

INTERGY EHR BY SAGE

Conformance Statement

Intergy EHR by Sage

**Intergy EHR by Sage DICOM Reference Viewer
Conformance Statement Version 4.x**



2202 North West Shore Blvd., Suite 300
Tampa, FL 33607-9953
Phone: 877-932-6301
www.sagehealth.com

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1. Overview

The DICOM Reference Viewer (DRV) is an optional component of the Intergy EHR by Sage electronic health record software product. The DRV supports the necessary DICOM services to query an archive device, such as a PACS, in order to retrieve a list of studies for a given patient and then to optionally retrieve selected images for display as part of the patient's electronic chart.

Neither Intergy EHR nor DRV support long term storage of diagnostic image information. All images retrieved from the DICOM archive device are transient and are only stored locally in a short term cache whose size is determined by available memory (RAM).

Table 1-1 lists the DICOM services supported by DRV.

NETWORK SERVICES Table 1-1

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Patient Root Query/Retrieve Information Model – FIND	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Computed Radiography Image Storage	Viewed	Yes
Digital Xray Image Storage – For Presentation	Viewed	Yes
Digital Xray Image Storage – For Processing	Viewed	Yes
Digital Mammography Image Storage – For Presentation	Viewed	Yes
Digital Mammography Image Storage – For Processing	Viewed	Yes
Digital Intra-oral Xray Image Storage – For Presentation	Viewed	Yes
Digital Intra-oral Xray Image Storage – For Processing	Viewed	Yes
CT Image Storage	Viewed	Yes
Ultrasound Image Storage	Viewed	Yes
Ultrasound Multi-frame Image Storage	Viewed	Yes
MR Image Storage	Viewed	Yes
Secondary Capture Image Storage	Viewed	Yes
Xray Angiographic Image Storage	Viewed	Yes
Xray Radioflourosopic Image Storage	Viewed	Yes
Nuclear Medicine Image Storage	Viewed	Yes
VL Endoscopic Image Storage	Viewed	Yes
VL Microscopic Image Storage	Viewed	Yes
VL Photographic Image Storage	Viewed	Yes

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3. Introduction

3.1. Revision History

Document Version	Date of Issue	Author	Description
070907	Sept 7, 2007	T Treiber	Initial publication

3.2. Audience

This document is intended for health system integrators, software designers or implementers that wish to utilize the Intergy EHR DICOM Reference Viewer to access and display information stored in a compatible DICOM archive device, such as a PACS.

3.3. Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication between Intergy EHR and its DICOM Reference Viewer module with other vendors' archive or PACS devices. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. 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 conformance statements is the first step towards assessing interconnectivity between Intergy EHR and non-Sage DICOM archive or PACS equipment.
- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements. Sage Software is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

3.4. Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Abbreviations and terms are as follows:

AE	DICOM Application Entity
AET	Application Entity Title
IOD	DICOM Information Object Definition
ISO	International Standard Organization
MPPS	Modality Performed Procedure Step
MSPS	Modality Scheduled Procedure Step
R	Required Key Attribute
O	Optional Key Attribute
PACS	Picture Archive and Communication System
PDU	DICOM Protocol Data Unit
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
U	Unique Key Attribute

