



DICOM 3.0 Conformance Statement - Odyssey VP and FX

Rev 4.1, January 27, 1999

P/N 892086

DICOM software release 1.5

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<p>This Conformance Statement describes DICOM software release 1.5, for the Picker Odyssey VP and FX Nuclear Medicine systems.</p>
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Introduction

Medical imaging devices claiming conformance to the DICOM 3.0 standard must indicate in sufficient detail the service classes and information objects, as defined by the standard, they conform to. This document details the conformance of Picker International's Odyssey series Nuclear Medicine products to the DICOM 3.0 standard. This document does not attempt to detail any other medical imaging devices manufactured by Picker International.

System requirements:

- Odyssey VP or FX computer.
- Baseline 7 (or higher) software.

1 Implementation model

This implementation provides for simple transfer of images using the DICOM Storage Service Class as both a Service Class User (SCU) and a Service Class Provider (SCP), simple management of images using the DICOM Query/Retrieve Service Class as SCU, and can read some CD-Rs as a File Set Reader (FSR). Transfers from the Odyssey to a remote Application Entity (AE) are initiated by an operator by selecting the appropriate options from the Image Workbench. Similarly, the Odyssey operator may initiate the transfer of images from a remote Application Entity (AE) to the Odyssey, provided that the remote AE also supports the DICOM Query/Retrieve Service Class as an SCP, by selecting the appropriate options from the Image Workbench. No operator action is required on the Odyssey to service Storage requests initiated by a remote Application Entity (AE).

For diagnostic purposes, this implementation also provides for simple communications testing using the DICOM Verification Service Class, as both SCU and SCP. Verification of communications to a remote AE is initiated by an operator by selecting the appropriate

options from the Image Workbench. Verification of communications from a remote AE is handled automatically and requires no operator actions.

1.1 Application Data Flow Diagram

Image transfers from the Odyssey to a remote AE are started when the user manually selects a set of studies to transfer via the Image Workbench, and then selects the DICOM transfer function.

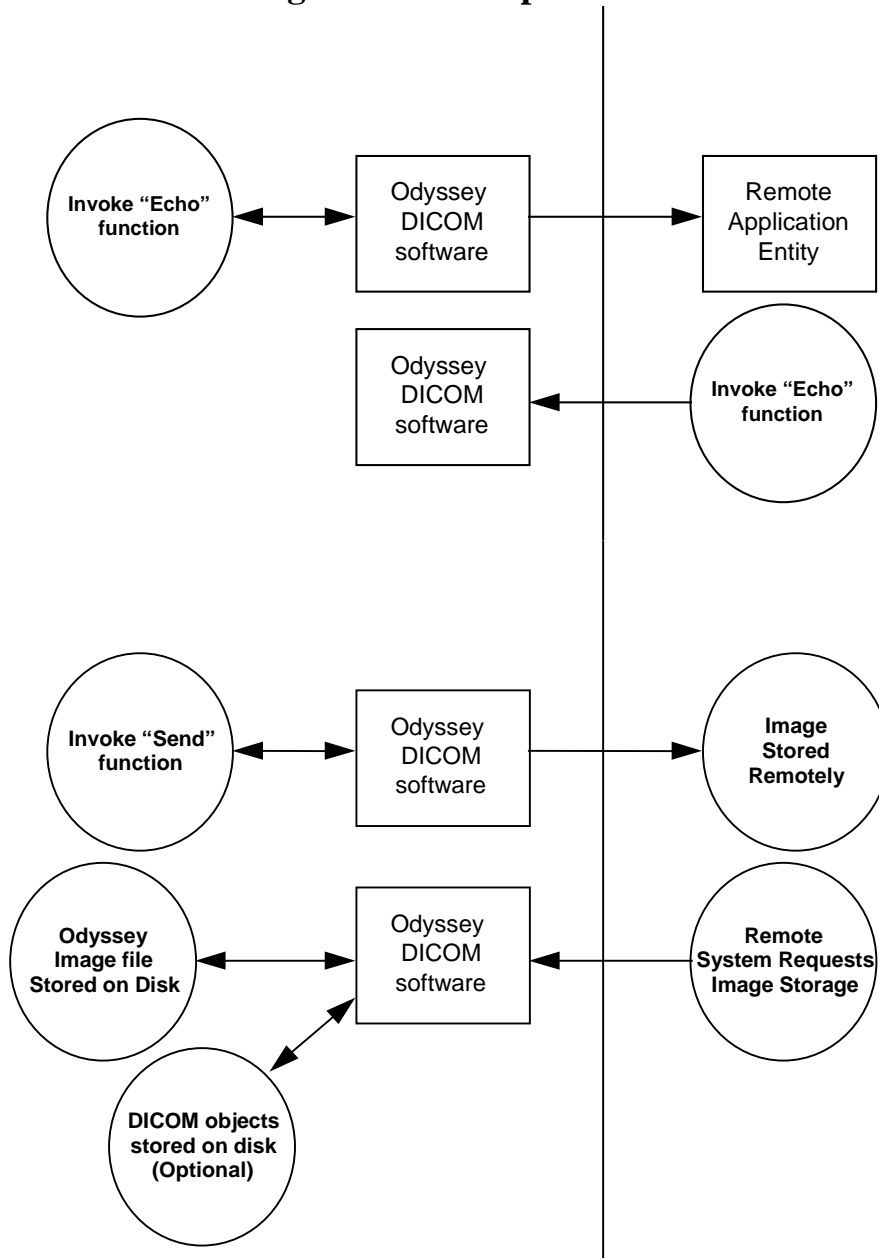
Image transfers from a remote AE to the Odyssey can be accomplished in either of two ways. The first is for the Odyssey operator to manually select a set of studies which reside on the remote AE, and transfer them to the Odyssey. Note that the remote AE must also support the DICOM Query/Retrieve Service Class as an SCP (and must support C-MOVE) in order to transfer images in this manner. If it does not, the image transfer cannot be initiated from the Odyssey. The second is for the transfer to be initiated by the remote AE. In this case there is no operator action required on the Odyssey.

