

IQPACS IMAGE STORE

DICOM 3.0 Conformance Statement

Revision history

Revision	Date	Description	Author
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2	08-11-2005	Revised	S.C. Info World S.R.L.
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1. INTRODUCTION

1.1. Purpose of this document

This document describes the conformance to the DICOM standard, version 3 for the **IQPACS Image Store** application and follows the contents and structuring requirements of DICOM PS 3.2.

InfoWorld is continually improving and enhancing the functionalities of its products based on customer requirements. This document is updated as appropriate.

1.2. IQPACS Image Store overview

IQPACS is a completely DICOM compliant picture and archiving system intended for the radiology and imagistic departments. IQPACS connects to any type of modality, processes and stores DICOM images in long and short time archive.

The application is written in Java code and uses Microsoft SQL Server.

IQPACS Image Store is mainly intended for archiving the DICOM instances received from other DICOM nodes in the network (either modalities or other DICOM compliant applications). It handles short and long term archive storage. IQPACS Image Store is also responsible with auto-routing the images – routing the images based on rules made at the configuration level.

The application uses DICOM as the interface to the external world. The IQPACS Image Store initiates and accepts DICOM association requests for the purpose of storing images and for other purposes, described in the following sections of this document.

1.3. General acronyms, abbreviations and definitions

AE – Application Entity

DB – Database

DICOM – Digital Imaging and Communications in Medicine

DICOM node = other DICOM compliant application entities with which communication can be established

DICOMDIR – DICOM directory

DIMSE – DICOM Message Service Element

DIMSE-C – DICOM Message Service Element – Composite

DIMSE-N – DICOM Message Service Element – Normalized

ID – Identifier

IQPACS – InfoMediQ Picture Archiving and Communication System

MPPS – Modality Performed Procedure Step

PACS – Picture Archiving and Communication System

PDU – Protocol Data Unit

RIS – Radiology Information System

SCP – Service Class Provider

SCU – Service Class User

SOP – Service-Object Pair

TCP/IP – Transmission Control Protocol

Trusted node = see DICOM node

UID – Unique Identifier

1.4. Interoperability

This Conformance Statement and the DICOM standard do not guarantee interoperability of the IQPACS Image Store with other vendors' applications or equipment. The user must compare the relevant DICOM Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required.

1.5. References

American College of Radiology – National Electrical Manufacturers Association (ACR-NEMA) Digital Imaging and Communications in Medicine – DICOM v3.0

2. IMPLEMENTATION MODEL

IQPACS Image Store contains a single Application Entity that implements the Verification Service Class, the Storage Service Class, the Query/Retrieve Service Class, the Study Content Notification Service Class, the Storage Commitment Service Class and the Study Management Service Class as a Service Class User (SCU) and Service Class Provider (SCP), and the Patient Management Service Class as a Service Class Provider (SCP), and provides Media Storage capabilities.

IQPACS Image Store provides the following DICOM 3.0 functions:

- Verification of a link at the application level using the DICOM 3.0 verify service class as a SCP and SCU;
- Short and long term storage for images using the DICOM 3.0 Storage service class as a SCP;
- Sending images to other DICOM nodes in the network using the DICOM 3.0 Storage service class as a SCU;
- Retrieval/sending of data from or to other AE using the DICOM Query/Retrieve service class as a SCP and SCU;
- Sending/receiving patient and study related information using the Patient Management and Study Management Services
- Off-line archiving and backup capabilities for the studies using the DICOMDIR file format