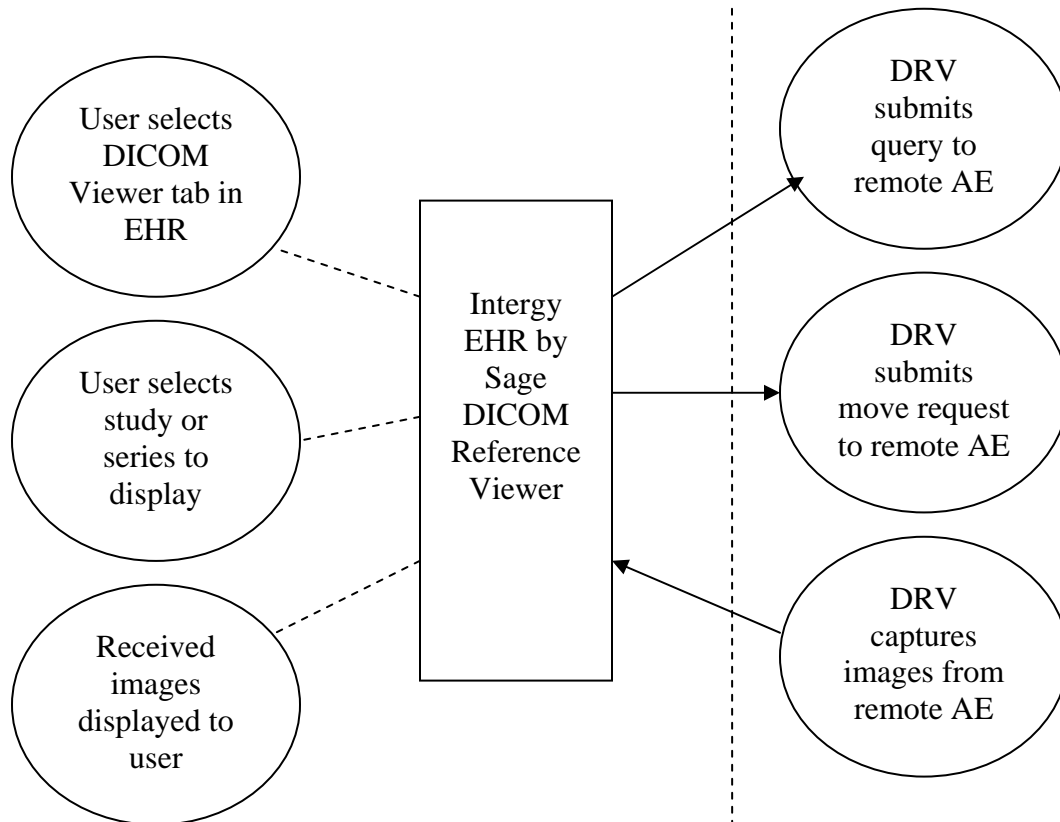
3.5. References

[DICOM]Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.16, 2006

4. Networking

4.1. Implementation Model

4.1.1. Application Data Flow



DICOM Standard Interface

A user operating the Intergy EHR product will select a patient and then proceed to view and/or edit information stored in the electronic patient chart. If the user elects to view information on the DICOM Viewer tab of the patient chart, the DICOM Reference Viewer (DRV) will submit a query to the configured PACS device. The query will request a list of all studies / exams stored on the PACS for the given patient identifier. For each study returned, DRV will also submit series and image level queries in order to gather pertinent information about that study. This information is then presented to the user in a tree view.

If the user elects to display any study or series referenced on this tree view, DRV will submit a move request to the PACS device and open a receive port to capture the images the PACS will send. As each image is received by DRV, the image is cached locally in memory and may also display the image depending upon the actions taken by the user.

4.1.2. Functional Definition of Intergy EHR DICOM Reference Viewer

Intergy EHR is a Windows application that is built using the .NET 2.0 framework. DICOM Reference Viewer is an optional module that is part of Intergy EHR. If the module has been enabled and properly configured, each client station will individually submit query and move requests to the specified DICOM archive device. When a move request has been submitted, at that time a listening session is started to receive transmitted images. It is not possible to directly send images to DRV without it having submitted the move request.

