** then the value is **TEXT** else if OBX:2 is **CE** then the value is **CODE**

[13] *(1, 2, 3)* If OBX:2 is **TX**, **only then** Text Value (0040, A160) is set in this item with text value taken from OBX:5

[14] *(1, 2, 3)* If OBX:2 is **CE**, **only then** Concept Code Sequence (0040, A168) is set in this item with code item taken from OBX:5

[15] OBX:5.5 shall contain the CDA document which is then encapsulated into a DICOM object. Though the value for this attribute shall contain the Retrieve URL path to this bulkdata.

[16] OBX:5.5 shall contain the base 64 encoded PDF document which is then encapsulated into a DICOM object. Though the value for this attribute shall contain the Retrieve URL path to this bulkdata.

[17] *(1, 2, 3, 4)* OBX:23 - Performing Organization Name : This field contains the name of the organization/service responsible for performing the service. When this field is null, the receiving system assumes that the observations were produced by the sending organization (MSH:4).

[18] *(1, 2)* Applicable only for HL7 ORU^O01 messages containing encapsulated documents

[19] *(1, 2, 3, 4)* "B6" must be mapped to DICOM. Enumerated value "3" (definitely pregnant)

10.2. Outbound

The Unsolicited Observation HL7 message is sent to other HL7 applications/receivers if HL7 receivers are to be notified about the availability of the imaging results. This notification can be triggered on receive of studies either by :

- DICOM Studies stored conforming to Storage AE Specification
- DICOM Studies / Bulkdata stored using STOW-RS Services
- Reports stored by HL7 ORU

10.2.1. Outbound Messages

10.2.1.1. ORU - Unsolicited Observation Message (Event R01)

Supported HL7 version: 2.5.1 (RAD-128)

10.2.1.1.1. Trigger Event

This message is sent out by the archive :

- when study received by the archive and notification about availability of imaging results is configured.

10.2.1.1.2. Supported Segments

The following segments are sent in an outgoing ORU^R01^ORU_R01 message:

Table 10.12 Supported segments of ORU^R01^ORU_R01 (HL7 v2.5.1)

Segment	Meaning	Usage	Card.	HL7 chapter
MSH - MSH - Message Header segment (HL7 v2.5.1)	Message Header	R	[1..1]	2

Segment	Meaning	Usage	Card.	HL7 chapter
PID - PID - Patient Identification segment (HL7 v2.5.1)	Patient Identification	R	[1..1]	3
NTE - NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)	Notes and Comments (for PID)	O	[0..1]	2
PV1 - PV1 - Patient Visit segment (HL7 v2.5.1)	Patient Visit	R	[1..1]	3
ORC - ORC - Order Control segment (HL7 v2.5.1)	Common Order	O	[1..1]	4
TQ1 - TQ1 - Timing/Quantity segment (HL7 v2.5.1)	Timing and Quantity	R	[1..1]	4
OBR - OBR - Observation Request segment (HL7 v2.5.1)	Order Request Segment	R	[1..1]	7
OBX - OBX - Observation Result segment (HL7 v2.5.1)	Observation Result Segment	R	[1..1]	7

10.2.1.1.3. Expected Actions

The Receiver shall accept and process the message.The Receiver shall support receiving multiple imaging result messages for the same DICOM Study Instance UID. That is, multiple imaging Series may each result in a separate notification message despite being part of a single DICOM Study. Receiver actions subsequent to receiving an image result will depend on internal business logic and/or the profile in which the transaction is being performed.

10.2.2. Outbound Message Segments

10.2.2.1. MSH - Message Header segment

Same as specified in MSH - Message Header segment (HL7 v2.5.1)

10.2.2.2. PID - Patient Identification segment

Same as specified in PID - Patient Identification segment (HL7 v2.5.1)

10.2.2.3. NTE - Notes and Comments segment for (PID)

Same as specified in NTE - Notes and Comments segment (for PID) (HL7 v2.5.1)

10.2.2.4. PV1 - Patient Visit segment

Table 10.13 PV1 - Patient Visit segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		01627	Set ID - PV1
2	1	IS	R		00132	**Patient Class**
3	80	PL	C		00133	Assigned Patient Location
4	2	IS	O	0007	00134	Admission Type
5	20	CX	O		00135	Preadmit Number
6	80	PL	O		00136	Prior Patient Location
7	60	XCN	C	0010	00137	Attending Doctor
8	60	XCN	C	0010	00138	Referring Doctor
9	60	XCN	R2	0010	00139	Consulting Doctor
10	3	IS	C	0069	00140	Hospital Service
11	80	PL	O		00141	Temporary Location
12	2	IS	O	0087	00142	Preadmit Test Indicator
13	2	IS	O	0092	00143	Readmission Indicator
14	3	IS	O	0023	00144	Admit Source
15	2	IS	C	0009	00145	Ambulatory Status
16	2	IS	O	0099	00146	VIP Indicator
17	60	XCN	C	0010	00147	Admitting Doctor
18	2	IS	O	0018	00148	Patient Type
19	20	CX	C		00149	**Visit Number**
20	50	FC	O	0064	00150	Financial Class
21	2	IS	O	0032	00151	Charge Price Indicator
22	2	IS	O	0045	00152	Courtesy Code
23	2	IS	O	0046	00153	Credit Rating
24	2	IS	O	0044	00154	Contract Code
25	8	DT	O		00155	Contract Effective Date
26	12	NM	O		00156	Contract Amount
27	3	NM	O		00157	Contract Period
28	2	IS	O	0073	00158	Interest Code
29	1	IS	O	0110	00159	Transfer to Bad Debt Code
30	8	DT	O		00160	Transfer to Bad Debt Date

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
31	10	IS	O	0021	00161	Bad Debt Agency Code
32	12	NM	O		00162	Bad Debt Transfer Amount
33	12	NM	O		00163	Bad Debt Recovery Amount
34	1	IS	O	0111	00164	Delete Account Indicator
35	8	DT	O		00165	Delete Account Date
36	3	IS	O	0112	00166	Discharge Disposition
37	25	CM	O	0113	00167	Discharge to Location
38	80	CE	O	0114	00168	Diet Type
39	2	IS	O	0115	00169	Servicing Facility
40	1	IS	O	0116	00170	Bed Status
41	2	IS	O	0117	00171	Account Status
42	80	PL	O		00172	Pending Location
43	80	PL	O		00173	Prior Temporary Location
44	26	TS	O		00174	Admit Date/Time
45	26	TS	O		00175	Discharge Date/Time
46	12	NM	O		00176	Current Patient Balance
47	12	NM	O		00177	Total Charges
48	12	NM	O		00178	Total Adjustments
49	12	NM	O		00179	Total Payments
50	20	CX	O	0203	00180	Alternate Visit ID
51	1	IS	C	0326	01226	**Visit Indicator**
52	60	XCN	O	0010	01224	Other Healthcare Provider

