

Visage[®] 7

HL7 Interface Specification

Visage 7

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1. Introduction

1.1 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of HL7.

1.2 Remarks

This document is the HL7 Interface Specification for Visage 7.

HL7, by itself, does not guarantee interoperability. However, the Interface Specification facilitates a first-level validation for interoperability between different applications supporting the same HL7 functionality.

This Interface Specification is not intended to replace validation with other HL7 equipment to ensure proper exchange of information intended.

The scope of this Interface Specification is to facilitate communication between Visage 7 and other HL7 systems. The Interface Specification should be read and understood in conjunction with the HL7 Standard and the IHE Technical Framework Revision 7.0. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different Interface Specifications is the first step towards assessing interconnectivity between Visage 7 and other HL7 conformant equipment.
- Test procedures should be defined to validate the desired level of connectivity.

1.3 Abbreviations and Acronyms

ACK	Acknowledge
ADT	Admission, Discharge and Transfer
CS	Client/Server
DICOM	Digital Imaging and Communications in Medicine
DSS	Department System Scheduler
HL7	Health Level 7
IHE	Integrating the Healthcare Enterprise
IP	Internet Protocol
MLLP	Minimal Lower Layer Protocol
MSA	Message Acknowledgement (Segment)
MRG	Merge Patient Information (Segment)
MSH	Message Header (Segment)
LLP	Lower Layer Protocol
OMG	General Clinical Order Message
ORM	General Order Message
ORU	Observational Report Unsolicited
PACS	Picture Archiving and Communication System

PID	Patient Identification (Segment)
PIR	Patient Information Reconciliation
PV1	Patient Visit (Segment)
RIS	Radiology Information System
SIU	Schedule Information Unsolicited
TCP	Transmission Control Protocol
UID	Unique Identifier
UTF	Unicode Transformation Format
VR	Value Representation

2. Functional Overview

2.1 General

2.1.1 Patient information reconciliation

The Visage 7 concept is based on a modular architecture for distributing medical images and reports within and outside of a clinical area. It allows external systems to send DICOM objects to it for temporary storage and long-term archiving.

This requires to provide mechanisms for patient information reconciliation. Therefore Visage 7 implements a HL7 Interface which supports a subset of HL7 messages defined by the IHE transaction 'Patient Update'.

The functionality which is provided with the HL7 module is:

- Reception of incoming HL7 trigger event messages.
- Converting information received with the HL7 messages into DICOM conforming data sets.
- Performing patient information reconciliation processes by modifying DICOM objects stored within Visage 7 according to the HL7 requests.
- Triggering prefetching of prior studies from a remote DICOM archive upon receipt of order or appointment messages.
- Sending appropriate response messages to the sender of the request message.

In addition Visage can be configured to send out HL7 messages to a HL7 partner node (typically a RIS system) in order to indicate that a certain study is considered complete (all images received) or verified (QA status completed).

2.1.2 Quality assurance

Additionally, Visage 7 implements functionality for quality assurance of incoming DICOM images: the data contained in images can be matched against HL7 messages defined by the IHE transaction 'Procedure Scheduled' / 'Procedure Updated'. In case differences are identified, those can be automatically corrected in the images, or they can be manually checked using the Quality Assistance function in the Visage Client.

The functionality which is provided by the HL7 module for this is:

- Reception of incoming HL7 order event messages.
- Converting these messages and storing them locally in a data base.
- Sending appropriate response messages to the sender of the request message.
- Match procedures against images and perform the required updates in the images, if configured.

2.1.3 Prefetching

Prefetching of DICOM objects denotes the operation to retrieve, from an external DICOM node such as an archive, DICOM objects that are needed at the time of a new examination. Typically prior DICOM studies that may be needed for comparison purposes are prefetched. Visage 7 supports to do prefetching based on HL7 messages, for example when the message of a new appointment has been received. Prefetching can be also done based of HL7 order event messages.

The functionality which is provided by the HL7 module for this is:

- Reception of incoming HL7 messages.
- Converting the data to update the prefetching queue in the Visage 7 data base. For prefetching, HL7 messages are not separately stored in the database.
- Sending appropriate response messages to the sender of the request message.
- The prefetching queue is processed asynchronously by a separate service.

2.1.4 Incoming reports

Visage 7 can accept, store, register and display text reports that match specific studies. The reports functionality of the HL7 module includes:

- Reception of incoming HL7 ORU R01 messages containing reports (text lines)
- Storing and registering reports in the Visage 7 database.
- Matching reports to existing studies.
- Matching incoming studies to existing reports
- Sending appropriate response messages to the sender of the request message.
- Visage 7 GUI access to reports

2.1.5 Handling of unsupported messages

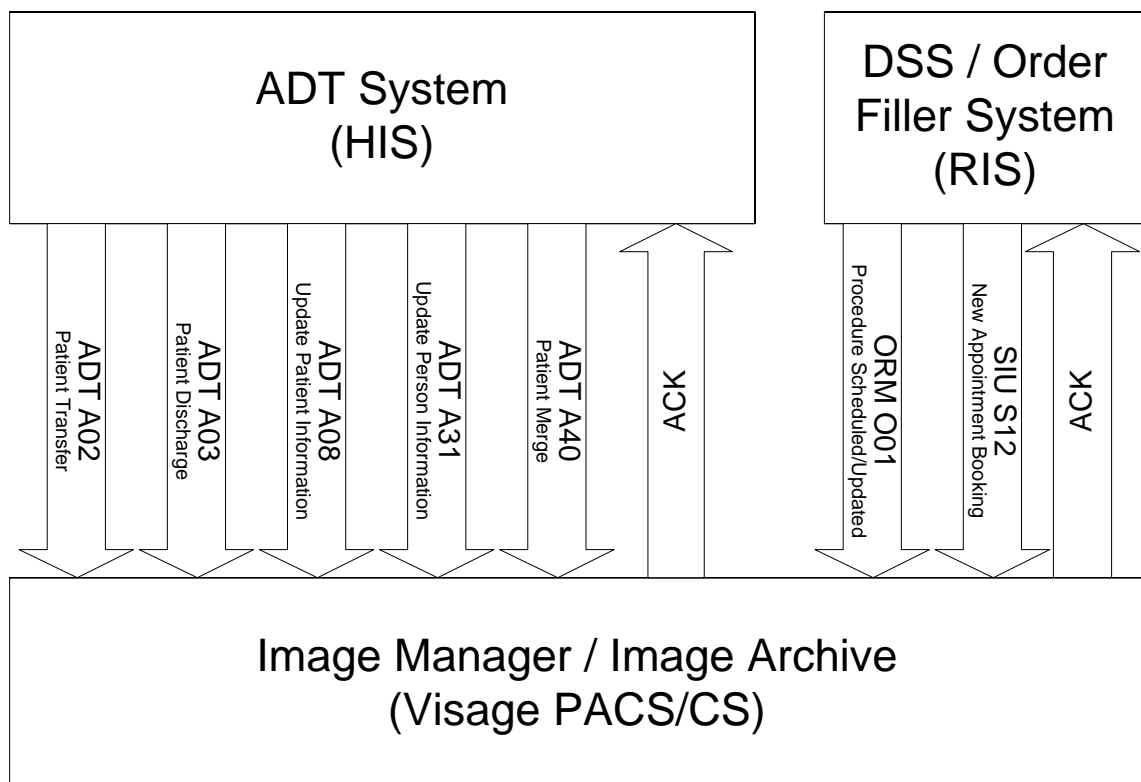
Additionally, the HL7 can report to the sender about unsupported messages (unsupported message types or HL7 versions).