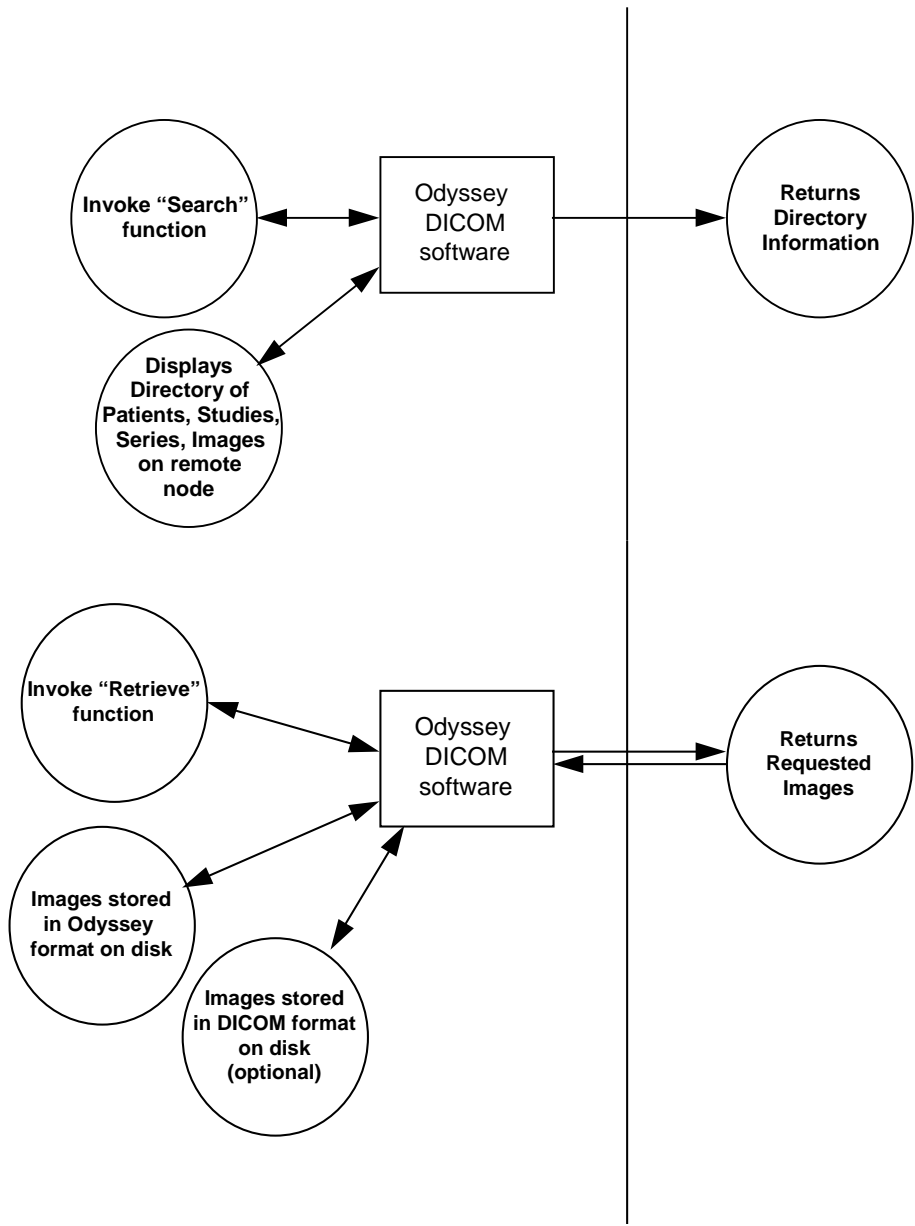
Images can also be read from a CD-R. This is accomplished using the same control panels as are used to retrieve images from remote AEs. The DICOM File-set is read, and the directory is displayed for the operator. Selected images can then be read and stored on the Odyssey. Only CT, MR, NM and SC SOP Instances can be read.

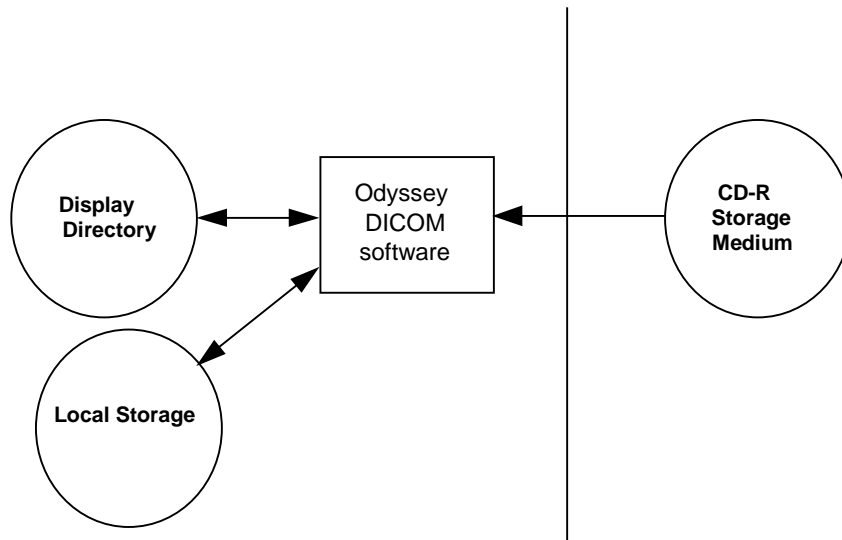
Communications to a remote AE can be verified using the C-ECHO request/response primitives of the DICOM Verification Service Class. The C-ECHO request can be sent to a remote AE using the same Image Workbench options, by selecting the verify option, rather than the image send option on the DICOM Image Transfer control panel.

Responses to C-ECHO requests received from remote AEs are handled automatically; the image receiver software also serves as SCP for the Verification Service Class.

Figure 1.1-1. Implementation Model







1.2 Functional Definitions of AE's

The DICOM image sending software is started when a study is selected, placed on the workbench and the DICOM transfer function is selected from the Image Workbench. There are three options presented; 'Send', 'Echo', and 'Get'.

When 'Send' is pressed, an association which includes a list of Presentation Contexts is proposed to the destination AE. The destination AE determines which of these Presentation Contexts it can support. The image send software then goes through the list of files on the workbench. For each file, it determines the Presentation Context to be used and checks to see if this Presentation Context is supported by the destination AE. If so, the file is transferred. When all files on the workbench have been processed the association is closed.

Any image which originated on the sending Odyssey must be converted into DICOM 3.0 format. This is done at the time of the transfer. Any image originating on the Odyssey is stored in Odyssey file format, not DICOM 3.0 file format. However, it is possible to 'Send' an image to a local directory, in which case a file is created which conforms to DICOM 3.0 file format as described in Part 10. Any image which was previously transferred to the Odyssey via DICOM, and saved in its entirety (see the discussion of the image receiving software later in this section), will be retransmitted in its original form.