2.1. Application data flow diagram

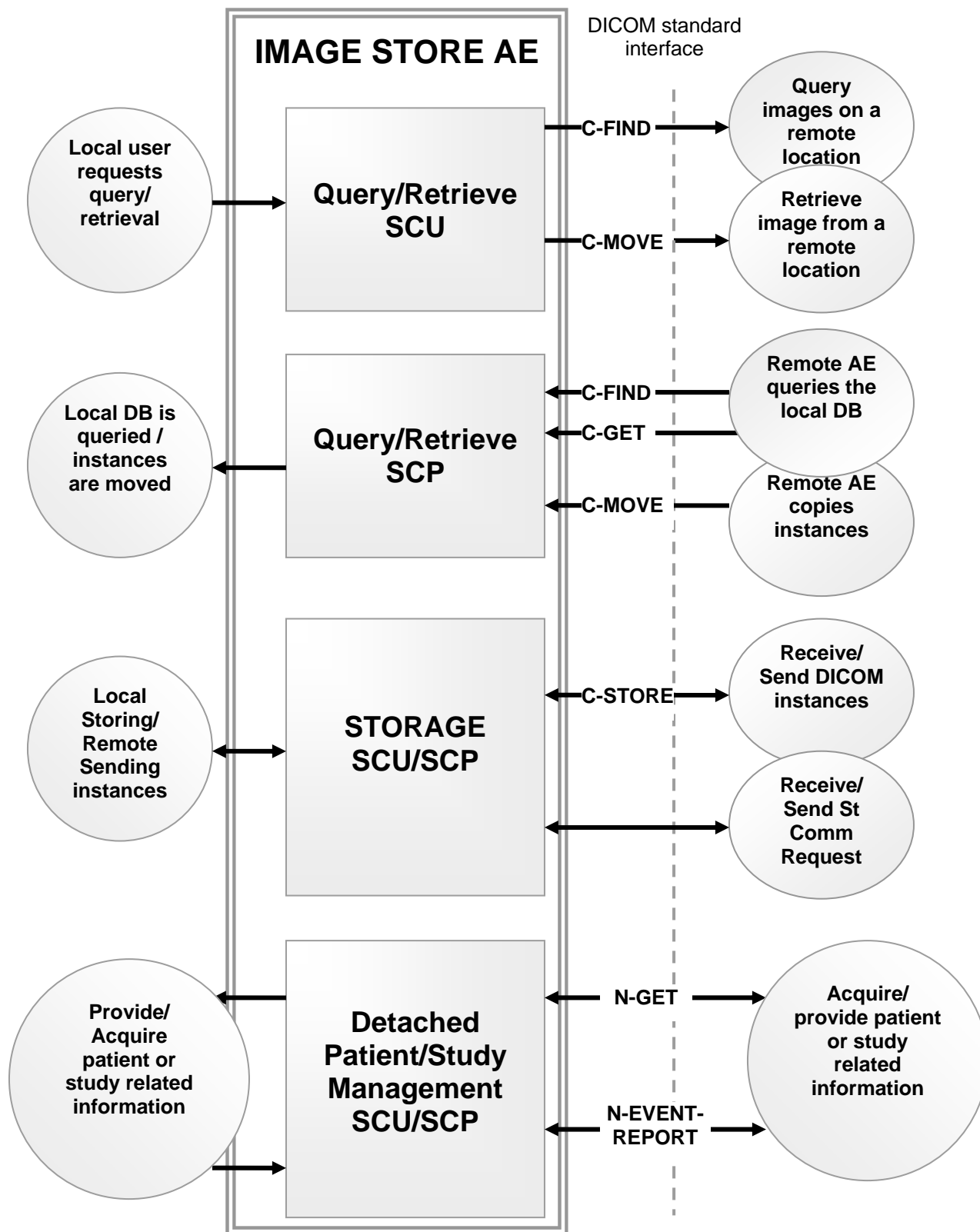


Figure 2.1. Application Data Flow Diagram

2.2. Functional definitions of the AE

The IQPACS Image Store is an application providing the data storage interface for the IQPACS clients or other vendor diagnosis applications. Each request will be handled by IQPACS Image Store as a unique thread.

IQPACS Image Store acts as a service class provider (SCP) in the following roles:

1. SCP for C-Echo operations to Verification service class users
2. SCP for C-Find operations to Query / Retrieve service class users
3. SCP for C-Move operations to Query / Retrieve service class users
4. SCP for C-Store operations to Storage service class users
5. SCP for N-Get and N-Event-Report operations to Patient (Study) Management service class users
6. SCP for C-Get operations to Query / Retrieve service class users

IQPACS Image Store acts as a service class user (SCU) in the following roles:

1. SCU of C-Echo operations from Verification service class providers
2. SCU of C-Find operations from Query / Retrieve service class providers
3. SCU of C-Move operations from Query / Retrieve service class providers
4. SCU of C-Store operations from Storage service class providers
5. SCU for N-Get and N-Event-Report operations from Patient (Study) Management service class providers

2.2.1. Verify – Verification SCU/SCP

In order to test a link to another DICOM AE, the IQPACS Image Store requests verification of communication using the C-ECHO request primitive. Upon receipt of the C-ECHO confirmation, the Image Store determines the verification is complete.