4.1.3. Sequencing of Real-World Activities

Under normal conditions, the following sequence of events applies:

1. User of Intergy EHR selects a patient in order to access or edit the patient's chart
2. User selects the DICOM Viewer tab (tab is only visible if DRV module is properly licensed and enabled)
3. DRV submits a study level query to the configured archive device. The purpose of the query is to retrieve a list of all exams stored on the archive device for the selected patient.
4. For each study returned, DRV submits series and image level queries in order to gather additional information about the contents of the study
5. User is presented with a tree view listing all studies on the archive device along with the series contained on each study
6. User selects either a study or series and DRV submits a move request to the archive device to cause the selected images to be transmitted to DRV
7. As each image is received, it can be displayed in the image viewer
8. If the user changes patients or otherwise closes the DICOM Viewer tab, the move request is canceled in order to halt any further transmission of images for the current study

4.2. AE Specifications

4.2.1. DICOM Reference Viewer AE Specification

This application provides Standard Conformance to the following DICOM V3.0 SOP Classes:

4.2.1.1. SOP Classes

SOP CLASSES FOR DRV

Table 4.2-1

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	No	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes

4.2.1.2. Association Policies

4.2.1.2.1. General

The Application Context Name for DICOM 3.0 is the only Application Context proposed.

DICOM APPLICATION CONTEXT

Table 4.2-2

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2.2. Number of Associations

Each Intergy EHR station running DRV will have at most two open associations at any one time. One association as SCU performing FIND or MOVE requests to the DICOM archive and another association initiated by the DICOM archive to store images back to DRV.

4.2.1.2.3. Asynchronous Nature

Asynchronous communication (multiple outstanding transactions over a single association) is not supported.

4.2.1.2.4. Implementation Identifying Information

DICOM IMPLEMENTATION

Table 4.2-3

Implementation Class UID	1.2.276.0.7230010.3.0.3.5.3
Implementation Version Name	3.5.3

4.2.1.3. Association Initiation Policies

DRV will attempt to initiate a new association whenever the DICOM Viewer tab is selected within Intergy EHR in order to query the archive device. If the user elects to view an image from a study, a new association is initiated in order to submit and monitor the move request.

4.2.1.3.1. Activity – Query Remote AE (Archive Device)

4.2.1.3.1.1. Description and Sequencing of Activities

DRV will attempt to initiate a new association whenever the DICOM Viewer tab is selected within Intergy EHR. If the association is accepted, a series of queries will be submitted to the configured archive device to produce a list of all studies stored on the archive device for the currently selected patient. The system will first perform a study level query to retrieve a list of all studies for the selected patient. This will be followed by series level queries for all returned studies and finally an image level query for all series. After all study information has been retrieved, the association is closed.

If a particular study or series is selected for viewing, DRV will attempt to initiate a new association in order to submit the MOVE request. This association is maintained in order to receive MOVE status updates for the duration of the MOVE operation. This association will be closed at the completion of the MOVE operation.

4.2.1.3.1.2. Proposed Presentation Contexts

PROPOSED PRESENTATION CONTEXTS

Table 4.2-4

Abstract Syntax		Transfer Syntax		Role	Ext Neg
Name	UID	Name	UID List	SCU	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2		
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2				

4.2.1.3.1.3. SOP Specific Conformance to C-FIND SOP Classes

Only Patient Root queries are utilized by DRV. DRV utilizes study, series and image level queries. The following tables list the matching and return keys utilized for each query.

STUDY LEVEL QUERY

Table 4.2-5

Name	Tag	Key Type
Patient ID	(0010,0020)	Matching
Study Date	(0008,0020)	Return
Study Description	(0008,1030)	Return
Accession Number	(0008,0050)	Return
Study Instance UID	(0020,000D)	Return

SERIES LEVEL QUERY

Table 4.2-6

Name	Tag	Key Type
Patient ID	(0010,0020)	Matching
Study Instance UID	(0020,000D)	Matching
Modality	(0008,0060)	Return
Name	Tag	Key Type

Body Part Examined	(0018,0015)	Return
Series Date	(0008,0021)	Return
Series Number	(0020,0011)	Return
Series Description	(0008,103E)	Return
Series Time	(0008,0031)	Return
Series Instance UID	(0020,000E)	Return

IMAGE LEVEL QUERY

Table 4.2-7

Name	Tag	Key Type
Patient ID	(0010,0020)	Matching
Study Instance UID	(0020,000D)	Matching
Series Instance UID	(0020,000E)	Matching
Instance Number	(0020,0013)	Return
SOP Instance UID	(0008,0018)	Return

DRV may send CANCEL requests if results are still pending and the user elects to close the current window or change patients.

