



Integration and HL7 Specification Guide for Symmetry-PACS

symmetry™-PACS

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OVERVIEW

This guide is designed to help you understand the messages used in the integration process with the Information System (IS) provider such as Practice Management, Electronic Medical Record, or Electronic Health Record.

Konica Minolta Healthcare Americas, Inc, (KMHA) provides the following options for IS integration.

- **Modality Worklist (MWL)** – This is a DICOM service that bridges the information system and the modality (X-ray) together. The purpose of this integration is to provide patient demographic information directly to the modality to eliminate the need for manual data entry. By doing this, the probability of typographic errors in the patient's demographics is reduced. Additionally, by eliminating the time required for manual data entry, the acquisition process becomes significantly more efficient. This use of this feature requires an Inbound Order (ORM) or Scheduling (SIU) message.
- **Orders (ORM)** – This interface will be using order specific messages that contain all PID, Date and time of service, Modality type, Procedure code and Procedure Description, Referring Physician Code and Description. These orders will be new, cancelled, and updates based on the accession number of the associated order. This is accomplished via an HL7 message using an ORM^O01 message type.
- **HTTP(S) URL Link** – The process of embedding a hyperlink into the Information System that will trigger direct access to the study images within the PACS. This logic can be hardcoded in the third-party information system or sent to the Information System via an ORU^R01 message type.
- **Reports Results (ORU)** – Textual report data, created either in the PACS or a third-party entity (such as a Reading Radiologist), that is sent to the PACS via HL7 to your Information System. This is accomplished via an HL7 message using an ORU^R01 message type.

MODALITY WORKLIST

Before getting into the configuration details for MWL, let us first look at how it works and what variables there may be. MWL is a service that is part of the DICOM standard. This service is part of what is referred to as an MWL Server or MWL Broker. It provides DICOM modalities (such as digital x-ray systems) a list of patients that are to have an exam and in some cases what specific exam has been ordered. This information is provided to the MWL service from an ORM HL7 messages sent from your information system.

- **Orders (ORM)** – This message contains the same basic information housed in the SIU, but with the added details of what type of X-ray exam has been ordered by the physician. Order specific messages will contain all PID, Date and time of service, Modality type, Procedure code and Procedure Description, Referring Physician Code and Description. These orders will be new, cancelled, and updates based on the accession number of the associated order.

With an ORM, only the patients assigned to that station will appear.

Setup of the MWL will require the following information.

- **Server IP Address:**
 - Variable and is assigned to the server at install
- **Port Number for Inbound ORM messages**
 - EXA – 1337
- **Port Number to pull the Modality Worklist (MWL)**
 - EXA – 4105
- **Port Number to send DICOM images**
 - EXA – 104
- **AE Title**
 - EXA – EXA_MWL

REQUIRED SEGMENTS AND FIELDS

The following are the **required**, fields and segments, **unless otherwise noted**. We will use the following segments and fields for the configuration. Edits or modifications must be done within the EMR/EHR.

Segments:

- HL7 segments that are required for the **ORM** are:
 - MSH - Message Header
 - PID - Patient Identification Segment
 - PV1 - Patient Visit Segment
 - ORC - Common Order Segment
 - OBR - Order Detail/Observation Request Segment

Fields:

- HL7 fields that are required for **ORM**:
 - PID-2 – Must contain the Patient Account Number/Visit Number/Encounter Number if you would like it returned in field PID-18 within the ORU message
 - PID-3 – Must contain the Medical Record # for the patient
 - PID-5 – Patient Name
 - ORC-1 – Must contain the proper Order Control Code
 - ORC-2 and ORC-3 – Must contain the Accession #
 - OBR-2 and OBR-3 – Must contain the Accession #
 - OBR-4 – Must contain the Procedure code (Appointment code/Ref Code) and description
 - OBR-24 – Must contain the Modality Code

MESSAGE LAYOUT AND EXAMPLES

This section provides the layout and examples of the ADT, SIU, and ORM message types. The required segments and fields are included. If the mapping of these fields is different, please enter it into the last column and return the document to your Integration Developer.