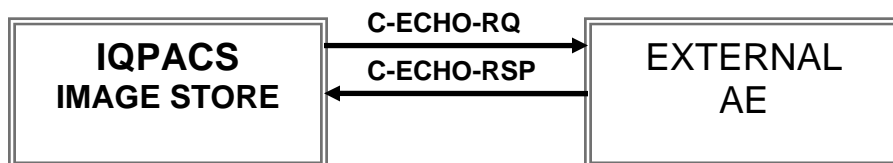


Figure 2.2. Verification SCU

When IQPACS Image Store receives a request to verify a current DICOM association (C-ECHO-RQ), it responds with the C-ECHO-RSP primitive.

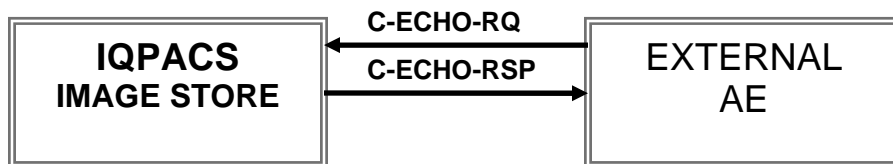


Figure 2.3. Verification SCP

2.2.2. Query an external AE – Query/Retrieve SCU

When the IQPACS Image Store queries an external database, it sends a C-FIND-RQ with the attributes to be matched. A list of the attributes used for matching can be found in the next chapter.

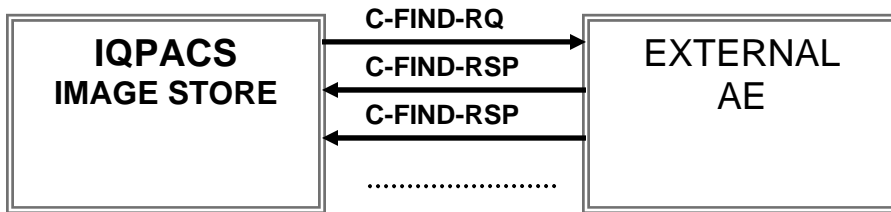


Figure 2.4. Query/Retrieve SCU

2.2.3. Query database – Query/Retrieve SCP

When the IQPACS Image Store receives a query request (C-FIND-RQ), the database is queried for matches using all the attributes supplied by the requesting application entity. The IQPACS Image Store searches its database and generates a C-FIND-RSP for each match. A list of the attributes used for matching can be found in the next chapter.

While IQPACS Image Store is performing the matching process, C-FIND operations can be interrupted by the calling AE through the use of C-CANCEL-RQ.

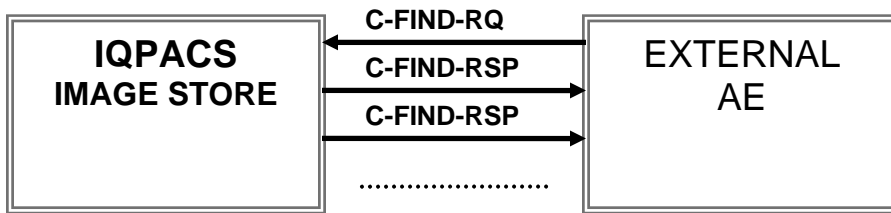


Figure 2.5. Query database

When the IQPACS Image Store receives a C-GET request, it identifies the SOP instances at the level of the retrieval and generates C-STORE sub-operations for the corresponding instances in the same association. The IQPACS Image Store also generates C-GET responses with a status of FF00 (Pending) while processing the C-STORE sub-operations. These C-GET responses indicate the number of remaining C-STORE sub-operations and the number of C-STORE sub-operations returning the status of Success, Warning, and Failed.

When the number of remaining C-STORE sub-operations reaches zero, IQPACS Image Store generates a final response with a status equal to Success, Warning, Failed, or Refused. This response indicates the number of C-STORE sub-operations returning the status of Success, Warning, and Failed. If the status of a C-STORE sub-operation was Failed a UID List will be returned.