10.2.2.5. ORC - Order Control segment

Table 10.14 ORC - Order Control segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	2	ID	R	0119	00215	**Order Control**
2	22	EI	R		00216	**Placer Order Number**
3	22	EI	X		00217	**Filler Order Number**
4	22	EI	C		00218	Placer Group Number
5	2	ID	O	0038	00219	**Order Status**
6	1	ID	O	0121	00220	Response Flag
7	200	TQ	X		00221	Quantity/Timing
8	200	EIP	C		00222	Parent
9	26	TS	O		00223	Date/Time of Transaction

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
10	250	XCN	O		00224	Entered By
11	250	XCN	O		00225	Verified By
12	250	XCN	O		00226	Ordering Provider
13	80	PL	O		00227	Enterer's Location
14	250	XTN	O		00228	Callback Phone Number
15	26	TS	O		00229	Order Effective Date/Time
16	250	CE	O		00230	Order Control Code Reason
17	250	CE	O		00231	Entering Organization
18	250	CE	O		00232	Entering Device
19	250	XCN	O		00233	Action By
20	250	CE	O	0339	01310	Advanced Beneficiary Notice Code
21	250	XON	O		01311	Ordering Facility Name
22	250	XAD	O		01312	Ordering Facility Address
23	250	XTN	O		01313	Ordering Facility Phone Number
24	250	XAD	O		01314	Ordering Provider Address
25	250	CWE	O		01473	Order Status Modifier
26	60	CWE	C	0552	01641	Advanced Beneficiary Notice Override Reason
27	26	TS	O		01642	Filler's Expected Availability Date/Time
28	250	CWE	O	0177	00615	Confidentiality Code
29	250	CWE	O	0482	01643	Order Type
30	250	CNE	O	0483	01644	Enterer Authorization Mode
31	250	CWE	O		02286	Parent Universal Service Identifier

10.2.2.6. TQ1 - Timing/Quantity segment

Table 10.15 TQ1 - Timing/Quantity segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		01627	Set ID - TQ1
2	20	CQ	O		01628	Quantity
3	540	RPT	O	0335	01629	Repeat Pattern
4	20	TM	O		01630	Explicit Time
5	20	CQ	O		01631	Relative Time and Units
6	20	CQ	O		01632	Service Duration
7	26	TS	R		01633	**Start Date/Time**
8	26	TS	O		01634	End Date/Time
9	250	CWE	O	0485	01635	**Priority**

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
10	250	TX	O		01636	Condition Text
11	250	TX	O	0065	01637	Text Instruction
12	10	ID	C	0472	01638	Conjunction
13	20	CQ	O		01639	Occurrence Duration
14	10	NM	O		01640	Total Occurrences

10.2.2.7. OBR - Observation Request segment

Table 10.16 OBR - Observation Request segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00237	SetID - OBR
2	22	EI	R2		00216	**Placer Order Number**
3	22	EI	R2		00217	**Filler Order Number**
4	250	CE	R		00238	**Universal Service ID**
5	2	ID	X		00239	Priority (retired)
6	26	TS	X		00240	Requested Date/Time
7	26	TS	R		00241	**Observation Date/Time**
8	26	TS	O		00242	Observation End Date/Time
9	20	CQ	O		00243	Collection Volume
10	250	XCN	O		00244	Collection Identifier
11	1	ID	O	0065	00245	Specimen Action Code
12	250	CE	X		00246	Danger Code
13	300	ST	C		00247	Relevant Clinical Info
14	26	TS	X		00248	Specimen Received Date/Time
15	300	SPS	X	0070	00249	Specimen Source
16	250	XCN	O		00226	Ordering Provider
17	250	XTN	O		00250	Order Callback Phone Number
18	60	ST	R		00251	**Placer Field 1**
19	60	ST	R2		00252	**Placer Field 2**
20	60	ST	O		00253	Filler Field 1
21	60	ST	O		00254	Filler Field 2
22	26	TS	O		00255	Results Rpt/Status Chng - Date/Time
23	40	MOC	O		00256	Charge to Practice
24	10	ID	R	0074	00257	**Diagnostic Service Sect ID**
25	1	ID	R	0123	00258	**Result Status**
26	400	PRL	O		00259	Parent Result

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
27	200	TQ	R		00221	**Quantity/Timing**
28	250	XCN	O		00260	Result Copies To
29	200	EIP	C		00261	Parent
30	20	ID	O	0124	00262	Transportation Mode
31	250	CE	R2		00263	**Reason For Study**
32	200	NDL	R2		00264	Principal Result Interpreter
33	200	NDL	R2		00265	Assistant Result Interpreter
34	200	NDL	R2		00266	**Technician**
35	200	NDL	O		00267	Transcriptionist
36	26	TS	O		00268	Scheduled Date/Time
37	4	NM	O		01028	Number of Sample Containers
38	250	CE	O		01029	Transport Logistics of Collected Sample
39	250	CE	O		01030	Collector's Comment
40	250	CE	O		01031	Transport Arrangement Responsibility
41	30	ID	O	0224	01032	Transport Arranged
42	1	ID	O	0225	01033	Escort Required
43	250	CE	O		01034	Planned Patient Transport Comment
44	250	CE	R	0088	00393	**Procedure Code**
45	250	CE	O	0340	01036	Procedure Code Modifier
46	250	CE	O	0411	01474	Placer Supplemental Service Information
47	250	CE	O	0411	01475	Filler Supplemental Service Information
48	250	CWE	O	0476	01646	Medically Necessary Duplicate Procedure Reason
49	2	IS	O	0507	01647	Result Handling
50	250	CWE	O		02286	Parent Universal Service Identifier

10.2.2.8. OBX - Observation Result segment

Table 10.17 OBX - Observation Result segment (HL7 v2.5.1)

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
1	4	SI	O		00569	**SetID - OBX**
2	2	ID	C	0125	00570	**Value Type**
3	250	CE	R		00571	**Observation Identifier**
4	20	ST	C		00572	Observation Sub-ID
5	99999^1	varies	C		00573	**Observation Value**
6	250	CE	O		00574	Units
7	60	ST	O		00575	References Range

SEQ	LEN	DT	OPT	TBL#	ITEM #	Element Name
8	5	IS	O	0078	00576	Abnormal Flags
9	5	NM	O		00577	Probability
10	2	ID	O	0080	00578	Nature of Abnormal Test
11	1	ID	R	0085	00579	**Observation Result Status**
12	26	TS	O		00580	Effective Date of Reference Range
13	20	ST	O		0581	User Defined Access Checks
14	26	TS	O		00582	Date/Time of Observation
15	250	CE	O		00583	Producer's ID
16	250	XCN	O		00584	Responsible Observer
17	250	CE	O		00936	Observation Method
18	22	EI	O		01479	Equipment Instance Identifier
19	26	TS	O		01480	Date/Time of the Analysis

Element names in **bold** indicates that the field is used by *APIX System*.