Order (ORM) Message

Configuration Segment	Description	Value	Vendor Mapped Segment
PID.2	Patient ID External	Unique number/ID for each patient	
PID.5	Patient Name	Last Name ^ First Name ^ Mi	
PID.7	DOB	Data (19460610)	
PID.8	Gender	F/M	
PV1.3	Facility/Location Code and Name	Code ^ Facility Name	
PV1.8	Code ^ Referring Physician Name	NPI ^ Last Name ^ First Name ^ Mi Name	
ORC.2 ORC.3	Accession Number	Unique number for each exam	
ORC.18	Scheduled Station (<i>optional if scheduled station is not being implemented.</i>)	CR, MR, NM etc or CR1, CR2, MR1, MR2 etc. <i>This the ID for the station as created by the practice/hospital/clinic</i>	
ORC.21	Office Name/Institution Name	Text only	
OBR.2 OBR.3	Accession Number	Unique number for each exam	
OBR.4	Exam Name /Study Description	Exam Code^ description (one exam per order)	
OBR.7	Schedule Date and Time	Date and time [20090423142500]	
OBR.24	Modality	Resource Name/Modality name such as XR, CR, etc. Must match the modality mnemonic associate with CPT code in the orders compendium.	

OBR.31	Reason for the Exam	Text Only No Subfields e.g. Text Identifier	
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Sample ORM Message

```

MSH|^~\&|EHR
VENDOR|SENDINGFACILITY|RECVAPP|RECEIVINGFACILITY|201707051639||ORM^O01|1077612M116
95|T|2.3.1|||||
PID||MRN943550|MRN943550||LASTNAME^FIRSTNAME^C||19790101|M||1406 TEST ST^APT
150^CITY^AL^19965^|(999)999-99999||||ACCT123456|||||
PV1||O|2D11694^^^MOBILE||||NPI^SMITH^TEST|NPI^SMITH^TEST|||||NPI^SMITH^TEST|||||
|||||
ORC|NW|4494895|4494895|||||140782441^TESTDR^JOSEPH||||STATIONTEST||OFFICE||
OBR|1|4494895|4494895|MISC^MRI, FOOT, W/O
CONTRAST||20170713153957|20170713153957|||^L||^|140782441^TESTDR^JOSEPH||||OFFICE||C
T||||STUDY REASON TEXT|||||
    
```

Please note:

- o All received messages should be wrapped as follows: CHAR (11) + Message + CHAR (28) + CHAR (13)
- o Each segment of the message needs to be separated by CHAR (13).
- o The same format will be used on our outbound messages.
- o An ACK will be sent for all successfully processed messages.
- o A NACK will be sent for all errors

To open a URL link for a specific study, one of the following is required:

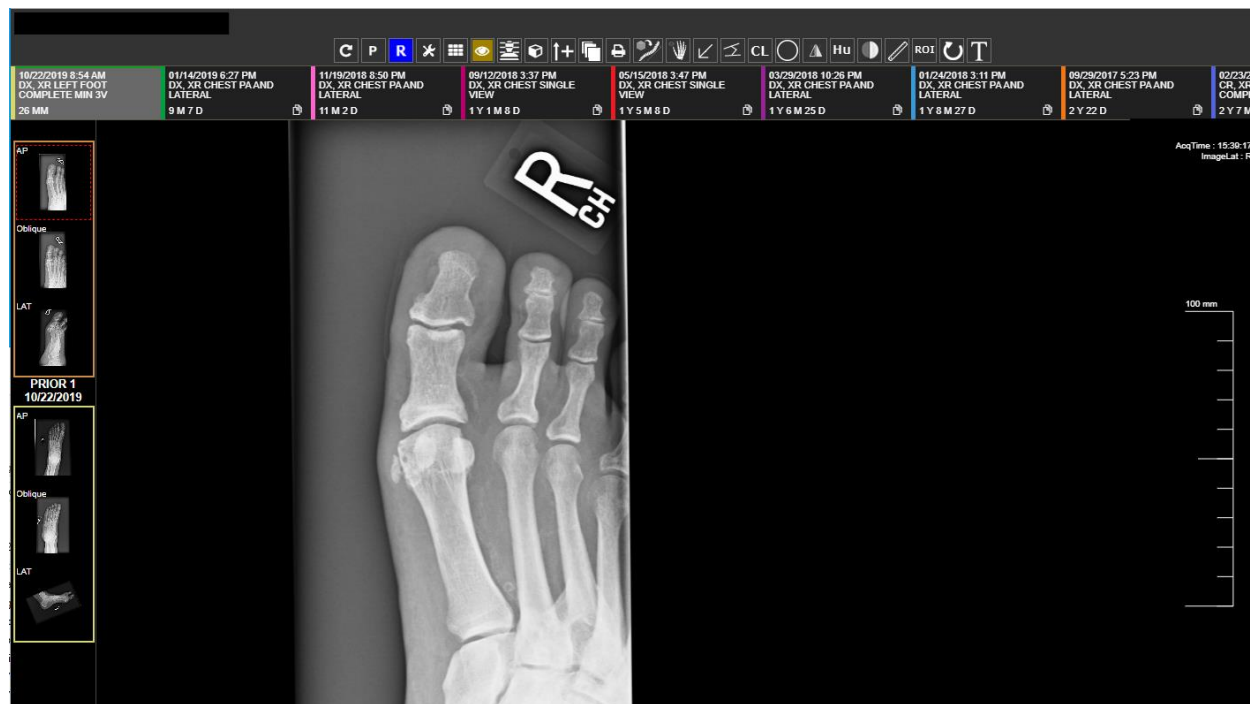
- DICOM study UID [information generated by modality]
- Accession Number [Information provided to modality by MWL and/or technician]
- Patient ID [Information provided to modality by MWL and/or technician]