The IQPACS Image Store may cancel the C-GET service by issuing a C-GET-CANCEL request at any time during the processing of the C-GET.

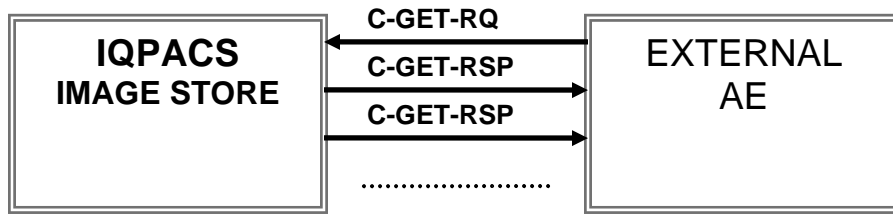


Figure 2.6. Query database – C-GET

2.2.4. Image transfer – STORAGE SCU

Storage SCU is responsible for transferring DICOM instances to external AEs. The C-STORE DIMSE-C Service is the mechanism used to transfer the instances.

The IQPACS Image Store acts as a Storage SCU either when it initiates a C-STORE-RQ, or when it receives a C-MOVE-RQ or C-GET-RQ (also acting as a SCP for C-MOVE / C-GET operations).

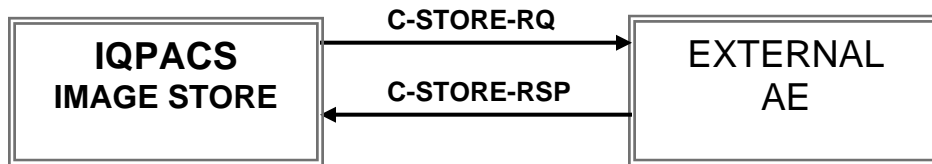


Figure 2.7. Image Transfer

When IQPACS Image Store receives an image move request (C-MOVE-RQ), the database is queried using the values that uniquely identify the instances. IQPACS Image Store initiates C-STORE operations through a separate association and transfers images corresponding to the values supplied in the move request.

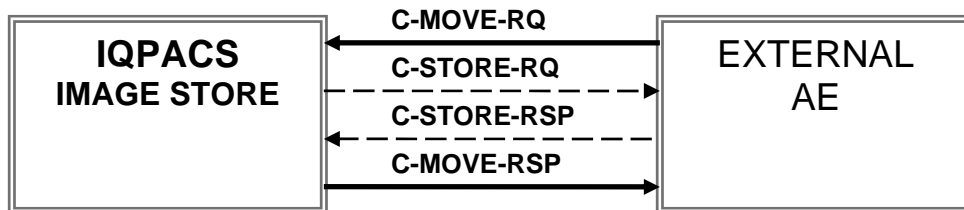


Figure 2.8. Image Transfer when a moving request received

When IQPACS Image Store receives a C-GET-RQ, the application will initiate C-STORE operations in the same association. It will not open a new association as when receiving a C-MOVE-RQ.

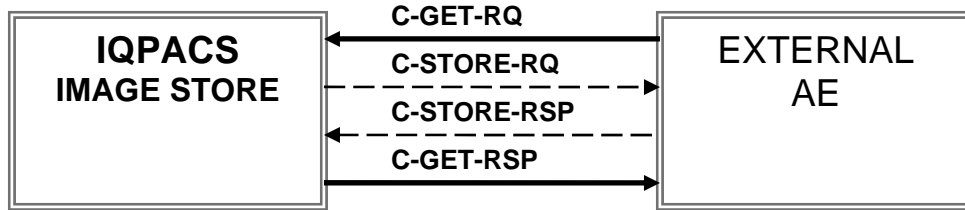


Figure 2.9. Image Transfer when a C-GET request received

2.2.5. Receiving and storing images – STORAGE SCP

When IQPACS Image Store receives a request to store images (C-STORE-RQ), the received image is stored in an on-line storage and image attributes are extracted and stored in the local database. All the received instances are copied from the on-line storage (which is on the local hard-disk) to the archive storage (which is on a couple of hard-disks with RAID controller) – either automatically or when receiving a StorageCommitment request, as specified at the configuration level. Only recently received or requested instances are stored in the on-line storage (for quick access purposes) and they are automatically removed considering some user defined removing policies. The location for storing the instances and the policies for removing the instances from the on-line storage are configurable.