10.2.3. DICOM to HL7 Unsolicited Observation Message Mapping

Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component.sub-component #/ DICOM (group, element))
- The component/sub-component value is not listed if the HL7 element should not contain multiple components/sub-components.

10.2.3.1. ORU - DICOM Image Attributes to HL7 Unsolicited Observation Message mapping

Table 10.18 DICOM Modality Worklist Attributes to HL7 Unsolicited Observation Message mapping

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Specific Character Set	(0008, 0005)	Character Set	00692	MSH:18	Mapping of MSH-18-Character Set to (0008,0005) Specific Character Set
Patient's Name	(0010, 0010)	Patient Name	00108	PID:5	
Patient ID	(0010, 0020)	Patient Identifier List	00106.1	PID:3.1	
Issuer of Patient ID	(0010, 0021)	Patient Identifier List	00106.4.1	PID:3.4.1	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Issuer of Patient ID Qualifiers Sequence	(0010, 0024)				
>Item	(FFFE, E000)				
>Universal Entity ID	(0040, 0032)	Patient Identifier List	00106.4.2	PID:3.4.2	
>Universal Entity ID Type	(0040, 0033)	Patient Identifier List	00106.4.3	PID:3.4.3	
Patient's Birth Date	(0010, 0030)	Date/Time of Birth	00110	PID:7	
Patient's Sex	(0010, 0040)	Administrative Sex	00111.1	PID:8.1	
Patient Comments	(0010, 4000)	Comment	00098	NTE:3	
Route of Admissions	(0038, 0016)	Patient Class	00132	PV1:2	
Admission ID	(0038, 0010)	Visit Number	00149.1	PV1:19.1	
Issuer of Admission ID Sequence	(0038, 0014)				
>Item	(FFFE, E000)				
>Local Namespace Entity ID	(0040, 0031)	Visit Number	00149.4.1	PV1:19.4.1	
>Universal Entity ID	(0040, 0032)	Visit Number	00149.4.2	PV1:19.4.2	
>Universal Entity ID Type	(0040, 0033)	Visit Number	00149.4.3	PV1:19.4.3	
		Visit Indicator	01226	PV1:51	Set to V
		Order Control	00215	ORC:1	Set to SC
		Order Status	00219	ORC:5	Set to CM
		Start Date/Time	01633	TQ1:7	
		Start Date/Time	01633	TQ1:7	
Accession Number	(0008, 0050)	Placer Field 1	00251	OBR:18	
Issuer of Accession Number Sequence	(0008, 0051)	Placer Field 2 #	00252	OBR:19	
Placer Issuer and Number	(0040, 2016)	Placer Order #	00216.1	ORC:2.1	

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Order Placer Identifier Sequence	(0040, 0026)				
>Local Namespace Entity ID	(0040, 0031)	Placer Order #	00216.2	ORC:2.2	
>Universal Entity ID	(0040, 0032)	Placer Order #	00216.3	ORC:2.3	
>Universal Entity ID Type	(0040, 0033)	Placer Order #	00216.4	ORC:2.4	
Filler Issuer and Number	(0040, 2017)	Filler Order #	00217.1	ORC:3.1	
Order Filler Identifier Sequence	(0040, 0027)				
>Local Namespace Entity ID	(0040, 0031)	Filler Order #	00217.2	ORC:3.2	
>Universal Entity ID	(0040, 0032)	Filler Order #	00217.3	ORC:3.3	
>Universal Entity ID Type	(0040, 0033)	Filler Order #	00217.4	ORC:3.4	
		Priority	01635	TQ1:9	Set to R^Routine^HL70078
		Quantity/Timing	00221	OBR:27	Set to ^^^^^R
		Universal Service ID	00238	OBR:4	
		Observation Date/Time	00241	OBR:7	
Institutional Department Type Code Sequence	(0008, 1041)				
>Code Value	(0008, 0100)	Diagnostic Service Sect ID #	00257	OBR:24	
		Result Status	00258	OBR:25	Set to R
		Reason For Study	00263	OBR:31	
		Technician	00266	OBR:34	
		Procedure Code	00393	OBR:44	
		SetID - OBX	00569	OBX:1	Set to 1
		Value Type	00570	OBX:2	Set to ST
		Observation Identifier	00571	OBX:3	Set to 113014^DICOM Study^DCM

DICOM Attribute	DICOM Tag	HL7 Field	HL7 Item #	HL7 Segment	Note
Study Instance UID	(0020, 000D)	Observation Value	00573	OBX:5	
		Observation Result Status	00579	OBX:11	Set to O

[1] *(1, 2)* This value is populated from the created time of the task. (The *task* here refers to a task created in database for sending out the HL7 notification.)

[2] This field shall contain a procedure code in the first three components: OBR-4.1 Identifier, OBR-4.2 text code meaning, OBR-4.3 coding system. The use of codes from a standardized coding system for procedures, such as the RadLex Playbook LOINC codes, is 1385 recommended. In order of preference, the procedure code may be taken from: - Procedure Code Sequence (0008,1032) - Requested Procedure Code Sequence (0032,1064)

[3] Observation Date/Time shall contain a date/time representative of the imaging procedure. When choosing the date/time to use, consider that an EMR might use this date/time to find other clinical entries for the patient at or near this time which might provide context for the imaging procedure. The date/time might be taken from one of the following attributes in the associated DICOM image objects: - Study Date (0008,0020) & Study Time (0008,0030) - Series Date (0008,0021) & Series Time (0008,0031)

[4] This field shall be valued, if known. This might be taken from one of the following attributes in the associated DICOM image objects: - Reason for Performed Procedure Code Sequence (0040,1012) - Reason for the Requested Procedure (0040,1002) or Code Sequence (0040,100A)1425 - Reason for Visit (0032,1066) or Code Sequence (0032,1066) - Admitting Diagnoses Description (0008,1080) or Code Sequence (0008,1084)

[5] This field shall be valued, if the person who acquired the images is known. This might be taken from one of the following attributes in the associated DICOM image objects: - Operators' Name (0008,1070) or Operator Identification Sequence (0008,1072) - Performing Physician's Name (0008,1050) or Performing Physician Identification Sequence (0008,1052)

[6] Procedure Code shall match OBR-4.