Odyssey 'Lightbox' images are transferred as single frame, 8 bit, black and white, Secondary Capture images. All other Odyssey images are transferred as one or more Multi-Frame image objects of the NM Storage SOP Class.

The image receiving software waits for another application to connect at the presentation address configured for its Application Entity Title. The application that connects must be a DICOM application. Associations are accepted with Presentation Contexts for SOP

Classes of the Storage Service Class, or the Verification Service Class. It will receive images on the Storage Service Class Presentation Contexts and create Odyssey image files from them. It can also (optionally) store a complete copy of the original DICOM message. This feature, which can be enabled/disabled during configuration, allows such images to be retransmitted exactly as they were received.

The 'Echo' function provides an easy way to determine if the remote AE is available. When 'Echo' is pressed, an association which includes a Presentation Context for Verification Class is proposed. A successful response indicates that the remote AE is available. The association is immediately closed.

When 'Get' is pressed, an association which includes a list of Presentation Contexts for all DICOM Query/Retrieve information models (i.e. Patient Root, Study Root, and Patient/Study Only) is presented. If more than one is accepted, the model which supports the greatest number of directory levels is used. The operator can then request directory information at any of these levels. A new association is created for each directory search, and is immediately closed as soon as the requested information is received. The operator may also request that a patient, study, series or image be retrieved from the remote AE by pressing the 'Retrieve' button. A new association is initiated for the request, which remains open until all files have been received. The actual file transfer occurs on a separate association initiated by the remote AE.

The 'Get' button is also used to retrieve images from the CD-R, by setting the 'Destination' choice on the DICOM Image Transfer control panel to be the CD-R instead of one of the remote AEs. Directory information is always displayed using the Patient Root model. The 'Retrieve' button is used to initiate the transfer of a patient, study, series or image from the CD-R.

1.3 Sequencing of Real-World Activities

Not applicable.

2 AE Specifications

The DICOM software on the Odyssey is divided into two logical entities, one which initiates associations and one which accepts associations. The operational parameters, including AE Title, for each are derived from configuration files in the /prism/site directory. The initiating software can be configured to present a different AE title for each destination, but only one association at a time is allowed. The receiving software will spawn a copy of itself for each new connection, each representing the same Application Entity. In order to simplify this description, these are described as a single Application Entity.

2.1 AE1 - Specification

This Application Entity provides Conformance to the following DICOM V3.0 SOP Classes.

Table 2.1-1 Supported SOP Classes

SOP Class Name	SOP Class UID	Conformance	Role
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Standard	SCU and SCP
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Standard	SCU and SCP
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Extended	SCU and SCP
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Standard	SCU and SCP
Verification	1.2.840.10008.1.1	Standard	SCU and SCP
Patient/Study Only, Query/Retrieve Information Model, Find	1.2.840.10008.5.1.4.1.2.3.1	Standard	SCU
Patient/Study Only, Query/Retrieve Information Model, Move	1.2.840.10008.5.1.4.1.2.3.3	Standard	SCU
Patient Root, Query/Retrieve Information Model, Find	1.2.840.10008.5.1.4.1.2.1.1	Standard	SCU
Patient Root, Query/Retrieve Information Model, Move	1.2.840.10008.5.1.2.1.2.1.2	Standard	SCU
Study Root, Query/Retrieve Information Model, Find	1.2.840.10008.5.1.4.1.2.2.1	Standard	SCU
Study Root, Query/Retrieve Information Model, Move	1.2.840.10008.5.1.4.1.2.2.2	Standard	SCU

2.1.1 Association Establishment Policies

2.1.1.1 General

The image transfer software will attempt to establish an association each time any of its functions (Send, Echo, Get, Search directory, Retrieve) are invoked, provided that a valid destination definition has been selected. When sending images, the association is maintained until all image files on the Workbench have been processed. Those files which cannot be transferred because the receiving AE does not support the required SOP Class are ignored.

When sending the verification (Echo) request, or when requesting directory information, the association is immediately closed as soon as the response is received. Each new request is made on a new association.

When a Retrieve request is made, the association remains open until all images have been transferred so that any error reports can be received if there are problems transferring the images. The actual image transfer occurs on a separate association initiated by the remote AE.

The maximum PDU size allowed is 4096 bytes.

2.1.1.2 Number of Associations

The image transfer software will attempt only one association at a time. However, since there can be more than one Image Workbench, it is possible for multiple copies to be invoked simultaneously. There is no synchronization attempted between multiple copies of the transfer software, so there may be a number of associations attempted simultaneously, limited only by the resources available.

The image receiver AE will spawn a separate process for each connection it establishes.

2.1.1.3 Asynchronous Nature

There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

The Implementation UID supplied for DICOM 3.0 associations is "2.16.840.1.113662.5".

2.1.2 Association Initiation By Real World Activity

The image receiving software does not initiate any associations.

The image transfer software attempts to initiate an association once each time it is invoked. The same association is held open until all image files on the workbench have been processed. There are four Real World Activities that cause association establishment.

1. Sending an Odyssey image file to a remote AE.
2. Sending a Verification request to a remote AE.
3. Requesting directory information (Query) from a remote AE.
4. Requesting that a remote AE send an image object (Retrieve).

2.1.2.1 Real World Activity 1. Sending an Odyssey image file.

2.1.2.1.1 Associated Real World Activity

The Associated Real World Activity is the attempt to transfer a set of images. This occurs when the operator manually selects a set of images, places them on the workbench and initiates the DICOM Send function.

2.1.2.1.2 Proposed Presentation Contexts

Table 2.1.2.1.2-1 Proposed Presentation Contexts, sending Odyssey image file

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
CT Image	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.1.3 SOP Specific Conformance to Storage SOP Classes

If the image transfer software is unable to open an association with the selected destination AE, an error message is printed in the console window and an error indicator is displayed in the status window of the DICOM transfer control window.

If the image transfer software is unable to determine the appropriate Abstract Syntax for a file, or if this Abstract Syntax is not supported by the receiving AE, or if a failed, refused, or warning response to the C-STORE operation is received, a warning message is printed in the main console window. It will then attempt to process the next file on the workbench. When all files on the Workbench have been processed, the status window of the DICOM transfer control window will indicate that some or all of the files failed to transfer successfully. The console window messages will give more detail as to which files failed, and why.

There are no special messages displayed when a successful response to the C-STORE operation is received.

The image transfer software does not attempt any extended negotiation.