The duration of the storage depends on the hardware resources allocated for storing the instances in every implementation. Instances saved in the archive storage can be removed only if they are saved in an off-line archive.

However, the Storage SCP does not guarantee that the data will be archived. The remote AE submitting data to the IQPACS Image Store should verify the data archiving commitment by sending a Storage Commitment Request – in a separate association. As long as the IQPACS Image Store is responsible for long term archiving of the instances, it implements the Storage Commitment Push Model SOP Class. If a specific DICOM node in the network is not able to send Storage Commitment request, the IQPACS Image Store can be configured to guarantee the instances archival.

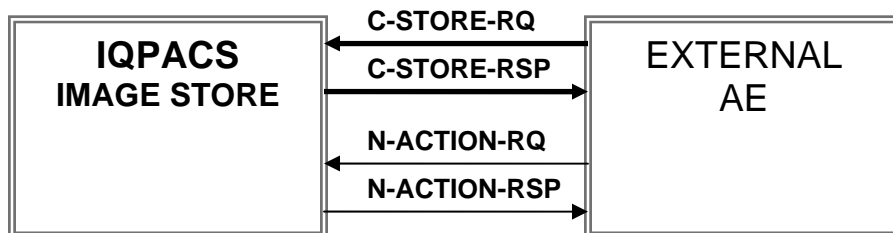


Figure 2.10. Receiving and storing images

2.3. Sequencing of Real-World Activities

Not applicable.

3. AE SPECIFICATIONS

3.1. SOP Classes

IQPACS Image Store Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
AmbulatoryECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.3
BasicTextSR	1.2.840.10008.5.1.4.1.1.88.11
BasicVoiceAudioWaveformStorage	1.2.840.10008.5.1.4.1.1.9.4.1
CardiacElectrophysiologyWaveformStorage	1.2.840.10008.5.1.4.1.1.9.3.1
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1
CTImageStorage	1.2.840.10008.5.1.4.1.1.2
DigitalIntraoralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3
DigitalIntraoralXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.3.1
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1
DigitalXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.1.1
EnhancedMRIImageStorage	1.2.840.10008.5.1.4.1.1.4.1
EnhancedSR	1.2.840.10008.5.1.4.1.1.88.22
GeneralECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.2
GrayscaleSoftcopyPresentationStateStorage	1.2.840.10008.5.1.4.1.1.11.1
HemodynamicWaveformStorage	1.2.840.10008.5.1.4.1.1.9.2.1
KeyObjectSelectionDocument	1.2.840.10008.5.1.4.1.1.88.59
MammographyCADSR	1.2.840.10008.5.1.4.1.1.88.50
MRIImageStorage	1.2.840.10008.5.1.4.1.1.4
MRSpectroscopyStorage	1.2.840.10008.5.1.4.1.1.4.2
MultiframeColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3
MultiframeSingleBitSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.1
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20
NuclearMedicineImageStorageRetired	1.2.840.10008.5.1.4.1.1.5
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128
RawDataStorage	1.2.840.10008.5.1.4.1.1.66
RTBeamsTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.4
RTBrachyTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.6
RTDoseStorage	1.2.840.10008.5.1.4.1.1.481.2
RTImageStorage	1.2.840.10008.5.1.4.1.1.481.1
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5
RTStructureSetStorage	1.2.840.10008.5.1.4.1.1.481.3
RTTreatmentSummaryRecordStorage	1.2.840.10008.5.1.4.1.1.481.7
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7
StandaloneCurveStorage	1.2.840.10008.5.1.4.1.1.9