[7] Value set to *RAD* as fallback, if no *Institutional Department Type Code Sequence (0008, 1041)* found in the object's attributes.

[8] As Encoding of Assigning Authority in ST data field OBR-19 needs to be clarified and it has been captured into Change Proposals, temporarily the HL7v2 Hierarchic Designator Macro Attributes of *Issuer Of Accession Number Sequence* have been encoded as per Example 3: ISO OID encoded in an ST subcomponent

[9] Route of Admissions (0038, 0016) DICOM attribute, if present, shall be mapped to PV1:2. If this DICOM attribute is absent, default "U" (denoting Patient Class as Unknown) shall be used.

11. HL7 Forward Service

The HL7 Forward Service forwards HL7 messages received by HL7 application of archive to one or more remote HL7 applications according to configurable HL7 Forward Rules.

12. Security

12.1. Security Profiles

12.1.1. Secure Transport Connection Profiles

APIX System supports the *Basic TLS Secure Transport Connection Profile* and the *AES TLS Secure Transport Connection Profile* as specified in DICOM Standard, Part 15, Annex B.1 and Annex B.3.

By default configuration, TLS 1.0, TLS 1.1 and TLS 1.2 are enabled, use of TLS 1.2 is preferred.

Also other cipher suite options than the two in compliance with *AES TLS Secure Transport Connection Profile*:

- TLS_RSA_WITH_AES_128_CBC_SHA
- TLS_RSA_WITH_3DES_EDE_CBC_SHA

may be configured.

Beside DICOM DIMSE service connections, also HL7 v2 and HTTP connections can be secured by use of TLS.

IP ports on which an implementation accepts TLS connections are configurable.

The private key and the Certificate used by an instance of *APIX System* to identify itself in the TLS negotiation with remote applications has to be provided in a local keystore file in PKCS12 or JKS (Java Key Store) format on the application host. Certificates of Certificate Authorities (CA) to validate Certificates received from remote applications during the TLS negotiation can also be provided in a local keystore file in JKS format or at the central LDAP server, used as configuration backend for all instances of *APIX System*.

12.1.2. Audit Trail Profiles

12.1.2.1. Audit Trail Message Format Profile

APIX System supports the *Audit Trail Message Format Profile* as specified in DICOM Standard, Part 15, Annex A.5. Following audit messages are triggered on receive of HL7 messages.

12.1.2.1.1. Audit Messages

12.1.2.1.1.1. General Message Format Conventions

12.1.2.1.1.1.1. Message Structure

- Event

- Active Participant (1..N)
- Audit Source
- Participant Object (0..N)

Table 12.1 Event

Field Name	Opt	Description	Additional Conditions on Field Format/Value
EventID	M	Identifier for a specific audited event.	The identifier for the family of event. E.g., 'User Authentication'
EventActionCode	M	Indicator for type of action performed during the event that generated the audit.	'C'⇒'Create a new database object, such as Placing an Order'
			'R'⇒'Read/View/Print/Query Display or print data, such as a Doctor Census'
			'U'⇒'Update data, such as Revise Patient Information'
			'D'⇒'Delete items, such as a master file record'
			'E'⇒'Perform a system or application function such as log-on, program execution, or use of an object's method'
EventDateTime	M	Universal coordinated time (UTC), i.e., a date/time specification that is unambiguous as to local time zones.	The time at which the audited event occurred
EventOutcomeIndicator	M	Indicates whether the event succeeded or failed.	'0'⇒'SUCCESS', '4'⇒'Minor failure'
EventOutcomeDescription	U	In failure cases, indicates the exception or error message.	
EventTypeCode	M	Identifier for the category of event.	The specific type(s) within the family applicable to the event, e.g., 'User Login'.

Table 12.2 Active Participant

Field Name	Opt	Description	Additional Conditions on Field Format/Value
UserID	M	Unique identifier for the user actively participating in the event.	
UserIDTypeCode	U	Describes the identifier that is contained in User ID.	
UserTypeCode	U	Code for the type of the user. This value is distinct from the user's role(s).	'1'⇒'Person'
			'2'⇒'Application'
AlternativeUserID	U	Alternative unique identifier for the user.	

Field Name	Opt	Description	Additional Conditions on Field Format/Value
UserName	U	The human-meaningful name for the user.	
UserIsRequestor	M	Indicator that the user is or is not the requestor, or initiator, for the event being audited.	
RoleIDCode	U	Specification of the role(s) the user plays when performing the event, as assigned in role-based access control security.	
NetworkAccessPointTypeCode	U	An identifier for the type of network access point.	
NetworkAccessPointID	M	An identifier for the network access point of the user device This could be a device id, IP address, or some other identifier associated with a device.	

Table 12.3 Audit Source

Field Name	Opt	Description
AuditEnterpriseSiteID	U	Logical source location within the healthcare enterprise network, e.g., a hospital or other provider location within a multi-entity provider group.
AuditSourceID	M	Identifier of the source.
AuditSourceTypeCode	M	Code specifying the type of source.

Table 12.4 Participant Object

Field Name	Opt	Description	Additional Conditions on Field Format/Value
ParticipantObjectTypeCode	U	Code for the participant object type being audited. This value is distinct from the user's role or any user relationship to the participant object.	'1'⇒'Person'
			'2'⇒'System Object'
			'3'⇒'Organization'
			'4'⇒'Other'
ParticipantObjectTypeCode	U	Code representing the functional application role of Participant Object being audited.	

Field Name	Opt	Description	Additional Conditions on Field Format/Value
ParticipantObjectDataLifeCycle	U	Identifier for the data life-cycle stage for the participant object. This can be used to provide an audit trail for data, over time, as it passes through the system.	
ParticipantObjectIDTypeCode	M	Describes the identifier that is contained in Participant Object ID.	
ParticipantObjectSensitivity	U	Denotes policy-defined sensitivity for the Participant Object ID such as VIP, HIV status, mental health status, or similar topics.	
ParticipantObjectID	M	Identifies a specific instance of the participant object.	
ParticipantObjectName	U	An instance-specific descriptor of the Participant Object ID audited, such as a person's name.	
ParticipantObjectQuery	U	The actual query for a query-type participant object.	
ParticipantObjectDetail	U	Implementation-defined data about specific details of the object accessed or used.	This element is a Type-value pair. The 'type' attribute is an implementation-defined text string. The 'value' attribute is base 64 encoded data. The value is suitable for conveying binary data.
SOPClass	MC		The UIDs of SOP classes referred to in this participant object. Required if ParticipantObjectIDTypeCode is (110180, DCM, 'Study Instance UID') and any of the optional fields (AccessionNumber, ContainsMPPS, NumberOfInstances, ContainsSOPInstances,Encrypted,Anonymized) are present in this Participant Object. May be present if ParticipantObjectIDTypeCode is (110180, DCM, 'Study Instance UID') even though none of the optional fields are present.
Accession	U		An Accession Number(s) associated with this participant object.
MPPS	U		An MPPS Instance UID(s) associated with this participant object.