When transferring files that were previously received from some other remote AE and stored in their entirety (the Save option was turned on), the image transfer software does not delete any elements from the file. Therefore, the set of optional elements depends entirely on the contents of the files specified for transfer.

When transferring files that originate on the Odyssey, the files must first be converted to the appropriate DICOM Image Objects. Odyssey "Lightbox" images are converted to 8-bit, black and white, Secondary Capture Image Objects using the following Secondary Capture Image IOD Modules: Patient, General Study, General Series, General Equipment, SC Image Equipment, General Image, Image Pixel, SC Image, VOI LUT, SOP Common. The following optional elements (Type 3) may be included:

Table 2.1.2.1.3-1 Optional Elements for SC Images

Tag	Name	Conditions for inclusion
[0008,0014]	Instance Creator UID	Always
[0008,0022]	Acquisition Date	Always
[0008,0032]	Acquisition Time	Always
[0008,0060]	Modality	Always
[0008,0080]	Institution Name	Always
[0008,0081]	Institution Address	Always
[0008,1060]	Name of Physician(s) Reading Study	Always
[0008,1090]	Manufacturer's Model Name	Always
[0018,0015]	Body Part Examined	If known
[0018,1000]	Device Serial Number	Always
[0018,1020]	Software Version(s)	Always
[0020,4000]	Image Comments	Always
[0028,0106]	Smallest Image Pixel Value	Always
[0028,0107]	Largest Image Pixel Value	Always
[0028,1050]	Window Center	Always

The Modality attribute [0008,0060] is always set to “OT” (other). This is because the Lightbox image from which the Secondary Capture image is created can contain anything on the screen, including control panels, color stripes, images from other modalities, etc.

The image transfer software provides Standard conformance to the DICOM Secondary Capture (SC) SOP Class.

All other Odyssey image files are converted to black and white Nuclear Medicine Image Objects using one or more of the following NM Image IOD Modules, as appropriate: Patient, General Study, Patient Study, General Series, Frame of Reference, General Equipment, General Image, Image Pixel, NM Image Pixel, Multi Frame, NM Multi-frame, NM Image, NM Isotope, NM Detector, NM TOMO Acquisition, NM Multi Gated, NM Phase, NM Reconstruction, SOP Common. The following optional elements (Type 3) may be included:

Table 2.1.2.1.3-2 Optional Elements for NM Images

Tag	Name	Conditions for inclusion
[0008,0014]	Instance Creator UID	Always
[0008,0022]	Acquisition Date	Always
[0008,0032]	Acquisition Time	Always
[0008,0080]	Institution Name	Always
[0008,0081]	Institution Address	Always
[0008,1030]	Study Description	Always
[0008,103E]	Series Description	Always
[0008,1060]	Name of Physician(s) Reading Study	Always
[0008,1070]	Operators' Name	If available
[0008,1090]	Manufacturer's Model Name	Always
[0018,0015]	Body Part Examined	If known
[0018,0071]	Acquisition Termination Condition	If known
[0018,1000]	Device Serial Number	Always
[0018,1020]	Software Version(s)	Always
[0018,1086]	Skip Beats	For 'Normal' bin gated studies only.
[0018,1130]	Table Height	Always
[0018,1131]	Table Traverse	Always
[0018,1142]	Radial Position	If available.
[0018,1180]	Collimator/Grid Name	If known
[0018,1242]	Actual Frame Duration	For Static or Whole Body only.
[0018,1301]	Whole Body Technique	For Whole Body only.
[0018,5020]	Processing Function	Always
[0020,0012]	Acquisition Number	If available
[0020,4000]	Image Comments	Always
[0028,0051]	Corrected Image	If applicable
[0028,0106]	Smallest Image Pixel Value	Always
[0028,0107]	Largest Image Pixel Value	Always
[0028,1050]	Window Center	Always
[0054,0012]	Energy Window Information Sequence	Always
[0054,0014]	Energy Window Lower Limit	Always
[0054,0015]	Energy Window Upper Limit	Always
[0054,0202]	Type of Detector Motion	For Tomo images
[0054,0400]	Image ID	If available

The image transfer software provides Standard Extended conformance to the DICOM Nuclear Medicine SOP Class. The additional Private data elements that may be included have group number 0x7001, and contain Odyssey specific information which could not be encoded in the standard NM IOD, and would be meaningless for non-Odyssey systems. Some receiving systems may need to be informed of the VR for these private elements in order to properly receive and store them. The following table shows the VR for each of these elements.

Table 2.1.2.1.3-3 Private Elements for NM Images

Tag	VR
[7001,0010]	LO
[7001,1001]	UI
[7001,1002]	OB
[7001,1003]	OB
[7001,1004]	OB
[7001,1005]	OB
[7001,1006]	OB
[7001,1007]	OB
[7001,1008]	OB
[7001,1009]	OB
[7001,1010]	SQ
[7001,1011]	LO
[7001,1012]	OB
[7001,1013]	US
[7001,1014]	OB
[7001,1016]	OB

The Private Creator Data Element [7001,0010] which is used to reserve these private data elements has value “Picker NM Private Group”.

2.1.2.2 Real World Activity 2. Sending a Verification Request

2.1.2.2.1 Associated Real World Activity

The Associated Real World Activity is the attempt to verify communications with a remote AE. This occurs when the operator selects the Echo function from the DICOM file transfer control panel.

2.1.2.2.2 Proposed Presentation Contexts

Table 2.1.2.2.2-1 Proposed Presentation Contexts, Sending Verification Request

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.2.3 SOP Specific Conformance to Verification SOP Class

The image transfer software provides standard conformance to the DICOM Verification SOP Class.

2.1.2.3 Real World Activity 3 Requesting Directory Information

2.1.2.3.1 Associated Real World Activity

The Associated Real World Activity is a request for directory information. This occurs when the operator selects the Get or Keyword Search functions from the DICOM file transfer control panel.

2.1.2.3.2 Proposed Presentation Contexts

Table 2.1.2.3.2-1 Proposed Presentation Contexts, Query

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient/ Study Root Find	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Patient Root Find	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Study Root Find	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.3.3 SOP Specific Conformance to Find SOP Classes

This implementation does not make use of any optional keys. It also does not generate Relational queries or support any extended negotiations.

2.1.2.4 Real World Activity 4. Requesting a file

2.1.2.4.1 Associated Real World Activity

The Associated Real World Activity is a request for the remote AE to transfer an object to the Odyssey. This occurs when the operator selects the Retrieve function from the DICOM file transfer control panel.