StandaloneModalityLUTStorage	1.2.840.10008.5.1.4.1.1.10
StandaloneOverlayStorage	1.2.840.10008.5.1.4.1.1.8
StandalonePETCurveStorage	1.2.840.10008.5.1.4.1.1.129
StandaloneVOILUTStorage	1.2.840.10008.5.1.4.1.1.11
TwelveLeadECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.1
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1
UltrasoundImageStorageRetired	1.2.840.10008.5.1.4.1.1.6
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1
UltrasoundMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.3
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1
VImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.1
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2
VLMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.2
VLPhotographicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.4
VLSlideCoordinatesMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.3
XRyAngiographicBiPlaneImageStorageRetired	1.2.840.10008.5.1.4.1.1.12.3
XRyAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1
XRyRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2
PatientRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.1.1
StudyRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.2.1
PatientStudyOnlyQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.3.1
PatientRootQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.1.2
StudyRootQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.2.2
PatientStudyOnlyQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.3.2
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1
DetachedResultManagement	1.2.840.10008.3.1.2.5.1
DetachedInterpretationManagement	1.2.840.10008.3.1.2.6.1
ModalityPerformedProcedureStep	1.2.840.10008.3.1.2.3.3
BasicStudyContent Notification	1.2.840.10008.1.9
StorageCommitmentPushModel	1.2.840.10008.1.20.1

Table 3.1. Supported SOP Classes in the SCU role

And to the following DICOM V3.0 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
AmbulatoryECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.3
BasicTextSR	1.2.840.10008.5.1.4.1.1.88.11
BasicVoiceAudioWaveformStorage	1.2.840.10008.5.1.4.1.1.9.4.1
CardiacElectrophysiologyWaveformStorage	1.2.840.10008.5.1.4.1.1.9.3.1
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1
CTImageStorage	1.2.840.10008.5.1.4.1.1.2
DigitalIntraoralXRyImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3

DigitalIntraoralXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.3.1
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1
DigitalXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.1.1
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1
EnhancedSR	1.2.840.10008.5.1.4.1.1.88.22
GeneralECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.2
GrayscaleSoftcopyPresentationStateStorage	1.2.840.10008.5.1.4.1.1.11.1
HemodynamicWaveformStorage	1.2.840.10008.5.1.4.1.1.9.2.1
KeyObjectSelectionDocument	1.2.840.10008.5.1.4.1.1.88.59
MammographyCADSR	1.2.840.10008.5.1.4.1.1.88.50
MRImageStorage	1.2.840.10008.5.1.4.1.1.4
MRSpectroscopyStorage	1.2.840.10008.5.1.4.1.1.4.2
MultiframeColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3
MultiframeSingleBitSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.1
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20
NuclearMedicineImageStorageRetired	1.2.840.10008.5.1.4.1.1.5
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128
RawDataStorage	1.2.840.10008.5.1.4.1.1.66
RTBeamsTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.4
RTBrachyTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.6
RTDoseStorage	1.2.840.10008.5.1.4.1.1.481.2
RTImageStorage	1.2.840.10008.5.1.4.1.1.481.1
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5
RTStructureSetStorage	1.2.840.10008.5.1.4.1.1.481.3
RTTreatmentSummaryRecordStorage	1.2.840.10008.5.1.4.1.1.481.7
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7
StandaloneCurveStorage	1.2.840.10008.5.1.4.1.1.9
StandaloneModalityLUTStorage	1.2.840.10008.5.1.4.1.1.10
StandaloneOverlayStorage	1.2.840.10008.5.1.4.1.1.8
StandalonePETCurveStorage	1.2.840.10008.5.1.4.1.1.129
StandaloneVOILUTStorage	1.2.840.10008.5.1.4.1.1.11
TwelveLeadECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.1
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1
UltrasoundImageStorageRetired	1.2.840.10008.5.1.4.1.1.6
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1
UltrasoundMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.3
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1
VImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.1
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2
VLMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.2
VLP photographicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.4
VLSlideCoordinatesMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.3
XRayAngiographicBiPlaneImageStorageRetired	1.2.840.10008.5.1.4.1.1.12.3
XRayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1
XRayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2
PatientRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.1.1
StudyRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.2.1

PatientStudyOnlyQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.3.1
PatientRootQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.1.3
StudyRootQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.2.3
PatientStudyOnlyQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.3.3
PatientRootQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.1.2
StudyRootQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.2.2
PatientStudyOnlyQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.3.2
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1
DetachedResultManagement	1.2.840.10008.3.1.2.5.1
DetachedInterpretationManagement	1.2.840.10008.3.1.2.6.1
ModalityPerformedProcedureStep	1.2.840.10008.3.1.2.3.3
BasicStudyContent Notification	1.2.840.10008.1.9
StorageCommitmentPushModel	1.2.840.10008.1.20.1

Table 3.2. Supported SOP Classes in the SCP role

3.2. Association Establishment Policies

3.2.1 General

All associations with IQPACS Image Store are established using the DICOM 3.0 Standard application context. All the parameters regarding association initiation or acceptance can be modified at the configuration level. These parameters are:

- the connection timeout
- the acceptance timeout (with a default value of 5000 ms)
- the dimes timeout
- the maximum length Protocol Data Unit (with a default value of 16352 bytes)
- the maximum number of operations invoked (with a default value of 500)
- the close delay (with a default value of 5000 ms)

3.2.2 Number of Associations

The number of permitted associations can be set at the configuration level in an interval between 1 and unlimited, depending on the available resources.

3.2.3 Asynchronous Nature

Not supported.

3.3. Association Initiation Policy

The IQPACS Image Store initiates associations for:

- testing a trusted node
- query another DICOM node
- image acquisition from another DICOM node
- auto-routing DICOM instances
- Modality Performed Procedure Step auto-routing
- get/notify detached information
- notify another DICOM Node the contents and source location of a study

3.3.1. Real World Activity: Request to verify a trusted node

3.3.1.1. Associated Real World Activity

The IQPACS Image Store initiates an association to verify application level communication with a peer DICOM application entity.

This request is performed using the C-ECHO request primitive. The remote DICOM AE, supporting the Verification SOP Class SCP role, issues a C-ECHO response primitive. Upon receipt of the C-ECHO confirmation, the SCU determines that verification is complete.

3.3.1.2 Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No

Table 3.3. Presentation Contexts to verify a DICOM association

3.3.2. Real World Activity: Request to query a DICOM node

3.3.2.1. Associated real-world activity

The IQPACS Image Store queries an external application entity against matching the attributes supplied in the query request. A list of the supported optional keys is listed in the table below. The list contains only the attributes in the C-FIND request.

The level of the query	Optional Key	Tags
Patient level	Patient ID	(0010,0020)
	Patient First Name	(0010,0010)
	Patient Last Name	(0010,0010)
	Patient Birth Date	(0010,0030)
	Patient Birth Name	(0010,0032)
Study level	Modalities In Study	(0008,0061)
	Study Status ID	(0032,000A)
	Study Arrival Date	(0008,0020)
	Name Of Physician Reading Study	(0008,1060)
	Requesting Physician	(0032,1032)

	Interpretation Diagnoses Code	(4008,0117)
	Accession Number	(0008,0050)
	Study Priority	(0032,000C)
Series level	Performing Physician Name	(0008,1050)
	Modality	(0008,0060)

Table 3.4. Optional Keys supported

3.3.2.2. Presentation Contexts

The presentation context shown in the following table is used for querying an external DICOM node:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
PatientRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.1.1	Case 1*	SCU	No
StudyRootQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.2.1	Case 1*	SCU	No
PatientStudyOnlyQueryRetrieveInformationModelFIND	1.2.840.10008.5.1.4.1.2.3.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.5. Presentation Contexts to query a DICOM node

3.3.3 Real World Activity: Request to move instances

3.3.3.1. Associated real world activity

The IQPACS Image Store requests the moving of some specified instances to a specified destination.

3.3.3.2. Presentation context

The presentation context shown in the following table is used for retrieval request:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
PatientRootQueryRetrieveInformationModel MOVE	1.2.840.10008.5.1.4.1.2.1.2	Case 2*	SCU	No
StudyRootQueryRetrieveInformationModelMOVE	1.2.840.10008.5.1.4.1.2.2.2	Case 2*	SCU	No
PatientStudyOnlyQueryRetrieveInformationModel MOVE	1.2.840.10008.5.1.4.1.2.3.2	Case 2*	SCU	No

*Note: Case 2 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.6. Presentation contexts to move instances