Field Name	Opt	Description	Additional Conditions on Field Format/Value
NumberOfInstances	U		The number of SOP Instances referred to by this participant object.
Instance	U		SOP Instance UID value(s)
Encrypted	U		A single value of True or False indicating whether or not the data was encrypted.
Anonymized	U		A single value of True or False indicating whether or not all patient identifying information was removed from the data
ParticipantObjectContainsStudy	U		A Study Instance UID, which may be used when the ParticipantObjectIDTypeCode is not (110180, DCM, 'Study Instance UID').

12.1.2.1.1.2. DICOM Instances Transferred

12.1.2.1.1.2.1. Trigger Events

This message is emitted by the archive on receive of HL7 ORU^R01 message.

12.1.2.1.1.2.2. Message Structure

Table 12.5 Entities in DICOM Instances Transferred Audit Message

Event Identification
Active Participant : Destination
Active Participant : Source
Audit Source
Participant Object Identification : Study
Participant Object Identification : Patient

Table 12.6 Event Identification

Field Name	Opt	Description
EventID	M	EV (110104, DCM, 'DICOM Instances Transferred')
EventActionCode	M	Create ⇒ 'C'
EventDateTime	M	The time at which the event occurred
EventOutcomeIndicator	M	Success ⇒ '0' Minor failure ⇒ '4'
EventOutcomeDescription	M	Error/Exception message when EventOutcomeIndicator ⇒ '4'

Table 12.7 Active Participant : Destination

Field Name	Opt	Description
UserID	M	AE title associated with HL7 Receiving Application and Facility

Field Name	Opt	Description
UserIsRequestor	M	false
UserIDTypeCode	U	EV (110119, DCM, 'Station AE Title')
UserTypeCode	U	Application ⇒ '2'
RoleIDCode	M	EV (110152, DCM, 'Destination Role ID')
NetworkAccessPointID	U	Hostname/IP Address of calling host
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name ⇒ '1' NetworkAccessPointID is an IP address ⇒ '2'

Table 12.8 Active Participant : Source

Field Name	Opt	Description
UserID	M	HL7 Sending Application and Facility Name
UserIDTypeCode	U	EV (HL7APP, 99DCM4CHEE, 'Application and Facility')
UserTypeCode	U	Application ⇒ '2'
UserIsRequestor	M	true
RoleIDCode	M	EV (110153, DCM, 'Source Role ID')
NetworkAccessPointID	U	Hostname/IP Address of initiating system
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name ⇒ '1' NetworkAccessPointID is an IP address ⇒ '2'

Table 12.9 Participant Object Identification : Study

Field Name	Opt	Description
ParticipantObjectID	M	Study Instance UID or 1.2.40.0.13.1.15.110.3.165.1 if unknown
ParticipantObjectTypeCode	M	System ⇒ '2'
ParticipantObjectTypeCodeRole	M	Report ⇒ '3'
ParticipantObjectIDTypeCode	M	EV (110180, DCM, 'Study Instance UID')
ParticipantObjectDetail	U	Base-64 encoded study date if Study has StudyDate(0008,0020) attribute
ParticipantObjectDataLifeCycle	U	OriginationCreation ⇒ '1'
ParticipantObjectDescription	U	
SOPClass	MC	Sop Class UID and Number of instances with this sop class. eg. <SOPClass UID='1.2.840.10008.5.1.4.1.1.88.22' NumberOfInstances='4'/>
Accession	U	Accession Number

Table 12.10 Participant Object Identification : Patient

Field Name	Opt	Description
ParticipantObjectID	M	Patient ID or <none> if unknown
ParticipantObjectTypeCode	M	Person ⇒ '1'

Field Name	Opt	Description
ParticipantObjectTypeCodeRole	M	Patient ⇒ '1'
ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, 'Patient Number')
ParticipantObjectName	U	Patient Name

12.1.2.1.1.2.3. Sample Message
Reports stored using HL7 ORU^R01

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="C" EventDateTime="2019-02-15T17:05:47+01:00" EventOutcomeIndicat
      <EventID csd-code="110104" codeSystemName="DCM" originalText="DICOM Instances Transferred" />
   </EventIdentification>
   <ActiveParticipant UserID="DCM4CHEE" AlternativeUserID="27673" UserIsRequestor="false" UserTypeCode="2
      <RoleIDCode csd-code="110152" codeSystemName="DCM" originalText="Destination Role ID" />
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="MESA_RPT_MGR|EAST_RADIOLOGY" UserIsRequestor="true" UserTypeCode="2" Networ
      <RoleIDCode csd-code="110153" codeSystemName="DCM" originalText="Source Role ID" />
      <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facilit
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="2.25.185448987116626056864758237726880870790" Pa
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <Accession Number="ACC1" />
         <SOPClass UID="1.2.840.10008.5.1.4.1.1.88.11" NumberOfInstances="1" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="P3^^^MINIRIS" ParticipantObjectTypeCode="1" Part
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" /
      <ParticipantObjectName>Miller^John</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

12.1.2.1.1.3. Patient Record

12.1.2.1.1.3.1. Trigger Events
This message is emitted by the archive on : - receive of HL7 messages :

- ADT Patient Management messages
- Order messages : ORM^O01, OMI^O23 and OMG^O19
- ORU^R01
- SIU Appointment Notification messages : SIU^S12, SIU^S13 and SIU^S15

- Forwarding of all of the above messages to external HL7 receivers
- Invocation of ADT Patient Management changes in external archive.
- Notification to HL7 receivers on ADT Patient Management changes in own archive.