The third-party vendor is required to open the URL in Google Chrome, Microsoft Edge, or Safari. **Internet Explorer is not supported.**

- **Study UID Example:**
https://Server IP or Domain name/viewer?m_i=0&l=1&def_session=demo_session#viewer2/<StudyUID/StudyID>
- **Accession Number Example:**
https://Server IP or Domain name/viewer?m_i=0&l=1&def_session=demo_session#viewer2/accession/<accession#>
- **Patient ID Example:**
https://Server IP or Domain name/patientStudies?acc=<PatientMRN>&cid=1&def_session=demo_session

URL Link Results:

When the URL link to a specific study is opened, the result will look like the example below.



Displaying the URL Link Study List:

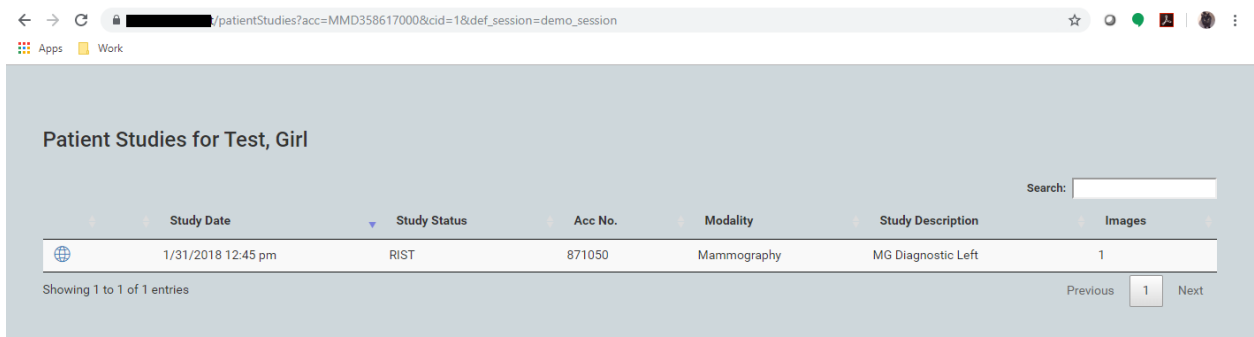
To open a list of studies for a specific patient, the Patient ID is required. From the list the user can select a study to open by double-clicking the row on the list.

The third-party vendor is required to open the URL in Google Chrome, Microsoft Edge, or Safari. **Internet Explorer is not supported:**

- **Patient ID Example:**
https://Server IP or Domain name/patientStudies?acc=<PatientID>&cid=1&def_session=demo_session

URL Link Study List Results:

When you open the URL link to a patient, you can select the specific study you want to view.