2.2 Framework

The HL7 communication takes place between the ADT actor and Visage 7 which works as the Images Manager / Image Archive actor according to the IHE Standard. For specific integration scenarios, Visage 7 can be optionally configured to provide a subset of the Department System Scheduler / Order Filler functionality. Actors are communication systems or components of information systems that produce, manage or act on information associated with operational activities in the enterprise. In the following the actors are described that are affected by the Visage 7 HL7 communication:

- ADT System:
A system responsible for adding and/or updating patient demographic and encounter information.
- Department System Scheduler / Order Filler:
A system that provides functions related to the management of orders received from external systems or through the departments system's user interface.
- Image Manager:
A system that provides functions related to safe storage and management of evidence objects.
- Image Archive:
A system that provides long term storage of evidence objects.

In the following diagram the data flow between the actors ADT and DSS / Order Filler and the Image Manager / Image Archive that is represented by Visage 7 is illustrated.



3. Communication Interface

The HL7 Standard recommends the Minimal Lower Layer Protocol (MLLP) for the communication between HL7 systems. For this purpose the HL7 Interface of Visage 7 provides a unidirectional TCP/IP socket interface. The Lower Layer Protocol defined by the HL7 Standard is implemented as follows:

- Message Start Character: 0x0B
- Segment End Character: 0x0D
- Message Stop Characters: 0x1C and 0x0D
- Character Encoding: UTF-8

Visage 7 allows to configure the character encoding of HL7 messages to UTF-8, Ansi (code page 1252), Mac (code page 10000), and default (standard Microsoft Windows[®] encoding). The other parameters are not configurable within the Visage 7 implementation. The number of concurrent connections which can be handled by Visage 7 is not limited.

4. Message Description

4.1 Overview

Visage 7 is able to handle a subset of ADT messages which are used to transmit portions of the Patient Administration data from one system to another. Additionally received ORM messages are accepted and responded to satisfy the requirements of the IHE Scheduled Workflow Profile. It also handles ORU messages containing reports as per IHE Simple Image and Numeric Report Profile.

This chapter informs about the supported HL7 versions and message types and describes the expected message contents and in which way the received data is used for further processing.

4.1.1 Supported IHE Profile

The Visage 7 HL7 interface supports a subset of HL7 messages defined by following IHE profiles and transactions:

- **Scheduled Workflow (SWF)**
 - Procedure Scheduled
 - Procedure Updated
 - Placer Order Management(optional, only if explicitly configured)
- **Patient Information Reconciliation (PIR)**
 - Patient Update
- **Simple Image and Numeric Report (SINR)**
 - Structured Report Export

4.1.2 Supported HL7 Versions

The Visage 7 HL7 interface supports messages which conform to the subset of HL7 versions which is listed below. Visage 7 responds to received messages of a not supported version with an Application Reject Acknowledgement message (see 4.7).

- HL7 Version 2.2
- HL7 Version 2.3
- HL7 Version 2.3.1
- HL7 Version 2.4
- HL7 Version 2.5
- HL7 Version 2.5.1

4.1.3 Supported Message Types

The Visage 7 HL7 interface supports the reception of the subset of ADT, ORM, ORU and SIU message types which is listed below. Visage 7 responds to received messages of a not supported type with an Application Reject Acknowledgement message (see 4.7).

- ADT A01 (Admin/Visit Patient)
- ADT A02 (Transfer a Patient)
- ADT A03 (Discharge/End Visit)
- ADT A04 (Register a Patient)
- ADT A05 (Pre-Admit a Patient)
- ADT A06 (Change an Outpatient to an Inpatient)
- ADT A07 (Change an Inpatient to an Outpatient)
- ADT A08 (Update Patient Information)
- ADT A11 (Cancel Admin / Visit Notification)
- ADT A12 (Cancel Transfer)
- ADT A13 (Cancel Discharge / End Visit)
- ADT A18 (Merge Patient Information)
- ADT A28 (Add Person or Patient Information)
- ADT A31 (Update Person Information)
- ADT A38 (Cancel Pre-Admit)
- ADT A40 (Merge Patient – Patient Identifier List)
- ADT A41 (Merge Account – Patient Account Number)
- ADT A45 (Move Visit Information – Visit Number)
- OMG O19 (Placer Order Management)
- ORM O01 (Procedure Scheduled/Updated)
- ORU R01 (Observational report – unsolicited)
- OMI O23
- SIU S12 (New Appointment Booking)

4.1.4 MSH Segment

All incoming HL7 messages must have an MSH segment with the following components. The last column of the table specifies the expected values and their intended use.

MSH Segment

Item	Component Name	Data Type	Value
0001	Field Separator	ST	For this element ' ' is expected.
0002	Encoding Characters	ST	For this element '^~\&' is expected.
0003	Sending Application	HD	Used to fill the Receiving Application in the acknowledgement message.
0004	Sending Facility	HD	Used to fill the Receiving Facility in the acknowledgement message.
0009	Message Type	CM	E.g., 'ADT^A01' (controls the message type).
0010	Message Control ID	ST	Used to fill the acknowledge message.
0011	Processing ID	PT	Used to fill the acknowledge message.
0012	Version ID	VIT	Used for HL7 version check and to fill the acknowledge message.

4.2 ADT Messages

4.2.1 ADT A01 - Admin/Visit Patient

An A01 event signals the result of a patient undergoing the admission process which has assigned the patient to a bed. This message type is used to store and update demographic and patient location information of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.1.1 Message Specification

The Admin/Visit Patient request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A01
Type of Request Message:	ADT^A01
Message Structure:	ADT_A01 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A01

4.2.1.2 Segment Description

The message segments and elements in the following tables are necessary to perform the patient update process and to generate an appropriate acknowledge message. The last column of the tables specifies the expected values and their intended use.

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the patient for the update process. See section 4.8.1.1.
00108	Patient Name	XPN	New name for the specified patient. See section 4.8.1.2.
00110	Date/Time Of Birth	TS	New date/time of birth for the specified patient.
00111	Sex	IS	New sex for the specified patient.

PV1 Segment

Item	Component Name	Data Type	Value
00133	Assigned Patient Location	PL	New assigned location for the specified patient.

Constraints:

- A PIR process can only be performed for patients with a valid Patient ID.
- If the Visage 7 DICOM database contains two or more patients with identical Patient IDs, the PIR process is performed for all of them.
- Visage 7 cannot perform a PIR process if it results in two or more identical patients.
- For PIR jobs no retry and visualization mechanisms are provided.
- When a PIR process is performed HTML reports stored in Visage 7 are either deleted or a warning text is added to the document depending on the configuration settings.

4.2.1.3 Attribute Processing

The reception of an ADT A01 message results in a PIR process in order to update patient information. Therefore it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1.