12.1.2.1.1.3.2. Message Structure

Table 12.11 Entities in Patient Record Audit Message

Event: Patient Record
Active Participant : Initiator
Active Participant : Archive application

Audit Source
Participant Object Identification : Patient

Table 12.12 Event: Patient Record

Field Name	Opt	Description
EventID	M	EV (110110, DCM, 'Patient Record')
EventActionCode	M	Create : 'C' Update : 'U' Delete : 'D'
EventDateTime	M	The time at which the event occurred
EventOutcomeIndicator	M	Success : '0' Minor failure : '4'
EventOutcomeDescription	M	Error/Exception message when EventOutcomeIndicator : '4'

Table 12.13 Active Participant : Initiator

Field Name	Opt	Description
UserID	M	HL7 messages : 'Sending Application and Facility' Triggered from UI : 'Remote IP address' or 'User name of logged in user' Triggered by object storage : 'Calling AE title in association'
UserIDTypeCode	U	HL7 messages : EV (HL7APP, 99DCM4CHEE, 'Application and Facility') Triggered from UI (secured archive) : EV (113871, DCM, 'Person ID') Triggered from UI (unsecured archive) : EV (110182, DCM, 'Node ID') Triggered by object storage : EV (110119, DCM, 'Station AE Title')
UserTypeCode	U	Triggered from UI : Person : '1' All other cases : Application : '2'
UserIsRequestor	M	true
RoleIDCode	M	EV (110153, DCM, 'Source')
NetworkAccessPointID	U	Hostname/IP Address of calling host
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name : '1' NetworkAccessPointID is an IP address : '2'

Table 12.14 Active Participant : Archive application

Field Name	Opt	Description
UserID	M	HL7 messages : 'Receiving Application and Facility' Triggered from UI : 'Request URI' Triggered by object storage : 'Called AE title in association' Triggered by scheduler : 'Archive device name'
UserIDTypeCode	U	HL7 messages : EV (HL7APP, 99DCM4CHEE, 'Application and Facility') Triggered from UI : EV (12, RFC-3881, 'URI') Triggered by object storage : EV (110119, DCM, 'Station AE Title') Triggered by scheduler : EV (113877, DCM, 'Device Name')

Field Name	Opt	Description
UserTypeCode	U	Application : '2'
AlternativeUserID	MC	Process ID of Audit logger
UserIsRequestor	M	Patient deletion triggered by scheduler : 'true' All other cases : 'false'
RoleIDCode	M	EV (110152, DCM, 'Destination')
NetworkAccessPointID	U	Hostname/IP Address of the connection referenced by Audit logger
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name : '1' NetworkAccessPointID is an IP address : '2'

Table 12.15 Participant Object Identification : Patient

Field Name	Opt	Description	Note
ParticipantObjectID	M	Patient ID or <none> if unknown	
ParticipantObjectTypeCode	M	Person : '1'	
ParticipantObjectTypeCodeRole	M	Patient : '1'	
ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, 'Patient Number')	
ParticipantObjectName	U	Patient Name	
ParticipantObjectDataLifeCycle	U	Verification ⇒ '4'	Present only for audits triggered by PDQ Service
ParticipantObjectDetail	U	'type=HL7v2 Message value=<Base-64 encoded HL7 message>'	
ParticipantObjectDetail	U	'type=HL7v2 Message value=<Base-64 encoded HL7 response>'	
ParticipantObjectDetail	U	'type=MSH-9 value=<Base-64 encoded HL7 message type>'	
ParticipantObjectDetail	U	'type=MSH-10 value=<Base-64 encoded HL7 message control ID>'	
ParticipantObjectDetail	U	'type=MSH-9 value=<Base-64 encoded HL7 response message type>'	
ParticipantObjectDetail	U	'type=MSH-10 value=<Base-64 encoded HL7 response message control ID>'	

12.1.2.1.1.3.3. Sample Message

Patient Record audit emitted on receive of HL7 ADT message

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
    <EventIdentification EventActionCode="C" EventDateTime="2018-09-11T11:43:05.007+02:00" EventOutcomeIn
        <EventID csd-code="110110" codeSystemName="DCM" originalText="Patient Record"/>
    </EventIdentification>
    <ActiveParticipant UserID="DCM4CHEE|DCM4CHEE" AlternativeUserID="9132" UserIsRequestor="false" UserTy
        <RoleIDCode csd-code="110152" codeSystemName="DCM" originalText="Destination Role ID"/>
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <ActiveParticipant UserID="PAMSimulator|IHE" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPoi
        <RoleIDCode csd-code="110153" codeSystemName="DCM" originalText="Source Role ID"/>
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
        <AuditSourceTypeCode csd-code="4"/>
    </AuditSourceIdentification>
    <ParticipantObjectIdentification ParticipantObjectID="MEE4-54798^^^MEE4&1.3.6.1.4.1.12559.11.1.4.1.2&
        <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881"
        <ParticipantObjectName>Berger^Oliver^^^^^L</ParticipantObjectName>
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8UEFNU2ltdWxhdG9yfElIRXxEQ000Q0hF
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8RENNNENIRUV8RENNNENIRUV8UEFNU2lt
        <ParticipantObjectDetail type="MSH-9" value="QURUXkEyOA=="/>
        <ParticipantObjectDetail type="MSH-10" value="MjAxNjA2MDIxNDI4NTY="/>
        <ParticipantObjectDetail type="MSH-9" value="QUNLXkEyOA=="/>
        <ParticipantObjectDetail type="MSH-10" value="MTY5MTc4NzA1Mw=="/>
    </ParticipantObjectIdentification>
</AuditMessage>
```

Patient Record audit emitted on forwarding of received HL7 ADT message

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
    <EventIdentification EventActionCode="C" EventDateTime="2018-09-11T11:43:05.007+02:00" EventOutcomeIn
        <EventID csd-code="110110" codeSystemName="DCM" originalText="Patient Record"/>
    </EventIdentification>
    <ActiveParticipant UserID="DCM4CHEE|DCM4CHEE" AlternativeUserID="9132" UserIsRequestor="false" UserTy
        <RoleIDCode csd-code="110152" codeSystemName="DCM" originalText="Destination Role ID"/>
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <ActiveParticipant UserID="PAMSimulator|IHE" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPoi
        <RoleIDCode csd-code="110153" codeSystemName="DCM" originalText="Source Role ID"/>
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
        <AuditSourceTypeCode csd-code="4"/>
    </AuditSourceIdentification>
    <ParticipantObjectIdentification ParticipantObjectID="MEE4-54798^^^MEE4&1.3.6.1.4.1.12559.11.1.4.1.2&
        <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881"
        <ParticipantObjectName>Berger^Oliver^^^^^L</ParticipantObjectName>
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8UEFNU2ltdWxhdG9yfElIRXxEQ000Q0hF
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8RENNNENIRUV8RENNNENIRUV8UEFNU2lt
        <ParticipantObjectDetail type="MSH-9" value="QURUXkEyOA=="/>
        <ParticipantObjectDetail type="MSH-10" value="MjAxNjA2MDIxNDI4NTY="/>
        <ParticipantObjectDetail type="MSH-9" value="QUNLXkEyOA=="/>
        <ParticipantObjectDetail type="MSH-10" value="MTY5MTc4NzA1Mw=="/>
    </ParticipantObjectIdentification>
</AuditMessage>
```

12.1.2.1.1.4. Procedure Record

12.1.2.1.1.4.1. Trigger Events
This message is emitted by the archive whenever :

- Modality worklist entry is created by UI / HL7 Order messages
- Modality worklist entry is updated by UI / HL7 Order messages / incoming MPPS
- Modality worklist entry is deleted by UI
- MPPS received by archive
- MPPS forwarded by archive to external MPPS SCP
- HL7 messages forwarded by archive to external HL7 receivers

- HL7 Order messages accepted (= also not processed) by archive
- Link Instances with MWL Entry using UI
- SPS Status of MWL items of a patient changed from SCHEDULED to ARRIVED on receive of Patient Arrival (ADT^A10) HL7 message.