REPORT RESULT

The reporting structure is usually handled by using empty OBX.5 fields to represent line breaks. As another option, we can send the report in a single OBX segment using the tilde character (field repeat separator) as the line feed.

Please note that the report can be configured such that addendums are sent containing the full report or just the addendum itself.

Outbound Result Message (ORU) Structure

Please see the list of fields we can send, and note that some fields populate only if the data is received from the originating EMR/EHR/PM system. Other fields may be available for output based on data sent to our system. If the mapping of these fields is different, please enter the correct mapping into the last column and return the document to your Integration Developer.

REQUIRED SEGMENTS AND FIELDS

The following are the **required** fields and segments for the ORU message, **unless otherwise noted**. We will use the following segments and fields for the configuration. Edits or modifications must be done within the EMR/ EHR.

Segments:

- HL7 segments that are required for the **ORU** are:
 - MSH - Message Header
 - PID - Patient Identification Segment
 - PV1 - Patient Visit Segment
 - ORC - Common Order Segment
 - OBR - Order Detail/Observation Request Segment
 - OBX - Observation Result Segment

Fields:

- HL7 fields that are required for **ORU**:
 - PID-2 – Must contain the Patient Account Number/Visit Number/Encounter Number if you would like it returned in field PID-18 within the ORU message
 - PID-3 – Must contain the Medical Record # for the patient
 - ORC-1 – Must contain the proper Order Control Code
 - ORC-2 and ORC-3 – Must contain the Accession #
 - OBR-2 and OBR-3 – Must contain the Accession #
 - OBR-4 – Must contain the Procedure code (Appointment code/Ref Code) and description
 - OBR-22 – Must contain the Approved Date
 - OBR-24 – Must contain the Modality Code
 - OBR-32 – Must contain Approving Provider NPI and name
 - OBX-11 – must contain the Final/Addendum identifier (F/A)

MESSAGE LAYOUT AND EXAMPLES

This section provides the layout and examples of the ORU message type. The required segments and fields are included. If the mapping of these fields is different, please enter the correct mapping into the last column and return the document to your Integration Developer.

Results (ORU) Message

Configuration	Description	Value	Vendor Mapped
Segment			Segment
MSH.3	Sending Application	This field will contain a reference to which one of our applications is sending the message. (OPAL, EXA, RIS)	
MSH.4	Sending Facility	This field will contain specific information related to the location the message is coming from.	
MSH.5	Receiving Application	This field will contain a reference to the application we are sending to and can be specified by the client or vendor receiving the message.	
MSH.6	Receiving Facility	This field will contain a reference to the facility we are sending to and can be specified by the client or vendor receiving the message.	
MSH.7	Date/Time of Message	Specific date/time that the message is sent.	
MSH.9	Message Type/Event Type	For outbound reports, an ORU^R01 message will be used to send report data out of the system.	
MSH.10	Message Control ID	Unique message date/time driven control ID sent with each message.	
MSH.11	Processing ID	This field will be either set to "P" to signify that the data coming across is production data or it will be set to "T" signifying that the messages are test/training related.	
MSH.12	Version ID	Depending on the product being used, our systems output messages using either HL7 2.3 (i.e. OPAL) or 2.5.1 (i.e. EXA).	
PID.2	External Patient Acct Number	Unique number/ID for each patient	

PID.3	Internal Patient Acct Number	Unique number/ID for each patient	
PID.4	Alternate Patient Acct Number	Unique number/ID for each patient	
PID.5	Patient Name	Patient last name, first name, and middle initial	
PID.7	DOB	Patient date of birth. (Format: 19460610)	
PID.8	Patient Gender	Gender of patient. (M (male), F (female), etc.	
PID.10	Patient Race	Race of Patient.	
PID.11	Patient Address	Address for patient.	
PID.12	Country Code	Country code.	
PID.13	Patient Home Phone Number	Home phone number for patient.	
PID.14	Patient Work Phone Number	Work phone number for patient.	
PID.15	Patient Primary Language	Primary language of patient.	
PID.16	Patient Marital Status	Marital status of patient.	
PID.18	Patient Account Number	Account number for patient.	
PID.19	Patient SSN	Social security number for Patient.	
PID.22	Patient Ethnic Group	Ethnic group of Patient.	
PV1.2	Patient Class	Class of patient. (example: Outpatient)	
PV1.3	Assigned Patient Location	Patient assigned location.	
PV1.7	Physician Information	Reading or radiologist of patient study. Code (NPI), first name, middle initial and last name.	
PV1.8	Physician Information	Referring doctor. Code (NPI), first name, middle initial, and last name.	
PV1.17	Physician Information	Approving doctor. Code (NPI), first name, middle initial, and last name.	