4.2.1.4 Acknowledgement

Visage 7 sends the acknowledge message after the PIR job was initiated or it is certain that PIR processing could not be performed successfully. In case of an unrecognized patient specified by the 'Patient Identifier List' item Visage 7 ignores the request and responds with status 'Success'. See chapter 4.7 for a detailed acknowledge message description.

4.2.2 ADT A02 - Patient Transfer

This message type is used to update the location of a specific patient.

4.2.2.1 Message Specification

The Patient Transfer request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A02
Type of Request Message:	ADT^A02
Message Structure	ADT_A02 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A02

4.2.2.2 Segment Description

The message segments and elements in the following tables are necessary to perform the patient visit update process and to generate an appropriate acknowledge message. The last column of the tables specifies the expected values and their intended use.

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the patient for the update process. See Section 4.8.1.1.

PV1 Segment

Item	Component Name	Data Type	Value
00133	Assigned Patient Location	PL	New assigned location for the specified patient.

Constraints:

- A PIR process can only be performed for patients with a valid Patient ID.
- If the Visage 7 DICOM database contains two or more patients with identical Patient IDs, the PIR process is performed for all of them.
- For PIR jobs no retry and visualization mechanisms are provided.
- When a PIR process is performed HTML reports stored in Visage 7 are either deleted or a warning text is added to the document depending on the configuration settings.

4.2.2.3 Attribute Processing

The reception of an ADT A02 message results in a PIR process in order to update patient visit information. Therefore it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1.

4.2.2.4 Acknowledgement

Visage 7 sends the acknowledge message after the PIR job was initiated or it is certain that PIR processing could not be performed successfully. In case of an unrecognized patient specified by the 'Patient Identifier List' item Visage 7 ignores the request and responds with status 'Success'. See chapter 4.7 for a detailed acknowledge message description.

4.2.3 ADT A03 - Patient Discharge

This message type is used to signal the end of a patient's stay in a healthcare facility by updating the location of a specific patient.

4.2.3.1 Message Specification

The Patient Discharge request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A03
Type of Request Message:	ADT^A03
Message Structure	ADT_A03 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A03

4.2.3.2 Description

Processing and acknowledgement of an ADT^A03 message is the same as for an ADT^A02 message. See sections 4.2.2.2 to 4.2.2.4 for details.

4.2.4 ADT A04 – Register a Patient

This message type signals that the patient has arrived or checked in. It is used to store and update demographic and patient location information of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.4.1 Message Specification

The Register a Patient request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A04
Type of Request Message:	ADT^A04
Message Structure:	ADT_A01 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A04

4.2.4.2 Description

Processing and acknowledgement of an ADT^A04 message is the same as for an ADT^A01 message. See sections 4.2.1.2 to 4.2.1.4 for details.

4.2.5 ADT A05 – Pre-Admit a Patient

An A05 event signals that a patient has undergone the pre-admission process. It causes that demographics of a specific patient are stored or updated. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.5.1 Message Specification

The Pre-Admit a Patient request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A05
Type of Request Message:	ADT^A05
Message Structure:	ADT_A05 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A05

4.2.5.2 Segment Description

The message segments and elements in the following tables are necessary to perform the patient update process and to generate an appropriate acknowledge message. The last column of the table specifies the expected values and their intended use.

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the patient for the update process. See Section 4.8.1.1.
00108	Patient Name	XP	New name for the specified patient. See Section 4.8.1.2.
00110	Date/Time Of Birth	TS	New date/time of birth for the specified patient.
00111	Sex	IS	New sex for the specified patient.

Note:

The difference for Visage 7 when processing ADT A01 or ADT A05 message is the following: With an ADT A01 message, both patient demographics and patient location are updated. With an ADT A05 message, only the patient demographics are updated. Any information in the PV1 segment of an ADT A05 message is ignored.

Constraints:

- A PIR process can only be performed for patients with a valid Patient ID.
- If the Visage 7 DICOM database contains two or more patients with identical Patient IDs, the PIR process is performed for all of them.
- Visage 7 cannot perform a PIR process if it results in two or more identical patients.
- For PIR jobs no retry and visualization mechanisms are provided.

- When a PIR process is performed HTML reports stored in Visage 7 are either deleted or a warning text is added to the document depending on the configuration settings.

4.2.5.3 Attribute Processing

The reception of an ADT A05 message results in a PIR process in order to update patient information. Therefore it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1.

4.2.5.4 Acknowledgement

Visage 7 sends the acknowledge message after the PIR job was initiated or it is certain that PIR processing could not be performed successfully. In case of an unrecognized patient specified by the 'Patient Identifier List' item Visage 7 ignores the request and responds with status 'Success'. See chapter 4.7 for a detailed acknowledge message description.

4.2.6 ADT A06 – Change an Outpatient to an Inpatient

This message type is used to signal that a patient who was present for a non-admitted visit is being admitted after an evaluation of the seriousness of the patient's condition. Processing this message causes to update the location of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.6.1 Message Specification

The Change an Outpatient to an Inpatient request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A06
Type of Request Message:	ADT^A06
Message Structure:	ADT_A06 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A06

4.2.6.2 Description

Processing and acknowledgement of an ADT^A06 message is the same as for an ADT^A02 message. See sections 4.2.2.2 to 4.2.2.4 for details.

4.2.7 ADT A07 – Change an Inpatient to an Outpatient

This message type is used to signal that a patient who was admitted changes his/her status to “no longer admitted” but is still being seen for this episode of care. Processing this message causes to update the location of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.7.1 Message Specification

The Change an Inpatient to an Outpatient request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A07
Type of Request Message:	ADT^A07
Message Structure:	ADT_A07 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A07

4.2.7.2 Description

Processing and acknowledgement of an ADT^A07 message is the same as for an ADT^A02 message. See sections 4.2.2.2 to 4.2.2.4 for details.

4.2.8 ADT A08 - Update Patient Information

This message type is used to merge to update demographic and patient location information of a specific patient.

Note:

According to the IHE Standard patient location changes should be requested with an ADT A02 message (Patient Transfer). However Visage 7 provides the possibility to perform modifications of the patient location when a Patient Information Update is requested with an ADT A08 message.

4.2.8.1 Message Specification

The Update Patient Information request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A08
Type of Request Message:	ADT^A08
Message Structure:	ADT_A01 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A08

4.2.8.2 Description

Processing and acknowledgement of an ADT^A08 message is the same as for an ADT^A01 message. See sections 4.2.1.2 to 4.2.1.4 for details.

4.2.9 ADT A11 – Cancel Admit / Visit Notification

This message type is used to signal that an A01 (admit/visit notification) event is cancelled, either because of an erroneous entry of the A01 event, or because of a decision not to admit the patient after all. Visage 7 does not process this message at all but acknowledges it anyway. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.9.1 Message Specification

The Cancel Admin / Visit Notification request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A11
Type of Request Message:	ADT^A11
Message Structure:	ADT_A11 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A11

4.2.9.2 Segment Description

The message segments and elements in the following tables are parsed by Visage

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Ignored.

4.2.9.3 Attribute Processing

None.

4.2.9.4 Acknowledgement

Visage 7 sends an acknowledge message after the message has been parsed.