12.1.2.1.1.4.2. Message Structure

Table 12.16 Entities in Procedure Record Audit Message

Event Identification
Active Participant : Source
Active Participant : Archive application
Audit Source
Participant Object Identification : Study
Participant Object Identification : Patient

Table 12.17 Event Identification

Field Name	Opt	Description
EventID	M	EV (110111, DCM, 'Procedure Record')
EventActionCode	M	Create ⇒ 'C' Update ⇒ 'U' Delete ⇒ 'D'
EventDateTime	M	The time at which the event occurred
EventOutcomeIndicator	M	Success ⇒ '0' Minor failure ⇒ '4'
EventOutcomeDescription	M	Error/Exception message when EventOutcomeIndicator ⇒ '4'

Table 12.18 Active Participant : Source

Field Name	Opt	Description
UserID	M	HL7 messages ⇒ 'Sending Application and Facility' Triggered from UI ⇒ 'Remote IP address' or 'User name of logged in user' Triggered by MPPS ⇒ 'Calling AE title in association'
UserIDTypeCode	U	HL7 messages ⇒ EV (HL7APP, 99DCM4CHEE, 'Application and Facility') Triggered from UI (secured archive) ⇒ EV (113871, DCM, 'Person ID') Triggered from UI (unsecured archive) ⇒ EV (110182, DCM, 'Node ID') Triggered by MPPS ⇒ EV (110119, DCM, 'Station AE Title')
UserTypeCode	U	Triggered from UI : Person ⇒ '1' All other cases : Application ⇒ '2'
UserIsRequestor	M	true
NetworkAccessPointID	U	Hostname/IP Address of calling host
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name ⇒ '1' NetworkAccessPointID is an IP address ⇒ '2'

Table 12.19 Active Participant : Archive application

Field Name	Opt	Description
UserID	M	HL7 messages ⇒ 'Receiving Application and Facility' Triggered from UI ⇒ 'Request URI' Triggered by MPPS ⇒ 'Called AE title in association'
UserIDTypeCode	U	HL7 messages ⇒ EV (HL7APP, 99DCM4CHEE, 'Application and Facility') Triggered from UI ⇒ EV (12, RFC-3881, 'URI') Triggered by MPPS ⇒ EV (110119, DCM, 'Station AE Title')
UserTypeCode	U	Application ⇒ '2'
AlternativeUserID	MC	Process ID of Audit logger
UserIsRequestor	M	false
NetworkAccessPointID	U	Hostname/IP Address of the connection referenced by Audit logger
NetworkAccessPointTypeCode	U	NetworkAccessPointID is host name ⇒ '1' NetworkAccessPointID is an IP address ⇒ '2'

Table 12.20 Participant Object Identification : Study

Field Name	Opt	Description
ParticipantObjectID	M	Study Instance UID or 1.2.40.0.13.1.15.110.3.165.1 if unknown
ParticipantObjectTypeCode	M	System ⇒ '2'
ParticipantObjectTypeCodeRole	M	Report ⇒ '3'
ParticipantObjectIDTypeCode	M	EV (110180, DCM, 'Study Instance UID')
ParticipantObjectDetail	U	Base-64 encoded study date if Study has StudyDate(0008,0020) attribute
ParticipantObjectDetail	U	If Procedure record created/updated by HL7 messages : 'type=HL7v2 value=<Base-64 encoded HL7 message>'
ParticipantObjectDetail	U	If Procedure record created/updated by HL7 messages : 'type=HL7v2 value=<Base-64 encoded HL7 response>'
ParticipantObjectDescription	U	
SOPClass	MC	Sop Class UID and Number of instances with this sop class. eg. <SOPClass UID='1.2.840.10008.5.1.4.1.1.88.22' NumberOfInstances='4'/>
Accession	U	Accession Number

Table 12.21 Participant Object Identification : Patient

Field Name	Opt	Description
ParticipantObjectID	M	Patient ID or <none> if unknown
ParticipantObjectTypeCode	M	Person ⇒ '1'
ParticipantObjectTypeCodeRole	M	Patient ⇒ '1'
ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, 'Patient Number')
ParticipantObjectName	U	Patient Name