ORC.1	Order Control Code	Example: RE (Observation/Performed service to follow)	
ORC.2	Accession Number	Placer order number field used to hold accession number.	
ORC.3	Accession Number	Filler order number field alternate field used to hold accession number.	
ORC.5	Order Status	Status of appointment.	
ORC.9	Date/Time of Transaction	Date/Time of transaction.	
ORC.12	Referring Doctor Information	Referring Doctor. Code (NPI), first name, middle initial, and last name.	
ORC.18	Scheduled Station (<i>optional if scheduled station is not being implemented</i>)	CR, MR, NM etc. or CR1, CR2, MR1, MR2 etc. <i>This the ID for the station as created by the practice/hospital/clinic</i>	
OBR.2	Accession Number	Filler order number field alternate field used to hold accession number.	
OBR.3	Accession Number	Filler order number field alternate field used to hold accession number.	
OBR.4	Exam Name /Study Description	Reference code and description for Study. (one exam per order)	
OBR.7	Schedule Date and Time	Date and time [20090423142500]	
OBR.24	Modality	Resource Name/Modality name such as XR, CR, etc. Must match the modality mnemonic associate with CPT code in the orders compendium.	
OBR.25	Result Status	Example: F (final results) or A (addendum)	
OBR.31	Reason for the Exam	Text Only No Subfields e.g. Text Identifier	
OBR.32	Principal Result Interpreter	Reading or radiologist of patient study. Code (NPI), first name, middle initial, and last name.	
OBX.1	Set ID	OBX Set ID	
OBX.2	Value Type	Value type	

OBX.3	Study Description	Study description	
OBX.5	Observation Value	Reports are typically sent out using multiple OBX segments and utilize empty OBX.5 fields for line feeds. If single OBX is used a tilde will be used to represent a line feed.	
OBX.11	Observation Result	Example: F - final or A - addendum.	
OBX.14	Study Date/Time	Date/time of study	

Sample ORU Message

```

MSH|^-|&|EXA|SENDINGFACILITY|RECVAPP|RECEIVINGFACILITY|20170907101753||ORU^R01^ORU_
R01|7979||2.5.1|||AL|||
PID||MRN1234|MRN1234|021322135|LASTNAME^FIRSTNAME^T^^^||19000101|U||Other|100 TEST
ST^Appt 12^Bronx^NY^10000|US|||Prefer not to answer||MRN1234|111111111|||US||
PV1|1|||^^^|1992972269^Uche^Akwuba^^^|||RADIARADIA^Radia^Radia^Harrison^^^|||
|||
ORC|RE|10001|10001||Approved|||1992972269^Akwuba^Uche|DX|Harrison||20170907173500
OBR|1|10001|10001|13983^MAMMOGRAM: BREAST LEFT
DIAGNOSTIC||DX||20170907173500|RADIARADIA^Radia^Radia^|||1992972269^Akwuba^Uche|199297
2269|||Approved||F|||RADIARADIA^Radia^Radia^||20170907173500|
OBX|1|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC||This is a test Report. There are only 4
lines.|||F||20170907173500||
OBX|2|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC||This is line 2.|||F||20170907173500||
OBX|3|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC||IMPRESSION: This is line
3.|||F||20170907173500||
OBX|4|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC||This is line 4.|||F||20170907173500||
OBX|5|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC|||F||20170907173500||
OBX|6|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC|||F||20170907173500||
OBX|7|TX|MAMMOGRAM: BREAST LEFT DIAGNOSTIC||Electronically Signed by: Rad
Rad|||F||20170907173500||
    
```


BASIC HL7 WORKFLOW

This diagram shows a basic HL7 workflow for Symmetry-PACS.

Basic HL7 Workflow for Symmetry-PACS