4.2.10 ADT A12 – Cancel Transfer

This message type is used to signal that an A02 (transfer a patient) event is cancelled, either because of erroneous entry of the A02 event or because of a decision not to transfer the patient after all. Processing this message causes to update the location of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.10.1 Message Specification

The Cancel Transfer request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A12
Type of Request Message:	ADT^A12
Message Structure:	ADT_A12 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A12

4.2.10.2 Description

Processing and acknowledgement of an ADT^A12 message is the same as for an ADT^A02 message. See sections 4.2.2.2 to 4.2.2.4 for details.

4.2.11 ADT A13 – Cancel Discharge / End Visit

This message type is used to signal that an A03 (discharge/end visit) event is cancelled, either because of erroneous entry of the A03 event or because of a decision not to discharge or end the visit of the patient after all. Processing this message causes to update the location of the patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.11.1 Message Specification

The Cancel Discharge / End Visit request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A13
Type of Request Message:	ADT^A13
Message Structure:	ADT_A13 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A13

4.2.11.2 Description

Processing and acknowledgement of an ADT^A13 message is the same as for an ADT^A02 message. See sections 4.2.2.2 to 4.2.2.4 for details.

4.2.12 ADT A18 - Merge Patient Information

This message type is used to merge two patients identified by the Patient ID or to modify the Patient ID value of a specific patient. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

Note:

According to the HL7 Standard (2.3.1 or newer), this message type exists for backward compatibility only. ADT A40 (merge patient-patient identifier list) events should be utilized in place of the A18 event.

4.2.12.1 Message Specification

The Merge Patient Information request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A18
Type of Request Message:	ADT^A18
Message Structure:	ADT_A18 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A18

4.2.12.2 Segment Description

The message segments and elements in the following tables are necessary to perform the patient merge process and to generate an appropriate acknowledge message. The last column of the tables specifies the expected values and their intended use.

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the resulting patient of the merge process. See Section 4.8.1.1.
00108	Patient Name	XPN	New name for the resulting patient. See Section 4.8.1.2.
00110	Date/Time Of Birth	TS	New date/time of birth for the resulting patient.
00111	Sex	IS	New sex for the resulting patient.

MRG Segment

Item	Component Name	Data Type	Value
00211	Prior Patient Identifier List	CX	Used to identify the patient to be merged into the resulting patient. See Section 4.8.1.1.

Notes:

- If the patient specified by the 'Prior Patient Identifier List' element of the MRG segment doesn't exist in Visage 7, a merge is not performed.
- The patient demographics (Patient's Name, Patient ID, Patient's Birth Date and Time, Patient's Sex) of the prior and the resulting patient are both updated to the values in the PID segment.

Constraints:

- A PIR process can only be performed for patients with a valid Patient ID.
- If the Visage 7 DICOM database contains two or more patients with identical Patient IDs, the merge is performed for all of them. This applies to the prior and to the resulting patient.
- Visage 7 cannot perform a PIR process if it results in two or more identical patients.
- For PIR jobs no retry and visualization mechanisms are provided.
- When a PIR process is performed HTML reports stored in Visage 7 are either deleted or a warning text is added to the document depending on the configuration settings.

4.2.12.3 Attribute Processing

The reception of an ADT A18 message results in a PIR process in order to merge two patients or to update the Patient ID of a patient. Therefore it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1.

4.2.12.4 Acknowledgement

Visage 7 sends the acknowledge message after the PIR job was initiated or it is certain that PIR processing could not be performed successfully. In case of an unrecognized patient specified by the 'Patient Identifier List' item Visage 7 ignores the request and responds with status 'Success'. See chapter 4.7 for a detailed acknowledge message description.

4.2.13 ADT A28 – Add Person or Patient Information

An A28 event signals ‘everything that is known about a person’, regardless of whether that person is currently a patient. It causes that the demographics of the person is stored or updated. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.13.1 Message Specification

The Add Person or Patient Information request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A28
Type of Request Message:	ADT^A28
Message Structure:	ADT_A05 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A28

4.2.13.2 Description

Processing and acknowledgement of an ADT^A28 message is the same as for an ADT^A05 message. See sections 4.2.5.2 to 4.2.5.4 for details.

4.2.14 ADT A31 - Update Person Information

This message type is used to store or update demographic information of a specific person that is not necessarily a patient.

4.2.14.1 Message Specification

The Update Person Information request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A31
Type of Request Message:	ADT^A31
Message Structure:	ADT_A05 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A31

4.2.14.2 Description

Processing and acknowledgement of an ADT^A31 message is the same as for an ADT^A05 message. See sections 4.2.5.2 to 4.2.5.4 for details.

4.2.15 ADT A38 – Cancel Pre-Admit

This message type is used to signal that an A05 (pre-admit a patient) event is cancelled, either because of an erroneous entry of the A01 event, or because of a decision not to admit the patient after all. Visage 7 does not process this message at all but acknowledges it anyway. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.15.1 Message Specification

The Cancel Pre-Admit request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A38
Type of Request Message:	ADT^A38
Message Structure:	ADT_A38 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A38

4.2.15.2 Description

Processing and acknowledgement of an ADT^A38 message is the same as for an ADT^A11 message. See sections 4.2.9.2 to 4.2.9.4 for details.

4.2.16 ADT A40 - Merge Patient (Patient Identifier List)

This message type is used to merge two patients identified by the Patient ID or to modify the Patient ID value of a specific patient.

4.2.16.1 Message Specification

The Merge Patient (Patient Identifier List) request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A40
Type of Request Message:	ADT^A40
Message Structure:	ADT_A39 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A40

4.2.16.2 Segment Description

The message segments and elements in the following tables are necessary to perform the patient merge process and to generate an appropriate acknowledge message. The last column of the tables specifies the expected values and their intended use.

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the resulting patient of the merge process. See Section 4.8.1.1.
00108	Patient Name	XPN	New name for the resulting patient. See Section 4.8.1.2.
00110	Date/Time Of Birth	TS	New date/time of birth for the resulting patient.
00111	Sex	IS	New sex for the resulting patient.

MRG Segment

Item	Component Name	Data Type	Value
00211	Prior Patient Identifier List	CX	Used to identify the patient to be merged into the resulting patient. See Section 4.8.1.1.

Notes:

- Visage 7 can handle more than one merge requests contained in an ADT A40 message. These multiple requests are specified by separate PID and MRG segment pairs.
- If the patient specified by the 'Prior Patient Identifier List' element of the MRG segment doesn't exist in Visage 7, a merge is not performed.
- The patient demographics (Patient's Name, Patient ID, Patient's Birth Date and Time, Patient's Sex) of the prior and the resulting patient are both updated to the values in the PID segment.

Constraints:

- A PIR process can only be performed for patients with a valid Patient ID.
- If the Visage 7 DICOM database contains two or more patients with identical Patient IDs, the merge is performed for all of them. This applies to the prior and to the resulting patient. Visage 7 cannot perform a PIR process if it results in two or more identical patients.
- For PIR jobs no retry and visualization mechanisms are provided.
- When a PIR process is performed HTML reports stored in Visage 7 are either deleted or a warning text is added to the document depending on the configuration settings.

4.2.16.3 Attribute Processing

The reception of an ADT A40 message results in a PIR process in order to merge two patients or to update the Patient ID of a patient. Therefore it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1.