12.1.2.1.1.4.3. Sample Message

MWL created by HL7 Order message

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
    <EventIdentification EventActionCode="C" EventDateTime="2018-09-12T12:48:59+02:00" EventOutcomeIndica
        <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record"/>
    </EventIdentification>
    <ActiveParticipant UserID="MESA_OF|XYZ_RADIOLOGY" UserIsRequestor="true" UserTypeCode="2" NetworkAcce
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <ActiveParticipant UserID="MESA_IM|XYZ_IMAGE_MANAGER" AlternativeUserID="18494" UserIsRequestor="fals
        <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facil
    </ActiveParticipant>
    <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
        <AuditSourceTypeCode csd-code="4"/>
    </AuditSourceIdentification>
    <ParticipantObjectIdentification ParticipantObjectID="1.2.4.0.13.1.432252867.1552647.1" ParticipantOb
        <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8TUVTQV9PRnxYWVpfUkFESU9MT0dZfE1F
        <ParticipantObjectDetail type="HL7v2 Message" value="TVNIfF5+XCZ8TUVTQV9JTXxYWVpfSU1BR0VfTUFOQUdF
        <ParticipantObjectDetail type="MSH-9" value="T1JNXk8wMQ=="/>
        <ParticipantObjectDetail type="MSH-10" value="MTAwMTEy"/>
        <ParticipantObjectDetail type="MSH2-9" value="QUNLXk8wMQ=="/>
        <ParticipantObjectDetail type="MSH2-10" value="MTk1OTExMzI5"/>
        <ParticipantObjectDescription>
            <Accession Number="$ACCESSION_NUMBER$"/>
        </ParticipantObjectDescription>
    </ParticipantObjectIdentification>
    <ParticipantObjectIdentification ParticipantObjectID="M4001^^^ADT1" ParticipantObjectTypeCode="1" Par
        <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881"
        <ParticipantObjectName>KING^MARTIN</ParticipantObjectName>
    </ParticipantObjectIdentification>
</AuditMessage>
```

MWL created using archive UI / REST service

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="C" EventDateTime="2019-02-05T18:23:08+01:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
   </EventIdentification>
   <ActiveParticipant UserID="127.0.0.1" UserIsRequestor="true" UserTypeCode="1" NetworkAccessPointID="12
      <UserIDTypeCode csd-code="110182" codeSystemName="DCM" originalText="Node ID" />
   </ActiveParticipant>
   <ActiveParticipant UserID="/dcm4chee-arc/aets/DCM4CHEE/rs/mwlitems" AlternativeUserID="5726" UserIsReq
      <UserIDTypeCode csd-code="12" codeSystemName="RFC-3881" originalText="URI" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="2.25.236495948151023012026390020924423660325" Pa
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <Accession Number="A-00000001" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="3850402XXXX" ParticipantObjectTypeCode="1" Parti
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" /
      <ParticipantObjectName>KASMANN^VARMO</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MWL SPS Status updated from SCHEDULED to ARRIVED on receive of ADT^A10

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="U" EventDateTime="2020-06-17T15:35:57.431+02:00" EventOutcomeInd
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
   </EventIdentification>
   <ActiveParticipant UserID="PAMSimulator|IHE" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPoin
      <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facilit
   </ActiveParticipant>
   <ActiveParticipant UserID="DCM4CHEE|DCM4CHEE" AlternativeUserID="21263" UserIsRequestor="false" UserTy
      <UserIDTypeCode csd-code="HL7APP" codeSystemName="99DCM4CHEE" originalText="Application and Facilit
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.2.4.0.13.1.432252867.1552647.1" ParticipantObj
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription />
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="M40011^^^ADT11" ParticipantObjectTypeCode="1" Pa
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" />
      <ParticipantObjectName>KING1^MARTIN1</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MPPS In-Progress received by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="C" EventDateTime="2020-05-04T17:06:04.303+02:00" EventOutcomeInd
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>IN PROGRESS</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="MPPSSCU" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="loca
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="DCM4CHEE" AlternativeUserID="11475" UserIsRequestor="false" UserTypeCode="2
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.19950804141659085950
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <MPPS UID="2.25.167652009927391867209751951017387655636" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Partici
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" />
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MPPS Completed received by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="U" EventDateTime="2020-05-04T17:06:04+02:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>COMPLETED</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="MPPSSCU" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="loca
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="DCM4CHEE" AlternativeUserID="11475" UserIsRequestor="false" UserTypeCode="2
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.1995080414165908595
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <MPPS UID="2.25.167652009927391867209751951017387655636" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Partici
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" /
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MPPS In-Progress forwarded by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="C" EventDateTime="2020-05-08T12:44:45+02:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>IN PROGRESS</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="DCM4CHEE" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="tes
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="TEST" AlternativeUserID="8959" UserIsRequestor="false" UserTypeCode="2" Net
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.1995080414165908595
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <MPPS UID="2.25.124456130015603657296934039173159643921" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Partici
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" /
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MPPS Completed forwarded by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="U" EventDateTime="2020-05-08T12:44:55+02:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>COMPLETED</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="DCM4CHEE" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="tes
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="TEST" AlternativeUserID="8959" UserIsRequestor="false" UserTypeCode="2" Net
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.19950804141659085950
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DCI
      <ParticipantObjectDescription>
         <MPPS UID="2.25.124456130015603657296934039173159643921" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Particip
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" />
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MWL status changed from SCHEDULED to STARTED triggered by MPPS In-Progress received by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="U" EventDateTime="2020-05-04T16:24:13+02:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>STARTED</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="MPPSSCU" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="loca
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="DCM4CHEE" AlternativeUserID="26364" UserIsRequestor="false" UserTypeCode="2
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.19950804141659085950
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DCI
      <ParticipantObjectDescription>
         <MPPS UID="2.25.309202333051991089433393223932804305160" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Particip
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" />
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

MWL status changed from STARTED to COMPLETED triggered by MPPS Completed received by archive

```
<?xml version="1.0" encoding="UTF-8"?>
<AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http:/
   <EventIdentification EventActionCode="U" EventDateTime="2020-05-04T16:24:13+02:00" EventOutcomeIndicat
      <EventID csd-code="110111" codeSystemName="DCM" originalText="Procedure Record" />
      <EventOutcomeDescription>COMPLETED</EventOutcomeDescription>
   </EventIdentification>
   <ActiveParticipant UserID="MPPSSCU" UserIsRequestor="true" UserTypeCode="2" NetworkAccessPointID="loca
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <ActiveParticipant UserID="DCM4CHEE" AlternativeUserID="26364" UserIsRequestor="false" UserTypeCode="2
      <UserIDTypeCode csd-code="110119" codeSystemName="DCM" originalText="Station AE Title" />
   </ActiveParticipant>
   <AuditSourceIdentification AuditSourceID="dcm4chee-arc">
      <AuditSourceTypeCode csd-code="4" />
   </AuditSourceIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="1.3.12.2.1107.5.8.1.12345678.1995080414165908595
      <ParticipantObjectIDTypeCode csd-code="110180" originalText="Study Instance UID" codeSystemName="DC
      <ParticipantObjectDescription>
         <MPPS UID="2.25.309202333051991089433393223932804305160" />
         <Accession Number="SMS000018" />
      </ParticipantObjectDescription>
   </ParticipantObjectIdentification>
   <ParticipantObjectIdentification ParticipantObjectID="SMS530102" ParticipantObjectTypeCode="1" Particip
      <ParticipantObjectIDTypeCode csd-code="2" originalText="Patient Number" codeSystemName="RFC-3881" />
      <ParticipantObjectName>COTTA^ANNA</ParticipantObjectName>
   </ParticipantObjectIdentification>
</AuditMessage>
```

12.1.2.2. Audit Trail Message Transmission Profile - SYSLOG-TLS

APIX System supports the *Audit Trail Message Transmission Profile - SYSLOG-TLS* as specified in DICOM Standard, Part 15, Annex A.6.

12.1.2.3. Audit Trail Message Transmission Profile - SYSLOG-UDP

APIX System supports the *Audit Trail Message Transmission Profile - SYSLOG-UDP* as specified in DICOM Standard, Part 15, Annex A.7.

12.2. Association Level Security

APIX System can be configured to check the Receiving Application and Facility in received HL7 v2 messages. Each HL7 Application provided by *APIX System* can be configured to accept HL7 v2 messages from only a limited list of Sending Application and Facility names.

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