2.1.2.4.2 Proposed Presentation Contexts

Table 2.1.2.4.2-1 Proposed Presentation Contexts, Move

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient/ Study Root Move	1.2.840.10008.5.1.4.1.2.3.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Patient Root Move	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.4.3 SOP Specific Conformance to Move SOP Classes

This implementation provides Standard conformance as SCU of C-MOVE.

2.1.3 Association Acceptance Policy

The image transfer software never accepts associations.

When the image receive software accepts an association, it will receive images transmitted on that association. Received images are converted to Odyssey format and entered in the Clinical Index for later review. Optionally, the received images are also saved in their original form to preserve all data elements. This option is useful if the images are to be retransmitted to another AE.

The image receive software places no limitations on who may connect to it. There is also no limitation on the number of simultaneous connections it will support.

A new copy of the image receive software is spawned for each new association.

2.1.3.1 Associated Real-World Activity

The Real-World Activity associated with the C-STORE operation is the conversion of the image to an Odyssey image file, and the optional storage of the complete DICOM image object.

2.1.3.2 Presentation Context Table

Table 2.1.3.2-1 Acceptable Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	None
CT Image	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	None
MR Image	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	None
NM Image	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	None
SC Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	None

2.1.3.3 SOP Specific Conformance

2.1.3.3.1 SOP Specific Conformance to Verification SOP Class

The image receive software provides standard conformance to the DICOM Verification Service Class.

2.1.3.3.2 SOP Specific Conformance to Storage SOP Classes

When the DICOM image save option is enabled, the complete DICOM image object is stored in a file. This constitutes Level 2 conformance. If this option is not enabled, the original DICOM image is not saved at all. In either case, an Odyssey image file is created using a subset of the elements of the received image. This image is entered in the Clinical Index and is available for viewing using the standard Odyssey image display functions.

If the Odyssey operator chooses to send an image to another AE, the original DICOM object file is used if available. If not available, and the image is an NM image, the Odyssey file is converted to a DICOM image and transmitted. Thus, when the image save option is disabled, the Odyssey image receive software is only providing Level 0 conformance. If the original DICOM image is not available, and the image is not an NM image, it cannot be retransmitted at all. In either case, the operator only has direct access to the Odyssey image file, which constitutes Level 0 conformance.

In the event of a successful C-STORE operation, the image has been successfully written to disk and/or converted to an Odyssey image file.

The image receive software never deletes an image file. The duration of the image storage is determined by the operator.

When Secondary Capture images with photometric interpretation equal to RGB are received, they are converted to black and white. No other color configuration is handled at this time.

If the C-STORE operation is unsuccessful, the image receive software will return one of the following status codes:

Table 2.1.3.3.2-1 C-STORE error codes

Status code	Meaning
A700 (Out of Resources)	Indicates that there is not enough room to store or process the image. Recovery is left to the user.
A800 (SOP Class not supported)	Indicates that the SOP Class of the image in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context. This indicates a problem with the SCU of the Service Class.
C204 (System Error)	A system error has occurred while storing or processing the incoming image. Recovery is left to the user.
CF01 (Protocol Error)	Protocol violation detected on the association.

A warning condition will also be returned in certain cases in which the data set does not match the IOD of the SOP class. In this case it will attempt to process the image anyway, but will return the following status:

Table 2.1.3.3.2-2 C-STORE Warnings

Status code	Meaning
B006 (Elements Discarded)	One or more data elements in the received image were not saved. This can occur if the option to save incoming messages in their entirety is turned off.
B007 (Data Set does not match SOP Class)	One or more required data elements were not present in the received image.

2.1.3.3.3 Service Specific Conformance for CD-R Media Storage Class

The Odyssey provides Standard Conformance to the DICOM Data Interchange option of the Media Storage Service Class. The Application Profiles and roles are listed in table 2.1.3.3.3-1.

Table 2.1.3.3.3-1 Supported Application Profiles

Application Profile	Real World Activity	Role	Service Class Option
STD-GEN-CD	Display directory	FSR	Data Interchange
	Read image – copy to local storage.	FSR	Data Interchange

The Media Storage AE acts as a FSR when requested to provide a directory listing. It will read the DICOMDIR file and display a directory of all patient record entries in the File-set.

The Media Storage AE also acts as FSR when copying images from the CD-R to local storage. Only SOP Instances of the CT, MR, NM or SC IODs can be copied.

2.1.3.4 Presentation Context Acceptance Criterion

The image receive software will always accept a Presentation Context for the Verification SOP Class with the DICOM Default Transfer Syntax. It will also accept any of the presentation contexts listed in the table in section 2.1.3.2. The receive software replicates itself for each new association.

2.1.3.5 Transfer Syntax Selection Policies

The image receive software will only receive images using the Implicit VR, Little Endian, syntax. There is no selection.

3 Communication Profiles

3.1 Supported Communications Stacks (Parts 8,9)

The image transfer and receive software provides DICOM 3.0 TCP/IP Network Communications Support as defined in Part 8 of the DICOM Standard.

3.2 OSI Stack

No OSI stack communications are provided with this implementation.

3.3 TCP/IP Stack

The TCP/IP protocol stack is supported.

3.3.1 Physical media supported

The following media are supported:

- 1) Twisted pair Ethernet
- 2) Thinnet Ethernet
- 3) Thicknet Ethernet

3.4 Point to Point Stack

No point to point stack communications are provided with this implementation.

4 Extensions/Specializations/Privatizations

No specializations or privatizations are used in this implementation. The NM SOP Class may be extended as described in section 2.1.2.1.3.

5 Configuration

5.1 AE Title/Presentation Address Mapping

Each remote workstation is given a name, which appears on the list of destinations presented to the user when the DICOM file transfer option is selected from the Workbench. Each destination name corresponds to exactly one AE Title/host address pair.

5.2 Configurable Parameters

5.2.1 Export

The following parameters are configurable:

Table 5.2.1-1 Configuration Parameters for export

Mode:	Determines the amount of diagnostic messages to be displayed as the images are transmitted.
For each destination:	
Protocol:	Determines whether exporting to a remote node using TCP/IP, or to a local disk file.
Port Number:	Port number on which to communicate with destination AE. The standard DICOM port is 104.
Calling AE Title:	The Odyssey Application Entity Title to use when opening an association with the destination AE.
Called AE Title:	Application Entity Title of destination AE.
Menu Title:	The title of this destination as it will appear in the list of destinations on the DICOM transfer control panel.
Timeout:	Max time to wait for a response before timing out.