4.2.16.4 Acknowledgement

Visage 7 sends the acknowledge message after the PIR job was initiated or it is certain that PIR processing could not be performed successfully. In case of an unrecognized patient specified by the 'Patient Identifier List' item Visage 7 ignores the request and responds with status 'Success'. See chapter 4.7 for a detailed acknowledge message description.

4.2.17 ADT A41 - Merge Account - Patient Account Number

This message type signals that a patient merge has been done at the account identifier level. Visage 7 does not process this message at all but acknowledges it anyway. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.17.1 Message Specification

The Merge Account - Patient Account Number request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A41
Type of Request Message:	ADT^A41
Message Structure:	ADT_A39 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A41

4.2.17.2 Segment Description

The message segments and elements in the following tables are parsed by Visage

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Ignored.

MRG Segment

Item	Component Name	Data Type	Value
00211	Prior Patient Identifier List	CX	Ignored.

4.2.17.3 Attribute Processing

None.

4.2.17.4 Acknowledgement

Visage 7 sends an acknowledge message after the message has been parsed.

4.2.18 ADT A45 - Move Visit Information - Visit Number

This message type signals that a move has been done at the visit identifier level, that is, if a Visit Number or Alternate Visit ID associated with an account identifier has been moved to another account identifier. Visage 7 does not process this message at all but acknowledges it anyway. Processing this message type is not part of the IHE Scheduled Workflow profile (SWF). Therefore processing of the message type is disabled by default.

4.2.18.1 Message Specification

The Move Visit Information - Visit Number request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	A45
Type of Request Message:	ADT^A45
Message Structure:	ADT_A45 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^A45

4.2.18.2 Segment Description

The message segments and elements in the following tables are parsed by Visage

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Ignored.

MRG Segment

Item	Component Name	Data Type	Value
00211	Prior Patient Identifier List	CX	Ignored.

4.2.18.3 Attribute Processing

None.

4.2.18.4 Acknowledgement

Visage 7 sends an acknowledge message after the message has been parsed.

4.3 OMG Messages

4.3.1 OMG O19 – Placer Order Management

This message type conveys general order management requests for a specific study or patient. If OMG O19 is enabled – which needs to be done explicitly in the Administration interface - Visage 7 is performing Placer Order Management functionality in the role of Department System Scheduler/Order Filler according to the IHE Framework, as it is necessary in specific integration scenarios. Please contact Visage 7 support personnel should you need additional information. Study related data is only updated if, for a DICOM modality that has sent the study, the quality assurance procedure step has been enabled.

OMG O19 messages can be also used to perform prefetching of DICOM objects from an external DICOM node. For this, prefetching in general and HL7 based prefetching using ORM O01/OMG O19 messages must be enabled in the Visage 7 administration. Prefetching is solely based on the Patient ID encoded in the ORM PID segment.

4.3.1.1 Message Specification

The order request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	O19
Type of Request Message:	OMG^O19
Message Structure	OMG_O19 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^O19

4.3.1.2 Segment Description

All segments are similar to ORM O01. Please consult section 4.4.1 for details.

4.3.1.3 Attribute Processing

The information provided with OMG O19 is stored by Visage 7 for further processing. If DICOM images then are imported, their data is matched against the data from the scheduled procedures stored so far, in order to detect and correct inconsistencies in the images.

For this workflow, it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1 and 4.8.2.

4.3.1.4 Acknowledgement

Visage 7 sends the acknowledge message after the Procedure was initiated/updated or it is certain that it could not be performed successfully. See chapter 4.7 for a detailed acknowledge message description.

4.4 ORM Messages

4.4.1 ORM 001 – Procedure Scheduled/Updated

This message type is used to convey and update a scheduled procedure for a specific study or patient. Study related data is only updated if, for a DICOM modality that has sent the study, the quality assurance procedure step has been enabled.

ORM 001 messages can be also used to perform prefetching of DICOM objects from an external DICOM node. For this, prefetching in general and HL7 based prefetching using ORM 001/OMG 019 messages must be enabled in the Visage 7 administration. Prefetching is solely based on the Patient ID encoded in the ORM PID segment.

Visage 7 satisfies the requirements of the IHE Scheduled Workflow Profile.

4.4.1.1 Message Specification

The patient visit update request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	O01
Type of Request Message:	ORM^O01
Message Structure	ORM_001 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^O01

4.4.1.2 Segment Description

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the patient for the scheduled procedure, and/or to identify the patient for which data shall be prefetched. See Section 4.8.1.1.
00108	Patient Name	XPN	Name of the patient. See Section 4.8.1.2.
00110	Date/Time Of Birth	TS	Date/time of birth of the patient.
00111	Sex	IS	Sex of the specified patient.

PV1 Segment

Item	Component Name	Data Type	Value
00133	Assigned Patient Location	PL	Assigned location of the specified patient.
00137	Attending Doctor	XCN	Maps to DICOM Attending Physician
00138	Referring Doctor	XCN	Maps to DICOM Referring Physician
00145	Ambulatory Status	IS	
00149	Visit Number	CX	

ORC Segment

Item	Component Name	Data Type	Value
00215	Order Control	ID	Order Control code, which is one of <ul style="list-style-type: none"> • “NW” for scheduling new procedures • “CA” for canceled procedures • “XO” for updating procedures • “DC” for discontinuing procedures
00216	Placer Order Number	EI	
00217	Filler Order Number	EI	
00219	Order Status	ID	
00226	Ordering Provider	XCN	
00231	Entering Organization	CE	

OBR Segment

Item	Component Name	Data Type	Value
00238	Universal Service ID	CE	
00239	Priority	ID	
00251	Placer Field 1	ST	Maps to the DICOM Accession Number
00252	Placer Field 2	ST	Maps to the DICOM Requested Procedure ID
00253	Filler Field 1	ST	Maps to the DICOM Scheduled Procedure ID
00257	Diagnostic Serv Sect ID	ID	
00263	Reason For Study	CE	
00393	Procedure Code	CE	Maps to DICOM Study Description

ZDS Segment

Item	Component Name	Data Type	Value
Z0001	Study Instance UID	RP	Study Instance UID of the procedure, according to the IHE Technical Framework. The Study Instance UID is contained in the first component of the first field of the ZDS Segment actually.

Notes:

- Visage 7 can handle more than one merge requests contained in an ORM O01 message. These multiple requests are specified by separate ORC and OBR segment pairs.

Constraints:

- Scheduling a Procedure generally needs a valid Study Instance UID or alternatively a unique accession number + Patient ID combination. If none of these are available, Visage 7 cannot process a procedure.

4.4.1.3 Attribute Processing

The information provided with ORM O01 is stored by Visage 7 for further processing. If DICOM images then are imported, their data is matched against the data from the scheduled procedures stored so far, in order to detect and correct inconsistencies in the images.

For this workflow, it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1 and 4.8.2.

4.4.1.4 Acknowledgement

Visage 7 sends the acknowledge message after the Procedure was initiated/updated or it is certain that it could not be performed successfully. See chapter 4.7 for a detailed acknowledge message description.