4.2.1.3.1.4. SOP Specific Conformance to C-MOVE SOP Classes

Only Patient Root move requests are issued by DRV.

All C-MOVE requests are series level moves to cause all objects associated with a specific series to be sent to DRV for viewing.

Cancel requests may be submitted during a move operation if the user elects to display a different study or patient.

The AE title submitted as part of the C-MOVE request is the same AE title used as part of the association initiation. This AE title is the same as the computer name on which DRV is executing. This means the C-MOVE SCP (the archive device) must be pre-configured to map the AE title / computer name with the host address and port of the client workstation running DRV.

4.2.1.4. Association Acceptance Policy

DRV only accepts associations as a storage SCP for the purposes of receiving images requested by the user. DRV will accept an association as a storage SCP from any AE.

4.2.1.4.1. Activity – Receive Storage Request

4.2.1.4.1.1. Description and Sequencing of Activities

When a user of DRV selects a study or series for review, DRV will begin accepting associations as a storage SCP and will then submit the appropriate move requests. During this time, DRV will only accept a single association and upon termination of the association, it will assume it has received all images that will be sent and it will no longer accept new associations until a new study or series is selected by the user.

4.2.1.4.1.2. Accepted Presentation Contexts

PRESENTATION CONTEXT TABLE

Table 4.2-8

Abstract Syntax		Transfer Syntax		Role	Ext Neg
Name	UID	Name	UID		

See Table 4.2-1	See Table 4.2-1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
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4.2.1.4.1.3. SOP Specific Conformance for Storage SOP Classes

DRV provides standard conformance to the storage SOP classes described in table 4.2-1. It provides only transient storage for these objects and provides no long term storage. All objects received are stored in only a short term cache whose size is limited to available memory. As the cache is filled, least recently accessed objects are removed from the cache and are no longer available for display.

4.2.1.4.1.4. Response Status

The following table lists the possible responses a storage SCU may receive when attempting to store objects to DRV.

RESPONSE CODES

Table 4.2-9

Service Status	Further Meaning	Status Code	Reason
Refused	Out of Resources	A700	Unable to allocate system resources to receive object.
Success		0000	Object received and stored to cache

4.3. Network Interfaces

4.3.1. Physical Network Interfaces

DRV utilizes the TCP/IP protocol stack provided by the Microsoft Windows operating system. It has no specific hardware requirements.

4.3.2. Additional Protocols

DNS can be utilized by DRV for providing name resolution services to connectivity to other host devices. In the absence of a name resolution service, all host addresses must be supplied as IP addresses. If a working name resolution service is available, device names may be used anywhere an IP address can be used.

4.4. Configuration

4.4.1. AE Title / Presentation Address Mapping

4.4.1.2. Local AE Title

The local AE title used by DRV is always the computer name of the machine DRV is executing on. This setting cannot be changed.

The port that is used to receive associations as storage SCP is always set to 10003. This value also cannot be changed.

4.4.1.3. Remote AE Title / Presentation Address Mapping

The AE title, host address and port of the archive device that DRV will query are defined within the Intergy System Administration utility. These values are changed in the section IEHR / EHR PDA → DICOM Viewer. Note that in the current version of EHR, all workstations can only query this single device.

4.4.2. Parameters

Consult the Intergy EHR by Sage help system and implementation guides for a complete description of the items that are configurable.

5. Media Interchange

DRV does not support media storage.

6. Support of Character Sets

DRV supports the following character sets:

ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

7. Security

DRV does not support any specific security measures.