5.2.2 Import

The following parameters are configurable:

Table 5.2.2-1 Configuration Parameters for import

Mode:	Determines the amount of diagnostic messages to be displayed as the images are received.
Save option:	Determines whether or not the original DICOM image is stored, in addition to the Odyssey file that is created from it.
Port Number:	Port number on which to receive association requests. The standard DICOM port is 104.
AE Title:	Application Entity Title for Odyssey image receive software.
Timeout:	Max time to wait for response before timing out.
Allow missing Image Orientations:	Determines whether or not to accept TOMO images that are missing Image Orientation information. If Yes, the image can be displayed but not processed. If No, the image is rejected.
Allow missing Patient Orientation:	Determines whether or not to accept TOMO images that are missing Patient Orientation information. If Yes, the image can be displayed but not processed. If No, the image is rejected.

6 Support of Extended Character Sets

The Latin alphabet No. 1, supplementary character set, identified as ISO_IR 100, is used and supported.



DICOM 3.0 Conformance Statement - Odyssey VP and FX Modality Worklist

Rev 2.1, February 18, 1998

P/N 892083

DICOM Modality Worklist software V1.6

Picker International, Inc., Nuclear Medicine Division

Highland Heights, Ohio 44128-5443

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This Conformance Statement describes DICOM Modality Worklist software release 1.6 for the Picker Odyssey VP and FX Nuclear Medicine systems.
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Introduction

Medical imaging devices claiming conformance to the DICOM 3.0 standard must indicate in sufficient detail the service classes and information objects, as defined by the standard, they conform to. This document details the conformance of Picker International's Odyssey series Nuclear Medicine products to the DICOM 3.0 standard. The Odyssey systems must have Odyssey v8.5 software as a minimum, as well as the DICOM 3.0 Basic Modality Worklist option. This document does not attempt to detail any other medical imaging devices manufactured by Picker International.

1 Implementation model

This implementation provides for simple transfer of patient demographic and procedure information using the DICOM Basic Modality Worklist SOP Class as a Service Class User (SCU).

1.1 Application Data Flow Diagram

Queries for information are generally initiated automatically by the Odyssey, but can also be initiated manually by the operator.

DICOM 3.0 Conformance Statement - Odyssey VP and FX Print Service

Rev 2.0, January 27, 1999

P/N 892087

DICOM Print software release 1.5

Picker International, Inc., Nuclear Medicine Division

Highland Heights, Ohio 44128-5443

Copyright (c) 1999

<p>This Conformance Statement describes DICOM Print software release 1.5 for the Picker Odyssey VP and FX Nuclear Medicine systems.</p>

Introduction

Medical imaging devices claiming conformance to the DICOM 3.0 standard must indicate in sufficient detail the service classes and information objects, as defined by the standard, they conform to. This document details the conformance of Picker International's Odyssey series Nuclear Medicine products to the DICOM 3.0 standard. The Odyssey systems must have Baseline 7 software as a minimum as well as the DICOM 3.0 Print option. This document does not attempt to detail any other medical imaging devices manufactured by Picker International.

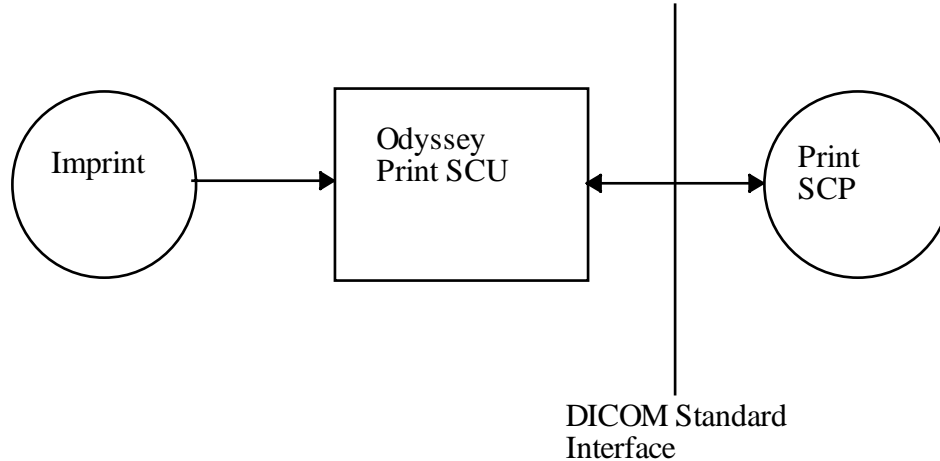
1 Implementation model

This implementation provides for simple transfer of images using the DICOM Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta SOP Class, as a Service Class User (SCU). Transfers from the Odyssey to a remote Printer are initiated by an operator by selecting the appropriate options from the Imprint general purpose printing application.

1.1 Application Data Flow Diagram

Image transfers from the Odyssey to a remote printer are started when the user manually selects the Print option on the Imprint control panel.

Figure 1.1-1. Implementation Model



1.2 Functional Definitions of AE's

The DICOM print software is started when the Print button, on the Imprint control panel, is clicked. Images are always printed in color unless 1) the printer does not support color printing, or 2) the operator selects Black&White only from the Imprint Options panel. In either of these cases, the images are converted to grayscale images before being transferred to the printer.

1.3 Sequencing of Real-World Activities

The Print SCU is started when the operator clicks on the PRINT button on the Imprint control panel. At this time, a film session is requested, the associated Film Box and Image Boxes are created which describe one film page, and the film is printed. The film session is immediately deleted and the association is terminated. When subsequent film pages are ready to be printed, a new association is established and a new film session is created.

2 AE Specifications

The operational parameters for the DICOM print AE are derived from configuration files in the /prism/site directory.

2.1 AE1 - Specification

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes.

Table 2.1-1 Supported Meta SOP Classes

SOP Class Name	SOP Class UID	Role
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	SCU
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	SCU

Support for these two Meta SOP Classes as SCU also implies support for the SOP Classes listed in Table 2.1-2. However, the SCU never presents individual Presentation Contexts for these Sop Classes.

Table 2.1-2 Supported SOP Classes

SOP Class name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16

2.1.1 Association Establishment Policies

2.1.1.1 General

The image transfer software will attempt to establish an association each time the Print function is invoked (i.e. for each separate film page). The association is maintained until all images for one film page have been processed.

The maximum PDU (Protocol Data Unit) size allowed is 4096 bytes.

2.1.1.2 Number of Associations

The image transfer software will attempt only one association at a time.