4.5 ORU Messages

4.5.1 ORU R01 – Observational report – unsolicited

This message type is used to send an observational report for a specific study/order and patient. A report sent for an existing study is stored and associated with the study so that it can be accessed in the Visage 7 Reports UI. A report for which no corresponding existing study can be found is stored and registered (a new order and, if necessary, patient record is created) in Visage 7 so that it can be later associated with an incoming study. Matching an existing report to an incoming study only happens if, for a DICOM modality that has sent the study, the quality assurance procedure step has been enabled – after which it can also be accessed in the Visage 7 Reports UI.

4.5.1.1 Message Specification

The incoming report and acknowledgement is specified by following trigger event and message types:

Trigger Event:	R01
Type of Request Message:	ORU^R01
Message Structure:	ORU_R01 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^R01

4.5.1.2 Segment Description

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	The patient ID to identify the patient. See Section 4.8.1.1.
00108	Patient Name	XPN	Name of the patient. See Section 4.8.1.2.
00110	Date/Time Of Birth	TS	Date/time of birth of the patient.
00111	Sex	IS	Sex of the specified patient.

PV1 Segment (optional, ignored)

Item	Component Name	Data Type	Value
00138	Referring Doctor	XCN	Maps to DICOM Referring Physician

ORC Segment (optional, ignored)

Item	Component Name	Data Type	Value
00215	Order Control	ID	Order Control code.
00216	Placer Order Number	EI	
00217	Filler Order Number	EI	
00219	Order Status	ID	
00226	Ordering Provider	XCN	
00231	Entering Organization	CE	

OBR Segment

Item	Component Name	Data Type	Value
00238	Universal Service ID	CE	
00239	Priority	ID	
00251	Placer Field 1	ST	Maps to the DICOM Accession Number
00252	Placer Field 2	ST	Maps to the DICOM Requested Procedure ID
00253	Filler Field 1	ST	Maps to the DICOM Scheduled Procedure ID
00257	Diagnostic Serv Sect ID	ID	
00263	Reason For Study	CE	
00393	Procedure Code	CE	Maps to DICOM Study Description

OBX Segment

Item	Component Name	Data Type	Value
00569	Set ID - OBX	SI	Index of the OBX segment in the current OBR
00570	Value Type	ID	Type of values contained in the OBX segment. Should be TX for text reports.
00571	Observation Identifier	CE	
00573	Observation Value	Varies	The actual report content (text lines).
00579	Observation Result Status	ID	Should be either 'F' (Final) or 'P' (Preliminary)

ZDS Segment (optional)

Item	Component Name	Data Type	Value
Z0001	Study Instance UID	RP	Study Instance UID of the report. The Study Instance UID is contained in the first component of the first field of the ZDS Segment actually.

Notes:

- Visage 7 interprets the report content as follows: each OBX segment can contain one or several report lines (as repetitions of the OBX-5 observational value field). The report consists of all lines in all OBX-5 fields.
- Visage 7 can handle more than one report contained in an ORU R01 message. These multiple reports are specified by separate OBR, OBX and optionally ZDS segment pairs. Moreover, the ORU R01 message can contain reports about several patients (specified multiple PID).

Constraints:

- Registering a report generally needs either a valid Study Instance UID or alternatively a unique_accession number + Patient ID combination which need to be transmitted in the OBR segment, one per report (as per HL7 2.5.1 standard, an ORC segment is not required and any information that can be included in either the ORB or ORC must be included in OBR for reporting messages). If the above study identification information is not available, Visage 7 cannot process a report

4.5.1.3 Attribute Processing

The information provided with ORU R01 is stored by Visage 7 for further processing. If DICOM images are imported to a later time, their data is matched against the data from the reports in order to map reports to incoming studies. For this workflow, it is necessary to convert the HL7 elements contained in the request message into appropriate DICOM attributes. This mapping process is described in chapter 4.8.1 and 4.8.2.

4.5.1.4 Acknowledgement

Visage 7 sends the acknowledge message after all reports have been successfully registered and stored or it is certain that it could not be performed successfully. See chapter 4.7 for a detailed acknowledge message description.

4.6 SIU Messages

4.6.1 SIU S12 – New Appointment Booking

This message type is used to perform prefetching of DICOM objects from an external DICOM node. For this, prefetching in general and HL7 based prefetching using SIU S12 messages must be enabled in the Visage 7 administration. Prefetching is solely based on the Patient ID encoded in the SIU PID segment.

4.6.1.1 Message Specification

The patient visit update request and acknowledgement is specified by following trigger event and message types:

Trigger Event:	S12
Type of Request Message:	SIU^S12
Message Structure	SIU_S12 (determined automatically if omitted)
Type of Acknowledge Message:	ACK^S12

4.6.1.2 Segment Description

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Used to identify the patient ID for which data shall be prefetched. See Section 4.8.1.1.

AIL Segment

Item	Component Name	Data Type	Value
01202	Start Date/Time	TS	Date/time of the appointment

4.6.1.3 Attribute Processing

The information provided with SIU S12 is temporarily stored in the prefetch table of Visage 7 for further processing, i.e., to perform the prefetching in a separate service. When the prefetching has been performed, the information is deleted shortly after.

4.6.1.4 Acknowledgement

Visage 7 sends the acknowledge message after the prefetching job has been stored in the prefetch table, or after trying to do this operation has failed. See chapter 4.7 for a detailed acknowledge message description.

4.7 Acknowledge Messages

4.7.1 Message Contents

Visage 7 responds to each received HL7 message with an appropriate acknowledge message. Visage 7 generated acknowledge messages contain the segments whose contents are listed in the following tables.

MSH Segment

Item	Component Name	Data Type	Value
00001	Field Separator	ST	This element is always set to ' '. .
00002	Encoding Characters	ST	This element is always set to '^~\&'. .
00003	Sending Application	HD	The DICOM AE title of the Visage server.
00004	Sending Facility	HD	"Visage".
00005	Receiving Application	HD	MSH-3 value from received message.
00006	Receiving Facility	HD	MSH-4 value from received message.
00007	Date/Time Of Message	TS	Current date and time when the acknowledge message is created.
00009	Message Type	CM	This element is always set to 'ACK^TriggerEvent from received message^ACK'. .
00010	Message Control ID	ST	Message Control ID value from the received message.
00011	Processing ID	PT	Processing ID value from the received message.
00012	Version ID	VIT	Version ID value from the received message.

MSA Segment

Item	Component Name	Data Type	Value
00018	Acknowledgement Code	ID	See section 4.7.2 for the used values.
00010	Message Control ID	ST	Message Control ID value from the received message.
00020	Text Message	ST	Detailed description of the occurred error (only present if Error Condition is not '0').
00023	Error Condition	CE	See section 4.7.2 for the used values.

4.7.2 Message Status

The acknowledge message tells the sender of the HL7 request message the final processing status of the message. For this the acknowledge message contains status information in form of an Acknowledge Code and an Error Condition. The values in the following table are used by the HL7 Interface of Visage 7.

Status	Acknowledge Code	Description	Error Condition
Success	AA	Message accepted	0
Error	AE	Segment sequence error (message segments are not in the proper order, or required segment is missing)	100
	AE	Required field missing	101
	AE	Field length exceeded (Field exceeds maximum length allowed according to HL7 standard)	104
	AE	Unexpected Message Structure (message type could not be determined due to missing or wrong MSH segment)	208
Reject	AR	Data type error (Field contains characters that are illegal in DICOM, or has otherwise invalid value)	102
	AR	Field length exceeded (Field exceeds maximum length allowed according to DICOM standard)	104
	AR	Unsupported Message Type	200
	AR	The Version ID is not supported	203
	AR	Duplicate key identifier (multiple patients are affected)	205
	AR	Application internal error (an error occurred which makes further processing with this message impossible)	207

4.8 Attribute Mapping

The attributes received with the HL7 messages are used to modify the DICOM objects which are stored within Visage 7. This requires the mapping of the HL7 attributes into DICOM conform data types. In this chapter all the attributes are listed which are converted for the patient information reconciliation process and/or for scheduling procedures.

If not mentioned otherwise, the following applies to all mappings: If the resulting value is longer than the maximum length allowed for the respective DICOM attribute, the value will be truncated.

4.8.1 Patient Information Reconciliation

4.8.1.1 Patient Identifier List / Prior Patient Identifier List

The HL7 'Patient Identifier' attributes are mapped to the DICOM attributes 'Patient ID' and 'Issuer of Patient ID'.

HL7			DICOM		
Item	Field/Component Name	Type	Tag	Attribute Name	VR
00106	PID-3 Patient Identifier List MRG-1 Prior Patient Identifier List	CX			
	ID Number	ST	0010,0020	Patient ID	LO
	Assigning Authority	HD	0010,0021	Issuer of Patient ID	LO

The 'Patient ID' DICOM value contains the value of the 'ID Number' component of the Patient Identifier List / Prior Patient Identifier List field.

The 'Issuer of Patient ID' DICOM value contains, by default, the value of the first subcomponent of the 'Assigning Authority' component of the Patient Identifier List / Prior Patient Identifier List field. The component for this mapping is configurable by the DicomWebConfig setting HL7Network / IssuerOfPatientIDComponent: this integer contains the component within the PID-3 resp. MRG-1 field that shall be used as 'Issuer of Patient ID'. If not specified, it defaults to 4, because the 'Assigning Authority' component is the 4th component of the CX data type.

If the Patient Identifier List contains more than one repetition, the Issuer of Patient ID can also control which Patient ID is chosen. This setting is configured with the DicomWebConfig setting HL7Network / PreferredIssuerOfPatientID that can contain a comma-separated list of issuers. If several patient IDs are contained in the HL7 message field, the one with the issuer at the front most place in the list is used. If no issuer from the message is contained in the list, the first patient ID in the Patient Identified List is used. The same applies to the Prior Patient Identifier List.

If the resulting values are longer than the maximum length allowed for the DICOM attributes 'Patient ID' and 'Issue of Patient ID' (max. 64 characters) the values will be truncated.

4.8.1.2 Patient Name

The HL7 'Patient Name' attribute is mapped to the DICOM attribute 'Patient's Name'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00108	Patient Name	XPN	0010,0010	Patient's Name	PN

The resulting DICOM value consists of the following parts of the Patient Name element. The character '^' is used as delimiter. Trailing delimiters will be deleted.

- Family Name
- Given Name
- Middle Initial Or Name
- Prefix
- Suffix

Example:

"Smith^John^J^III^DR

If the resulting value is longer than the maximum length allowed for the DICOM attribute 'Patient's Name' (max. 64 characters) the value will be truncated.

Note:

If the Patient Name field contains more than one repetition, the first name is used.

Note:

In HL7 messages of Version 2.4 and 2.5 for the Family Name an own component of type FN is provided. For the mapping the whole contents of this component is used. The surname is not extracted explicitly.

4.8.1.3 Date/Time Of Birth

The HL7 'Date/Time Of Birth' attribute is mapped to the DICOM attributes 'Patient's Birth Date' and 'Patient's Birth Time'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00110	Date/Time Of Birth	TS	0010,0030	Patient's Birth Date	DA
			0010,0032	Patient's Birth Time	TM

The resulting DICOM birth date value consists of year, month and day information in the format yyyymmdd. Following conditions must be kept to make further processing with this value possible:

- Year (yyyy) > 1752 (database constraint)
- Month (mm) between 1 and 12

- Day (dd) between 1 and 31

The resulting DICOM birth time value consists of hours, minutes, seconds and milliseconds information in the format hhmmss.frac. Following conditions must be kept to make further processing with this value possible:

- Hours (hh) between 0 and 23
- Minutes (mm) between 0 and 59
- Seconds (ss) between 0 and 59
- Milliseconds (frac) between 0 and 999

4.8.1.4 Sex

The HL7 'Sex' attribute is mapped to the DICOM attribute 'Patient's Sex'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00111	Sex	PL	0010,0040	Patient's Sex	CS

If the resulting value is longer than the maximum length allowed for the DICOM attribute 'Patient's Sex' (max. 16 characters) the value will be truncated.

Note:

The HL7 values will not be mapped to appropriate DICOM values if the HL7 element contains 'U', 'A' or 'N' which are not defined in the DICOM standard.

4.8.1.5 Assigned Patient Location

The HL7 'Assigned Patient Location' attribute is mapped to the DICOM attribute 'Current Patient Location'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00133	Assigned Patient Location	PL	0038,0300	Current Patient Location	LO

The resulting DICOM value consists of the following parts of the Assigned Patient Location element. Each value is preceded with the element name separated by a colon.

- Facility (contains NamespaceID, UniversalID, UniversalIDType separated by SPACE)
- Building
- Floor
- PointOfCare
- Room
- Bed

The actual mapping can be configured on the Visage 7 administration pages: the resulting DICOM Current Patient Location there is set in a configuration string containing wildcards for all the aforementioned fields.

If the resulting value is longer than the maximum length allowed for the DICOM attribute 'Current Patient Location' (max. 64 characters) the value will be truncated.

4.8.2 Scheduling/Updating Procedures

4.8.2.1 Study Instance UID

The IHE 'Study Instance UID' attribute is mapped to the DICOM attribute 'Study Instance UID'. Note the ZDS Segment is not described in the HL7 specification, but is an enhancement of the IHE technical framework.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
Z0001	Study Instance UID	RP	0020,000D	Study Instance UID	UI

The resulting DICOM value contains the 'Reference Pointer' (Component 1) part of the Study Instance UID element.

If the resulting value is longer than the maximum length allowed for the DICOM attribute 'Study Instance UID' (max. 64 characters), the HL7 message is rejected.

4.8.2.2 Accession Number

By default, the HL7 'Placer Field 1' attribute is mapped to the DICOM attribute 'Accession Number'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00251	Placer Field 1	ST	0008,0050	Accession Number	LO

This mapping is configurable by the DicomWebConfig setting HL7Network / AccessionNumberField: this string contains a description from which fields and components the accession number is composed. For example, if the string is

- OBR-21 the accession is taken from the field OBR-21
- {OBR-18-1}.{OBR-18-2} the accession is composed from the first two components of the field OBR-18, joint by a '.'.

If the resulting value is longer than the maximum length allowed for the DICOM attribute 'Accession Number' (max. 16 characters), the HL7 message is rejected.