2.1.1.3 Asynchronous Nature

There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

The Implementation UID supplied for DICOM 3.0 associations is "2.16.840.1.113662.5".

2.1.2 Association Initiation By Real World Activity

The image transfer software attempts to initiate an association once each time it is invoked. There is only one Real World Activity that can cause association establishment: Clicking on the Print button on the Imprint control panel.

2.1.2.1 Proposed Presentation Contexts

Table 2.1.2.1.2-1 Proposed Presentation Contexts, sending Odyssey image file

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.2 SOP Specific Conformance to Print SOP Classes

If the DICOM print software is unable to open an association with the selected destination AE, an error message is printed in the console window.

At the end of each print attempt, a message is displayed in the console window which shows whether the print succeeded or failed, and shows the printer status (out of film, etc.).

The print software does not attempt any extended negotiation.

Images are printed using either the Basic Grayscale or Basic Color Print management Meta SOP Class. The following optional elements may be included:

**Table 2.1.2.2-1 Optional Elements for N-CREATE request
 for Basic Film Session SOP Class**

Tag	Name	Conditions for inclusion
[2000,0010]	Number of Copies	Always
[2000,0030]	Medium Type	If supported by SCP and operator does not select "Current".

**Table 2.1.2.2-2 Optional Elements for N-CREATE request
 for Basic Film Box SOP Class**

Tag	Name	Conditions for inclusion
[2010,0040]	Film Orientation	Always*
[2010,0050]	Film Size ID	Always*
[2010,0100]	Border Density	Always
[2010,0120]	Minimum Density	Always*
[2010,0130]	Maximum Density	Always*
[2010,0140]	Trim	Always

**If supported by the print SCP*

**Table 2.1.2.2-3 Optional Elements for N-SET request
 for Basic Grayscale Image Box SOP Class**

Tag	Name	Conditions for inclusion
[2020,0020]	Polarity	Always

**Table 2.1.2.2-4 Optional Elements for N-SET request
 for Basic Color Image Box SOP Class**

Tag	Name	Conditions for inclusion
[2020,0020]	Polarity	Always

**Table 2.1.2.2-5 Optional Elements for N-GET request
 for Printer SOP Class**

Tag	Name	Conditions for inclusion

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DICOM 3.0 Conformance Statement - Odyssey Print Service
Rev 2.0 - P/N 892087
DICOM Print software release 1.5

The DICOM Print software provides Standard conformance to the DICOM Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta Sop Class.

The software that provides the user interface to set up films to be printed has been customized to match the capabilities of several popular printers. These are listed in Table 2.1.2.2-6, along with a list of the options that are available for each printer. There is also a generic configuration that should support most other DICOM printers.

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 DICOM 3.0 Conformance Statement - Odyssey Print Service
 Rev 2.0 - P/N 892087
 DICOM Print software release 1.5

Table 2.1.2.2-6 Printer Options

Printer	Orientation	Format	Max Copies	Density	Film Size	Media Type	Mag Type	Smoothing Type	Window capture allowed
Generic	Portrait	1x1,2x2 2x3,3x3	99	0-10	-	-	-	-	Y
	Land- scape	1x1,2x2 3x2,3x3							
Agfa Drystar 2000	Portrait	1x1,1x2 2x2,2x3 3x3,4x5	99	0-4	-	Current Clear Film Blue Film Paper	Current Replicate Bilinear Cubic	Current 0 140	Y
	Land- scape	1x1,2x1 2x2,3x3							
Codonics NP-1600M	Portrait	1x1,2x2 2x3,3x3	99	1.5-10	-	-	-	-	Y
	Land- scape	1x1,2x2 3x2,3x3							
Imation 8300 Dryview	Portrait	1x1,1x2	99	1.5-3	-	Current Clear Film Blue Film	Current Replicate Cubic None	Current 1,2,3, 4,5,6	N
	Land- scape	1x1,2x1 2x2							
Kodak MLP190	Portrait	1x1,1x2 2x2,2x3 3x3,3x4 4x5	99	0-4	-	-	Current Replicate Bilinear Cubic	Current NORMAL ENHANCED ENHANCED1	Y
	Land- scape	1x1,2x1 2x2,3x2 3x3,4x3 5x4							
Kodak 2180	Portrait	1x1,1x2 2x2,2x3 2x4,3x3 3x4,3x5 4x4,4x5	9	0-3.98	Current 8x10IN 11x14IN 14x17IN	Current Clear Film Blue Film	Current Replicate Bilinear Cubic	NORMAL ENHANCED1	Y
	Land- scape	1x1,2x1 2x2,3x2 4x2,3x3 4x3,5x3 4x4,5x4							

2.1.3 Association Acceptance Policy

The DICOM Print software does not accept associations.

3 Communication Profiles

3.1 Supported Communications Stacks (Parts 8,9)

The DICOM Print software provides DICOM 3.0 TCP/IP Network Communications Support as defined in Part 8 of the DICOM Standard.

3.2 OSI Stack

No OSI stack communications are provided with this implementation.

3.3 TCP/IP Stack

The TCP/IP protocol stack is supported.

3.3.1 Physical media supported

The following media are supported:

- 1) Twisted pair Ethernet
- 2) Thinnet Ethernet
- 3) Thicknet Ethernet

3.4 Point to Point Stack

No point to point stack communications are provided with this implementation.

4 Extensions/Specializations/Privatizations

No extensions, specializations, or privatizations are used in this implementation.

5 Configuration

5.1 AE Title/Presentation Address Mapping

Each remote printer is given a name. This name appears on the list of printers which is presented to the user on the Imprint control panel. Each printer name corresponds to exactly one AE Title/host address pair.

5.2 Configurable Parameters

The following parameters are configurable:

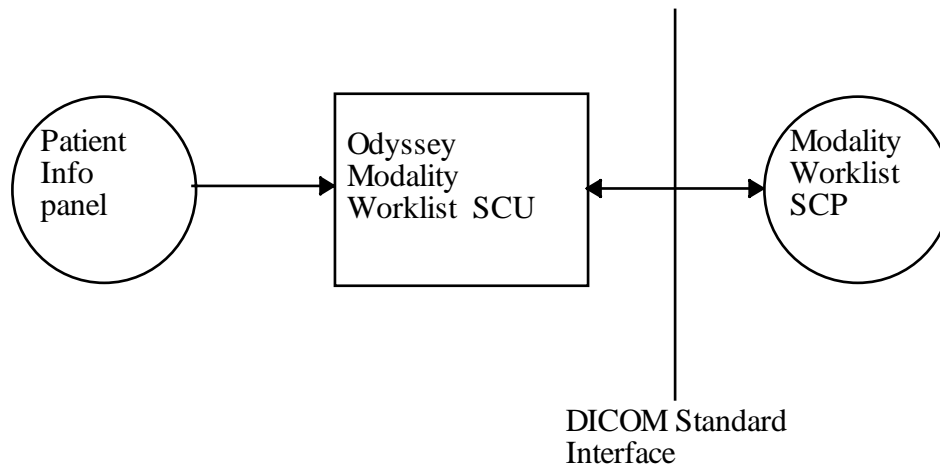
Table 5.2-1 Configuration Parameters

Mode:	Determines the amount of diagnostic messages to be displayed as the images are transmitted.
For each destination:	
Port Number:	Port number on which to communicate with destination AE. The standard DICOM port is 104.
Calling AE Title:	The Odyssey Application Entity Title to use when opening an association with the destination AE.
Called AE Title:	Application Entity Title of destination AE.
Host name:	Host name of remote printer.
Configuration Information	Printer specific configuration information.
Timeout	Max time (seconds) to wait for a response from the printer before timing out.

6 Support of Extended Character Sets

Extended Character Sets are not used or supported in this implementation.

Figure 1.1-1. Implementation Model



1.2 Functional Definitions of AE's

The DICOM Modality Worklist software is periodically started automatically by the Odyssey based on a configurable timing parameter. Each time it runs it initiates a Query FIND request to obtain a list of all scheduled procedures from the Modality Worklist SCP. The received information is stored in a local schedule database, which can be accessed by the operator through the Acquisition Setup, Patient Information panel. The operator can also initiate the Worklist Query operation, for the purpose of getting an immediate update of the patient schedule, by clicking on the <Update> button on the Patient List panel.

Entries are removed from the local schedule database as soon as the Modality Worklist SCP stops updating them. In other words, they are removed from the database as soon as the HIS stops reporting them as 'scheduled'.

1.3 Sequencing of Real-World Activities

The Modality Worklist SCU is started when the operator clicks on the <Update> button on the Patient List control panel, or automatically after a configurable time period has passed. At this time an association is established with the appropriate Worklist SCP, and a Query is generated for all NM procedures scheduled over the next N days (where N is configurable). All of the responses are recorded in a database on the Odyssey.

2 AE Specifications

The operational parameters for the DICOM Modality Worklist AE are derived from configuration files.

2.1 AE1 - Specification

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes.

Table 2.1-1 Supported Meta SOP Classes

SOP Class Name	SOP Class UID	Role
Modality Worklist Query Find	1.2.840.10008.5.1.4.31	SCU

2.1.1 Association Establishment Policies

2.1.1.1 General

The Modality Worklist software will attempt to establish an association each time the List Patients function is invoked, or after a configurable time duration has elapsed. The association is maintained until all responses have been received and processed.

The maximum PDU (Protocol Data Unit) size allowed is 4096 bytes.

2.1.1.2 Number of Associations

Only one association at a time is attempted. However, it can be configured to query more than one Modality Worklist SCP.

2.1.1.3 Asynchronous Nature

There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

The Implementation UID supplied for DICOM 3.0 associations is "2.16.840.1.113662.5".

2.1.2 Association Initiation By Real World Activity

The Modality Worklist software attempts to initiate an association once each time it is invoked. There is only one Real World Activity that can cause association establishment: Clicking on the <Update> button on the Patient List control panel.

2.1.2.1 Proposed Presentation Contexts

Table 2.1.2.1.2-1 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Query Find SOP Class	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.1.2.2 SOP Specific Conformance to the Basic Modality Worklist SOP Class

If the DICOM Modality Worklist software is unable to open an association with the selected destination AE, an error message is printed in the console window.

The Modality Worklist software does not attempt any extended negotiation.

The following optional attributes are included in the Query Find message:

Table 2.1.2.2-1 Optional Matching Key Attributes for Basic Modality Worklist SOP Class

Tag	Name
	None

**Table 2.1.2.2-2 Optional Return Key Attributes for
Basic Modality Worklist SOP Class**

Tag	Name
[0040,2400]	Imaging Service Request Comments
[0040,1002]	Reasons for Requested Procedure
[0040,1400]	Requested Procedure Comments
[0040,0400]	Comments on Scheduled Procedure Step

The DICOM Modality Worklist software provides Standard conformance to the DICOM Basic Modality Worklist SOP Class.

2.1.3 Association Acceptance Policy

The DICOM Modality Worklist software does not accept associations.

3 Communication Profiles

3.1 Supported Communications Stacks (Parts 8,9)

The DICOM Modality Worklist software provides DICOM 3.0 TCP/IP Network Communications Support as defined in Part 8 of the DICOM Standard.

3.2 OSI Stack

No OSI stack communications are provided with this implementation.

3.3 TCP/IP Stack

The TCP/IP protocol stack is supported.

3.3.1 Physical media supported

The following media are supported:

- 1) Twisted pair Ethernet
- 2) Thinnet Ethernet
- 3) Thicknet Ethernet

3.4 Point to Point Stack

No point to point stack communications are provided with this implementation.

4 Extensions/Specializations/Privatizations

No extensions, specializations, or privatizations are used in this implementation.

5 Configuration

5.1 AE Title/Presentation Address Mapping

The host name and AE title for each Worklist SCP are maintained in configuration files on the Odyssey.

5.2 Configurable Parameters

The following parameters are configurable:

Table 5.2-1 Configuration Parameters

Mode:	Determines the amount of diagnostic messages to be displayed as the images are transmitted.
Database Path:	The device name for the disk that contains the patient schedule database.
Database Node:	The host name for the Odyssey that maintains the patient schedule database. The device defined in the Database Path parameter, above, is connected to this host.
Lookahead:	Number of days worth of schedule information to be maintained in the database. 0 means show patients scheduled for 'today' only. 1 means show patients scheduled for 'tomorrow' as well, etc.
For each destination:	
Port Number:	Port number on which to communicate with destination AE (Worklist SCP). The standard DICOM port is 104.
Calling AE Title:	The Odyssey Application Entity Title to use when opening an association with the destination AE.
Called AE Title:	Application Entity Title of destination AE.
Host name:	Host name of remote Worklist SCP.
Timeout	Max time (seconds) to wait for a response from the SCP before timing out.
Timer:	Defines the amount of time to wait before querying this destination AE again.

6 Support of Extended Character Sets

This implementation supports the ISO IR-100 character set.