4.8.2.3 Requested Procedure ID

The HL7 'Placer Field 2' attribute is mapped to the DICOM attribute 'Requested Procedure ID'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00252	Placer Field 2	ST	0040,1001	Requested Procedure ID	SH

4.8.2.4 Scheduled Procedure Step ID

The HL7 'Filler Field 1' attribute is mapped to the DICOM attribute 'Scheduled Procedure Step ID'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00253	Filler Field 1	ST	0040,0009	Scheduled Procedure Step ID	SH

4.8.2.5 Referring Physicians Name

The HL7 'Procedure Code' attribute is mapped to the DICOM attribute 'Referring Physicians Name'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00138	Referring Doctor	XCN	0008,0090	Referring Physicians Name	PN

The resulting DICOM value consists of the following parts of the Referring Doctor element. The character '^' is used as delimiter. Trailing delimiters will be deleted.

- Family Name
- Given Name
- Middle Initial Or Name
- Prefix
- Suffix

4.8.2.6 Study Description

The HL7 'Procedure Code' attribute is mapped to the DICOM attribute 'Study Description'.

HL7			DICOM		
Item	Component Name	Type	Tag	Attribute Name	VR
00393	Procedure Code	CE	0008,1030	Study Description	LO

The resulting DICOM value contains the 'Alternate Text' component of the Procedure Code.

4.8.3 Configuration

Visage 7 provides an administration interface for configuring the HL7 Interface. The parameters listed in the following table can be changed by the administrator to integrate Visage 7 properly in the HL7 network environment.

Parameter	Description	Default Value
HL7 Interface enabled	Enables/Disables the HL7 Network Interface	Disabled
TCP/IP Port	The HL7 Interface listens on this port number for incoming HL7 messages.	2020
Timeout [sec]	Time span (in sec) to wait for an incoming message after a connection was initiated or a previous message was received (inactivity timeout).	60
Retries [min]	Defines how many times and to which time intervals it should be attempted to re-send a HL7 outgoing message.	3,30,300
HL7 Character Encoding	Character encoding of incoming / outgoing HL7 messages. One of UTF-8, ansi (code page 1252), Mac (code page 10000), and default (standard Microsoft Windows® encoding)	UTF-8
HL7 Message Processing	Enabling/disabling the processing of incoming HL7 message types. Disabling a message type means that that Visage 7 will process it in "dry-mode", that is, the message is parsed, interpreted and acknowledged, but no action is performed on the data.	ADTA02, ADTA03, ADTA08, ADTA31, ADTA40, ORMO01, ORUR01, SIUS12 are enabled
DICOM Current Patient Location String	Describes the mapping of HL7 Assigned Patient Location to the DICOM Current Patient Location. See section 4.8.1.5.	\$PointOfCare{, Room \$Room{, Bed \$Bed}}
HL7 Based Prefetching – SIU S12 HL7 Based Prefetching – ORM O01 or OMG O19	Prefetching of DICOM objects can be enabled independently for SIU S12 or ORM O01/OMG O19 messages	Disabled Disabled

Studies for future appointments are prefetched from ... to ...	For future appointments (not at the same day), prefetching can be delayed to night time. Start and end of the night time is configured by this option. Delayed prefetching is only possible for SIU S12 based prefetching, because only this message contains a date of the appointment	From 20:00 to 06:00
Always Update DICOM Files	Allows to enable or to disable updating the DICOM files for Patient Information Reconciliation if the values in database are already up-to-date.	Disabled
Update Current Patient Location in DICOM Files	Allows to enable or to disable the patient location in the DICOM files.	Disabled
Write Info Traces When Performing QA Operations	If enabled, when PIR or QA operations are performed such that DICOM data is changed in the database, these changes are logged in the traces of Visage 7.	Enabled
Delete Private DICOM Attributes Delete Overlays Delete Curves Delete HTML Reports	These parameters specify how non-changeable DICOM elements and HTML reports are handled when a PIR process is performed.	Enabled Enabled Enabled Enabled
DicomWebConfig: HL7Network / IssuerOfPatientIDComponent	<u>See Section 4.8.1.1.</u>	4
DicomWebConfig: HL7Network / PreferredIssuerOfPatientID	<u>See Section 4.8.1.1.</u>	
DicomWebConfig: HL7Network / AccessionNumberField	<u>See Section 4.8.2.2.</u>	

4.9 Outgoing HL7 Messages

Visage can be configured to send HL7 order messages to a remote HL7 partner (typically a RIS system).

It can happen that a message cannot be successfully sent, either because the HL7 partner cannot be connected, or because it replies with a 'reject' acknowledgment code. In these cases, Visage 7 will attempt to re-send the message a specified number of times at configurable time intervals. The automatic resending functionality can be configured on the Visage 7 administration site under HL7 Network/Outgoing.

If the HL7 partner replies with an 'error' acknowledgment code, no retry is done. Visage 7 assumes that the HL7 message is not understood by the partner, and sending again will likely not change that.

4.9.1 Study Completed: Message Specification

Study completed messages are sent if a study becomes complete or verified. Completeness means, that no new images arrived for a certain amount of time. Both a default timeout plus a specific timeout per sending DICOM AE title can be configured. Verified means, that a matching order was found when the study was inserted, or that the QA status of a study was manually set to COMPLETED in the QA tab of the Visage client application.

4.9.1.1 Message Specification

Study complete messages are standard order messages:

Trigger Event:	O01
Type of Request Message:	ORM O01
Expected Response:	ACK

4.9.1.2 Segment Description

MSH Segment

Item	Component Name	Data Type	Value
0001	Field Separator	ST	Always set to ' '.
0002	Encoding Characters	ST	Always set to '^~\&'.
0009	Message Type	CM	Always set to 'ORM^O01'.
0010	Message Control ID	ST	Automatically generated.
0011	Processing ID	PT	Always set to 'P'.
0012	Version ID	VIT	Always set to '2.3.1'

PID Segment

Item	Component Name	Data Type	Value
00106	Patient Identifier List	CX	Patient ID.
00108	Patient Name	XPN	Patient Name.
00110	Date/Time Of Birth	TS	Birth date (no birth time is set).
00111	Sex	IS	Sex of patient.

PV1 Segment

PV1 segment is given but will be left empty.

ORC Segment

Item	Component Name	Data Type	Value
00215	Order Control	ID	Always set to 'SC'
00216	Placer Order Number	EI	Accession number of study.
00217	Filler Order Number	EI	Accession number of study.
00219	Order Status	ID	ZC = Study is complete (all images arrived) ZV = Study is complete and verified

OBR Segment

Item	Component Name	Data Type	Value
00251	Placer Field 1	ST	Accession number of study.
00252	Placer Field 2	ST	Requested procedure ID of study.
00253	Filler Field 1	ST	

- When a study arrives and a matching order was found only one message will be sent. This will be a 'ZV' message (images complete and verified). No additional 'ZC' message is sent.
- If additional images for a study are received later, or if the study is received again, another 'ZC' or 'ZV' message will be sent.
- If the QA status is manually changed to COMPLETED in the Visage QA tab, always a 'ZV' message will be sent.

5. Document History

16.01	2013-08-29	Section 4.7.2 (Acknowledge Messages) updated due to BZ 9271
16.02	2013-08-29	Minor changes during review
17.00	2014-01-30	Released version 17.00
17.01	2014-04-08	HL7 V2.2 support
17.02	2014-07-30	Updated due to BZ11365
17.03	2014-08-11	Editorial changes
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