3.3.4. Real World Activity: Request to Transfer Images (copy images, auto-route images)

3.3.4.1 Associated Real World Activity

The IQPACS Image Store initiates C-STORE requests when selecting instances from the local database and copying them to an external Storage SCP AE. The Storage SCU invokes a C-STORE DIMSE Service with every instance to be sent. If a successful C-STORE response is received for the C-STORE request initiated by the Storage SCU this means that the instance has been stored and a new C-STORE-RQ can be initiated for the next instance. If a failed C-STORE response is received, this won't imply any further action from the Storage SCU as long as the Storage service class does not guarantee that the data will be archived. After a failed C-STORE response for one instance the Storage SCU will proceed with a new C-STORE-RQ for the next instance.

IQPACS Image Store can also initiate an association to transfer images either as a result of a C-MOVE request or when auto-routing rules are defined at the configuration level. The auto-routing rules are verified after each instance is received. If all attributes defined in the rules match the attributes of the incoming instance, the application entity will initiate an association to transfer the image to other DICOM application entity.

3.3.4.2 Presentation Contexts

The presentation context shown in the following table is used for transfer request:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
AmbulatoryECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.3	Case 1*	SCU	No
BasicTextSR	1.2.840.10008.5.1.4.1.1.88.11	Case 1*	SCU	No
BasicVoiceAudioWaveformStorage	1.2.840.10008.5.1.4.1.1.9.4.1	Case 1*	SCU	No
CardiacElectrophysiologyWaveformStorage	1.2.840.10008.5.1.4.1.1.9.3.1	Case 1*	SCU	No
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33	Case 1*	SCU	No
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	Case 2*	SCU	No
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	Case 2*	SCU	No
DigitalIntraoralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	Case 2*	SCU	No
DigitalIntraoralXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.3.1	Case 2*	SCU	No
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	Case 2*	SCU	No
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	Case 2*	SCU	No
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	Case 2*	SCU	No
DigitalXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.1.1	Case 2*	SCU	No
EnhancedMRIImageStorage	1.2.840.10008.5.1.4.1.1.4.1	Case 2*	SCU	No
EnhancedSR	1.2.840.10008.5.1.4.1.1.88.22	Case 1*	SCU	No
GeneralECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.2	Case 1*	SCU	No
GrayscaleSoftcopyPresentationStateStorage	1.2.840.10008.5.1.4.1.1.11.1	Case 1*	SCU	No

HemodynamicWaveformStorage	1.2.840.10008.5.1.4.1.1.9.2.1	Case 1*	SCU	No
KeyObjectSelectionDocument	1.2.840.10008.5.1.4.1.1.88.59	Case 1*	SCU	No
MammographyCADSR	1.2.840.10008.5.1.4.1.1.88.50	Case 1*	SCU	No
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	Case 2*	SCU	No
MRSpectroscopyStorage	1.2.840.10008.5.1.4.1.1.4.2	Case 2*	SCU	No
MultiframeColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	Case 2*	SCU	No
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2	Case 2*	SCU	No
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	Case 2*	SCU	No
MultiframeSingleBitSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.1	Case 2*	SCU	No
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	Case 2*	SCU	No
NuclearMedicineImageStorageRetired	1.2.840.10008.5.1.4.1.1.5	Case 2*	SCU	No
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	Case 2*	SCU	No
RawDataStorage	1.2.840.10008.5.1.4.1.1.66	Case 1*	SCU	No
RTBeamsTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.4	Case 1*	SCU	No
RTBrachyTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.6	Case 1*	SCU	No
RTDoseStorage	1.2.840.10008.5.1.4.1.1.481.2	Case 1*	SCU	No
RTImageStorage	1.2.840.10008.5.1.4.1.1.481.1	Case 2*	SCU	No
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	Case 1*	SCU	No
RTStructureSetStorage	1.2.840.10008.5.1.4.1.1.481.3	Case 1*	SCU	No
RTTreatmentSummaryRecordStorage	1.2.840.10008.5.1.4.1.1.481.7	Case 1*	SCU	No
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	Case 2*	SCU	No
StandaloneCurveStorage	1.2.840.10008.5.1.4.1.1.9	Case 1*	SCU	No
StandaloneModalityLUTStorage	1.2.840.10008.5.1.4.1.1.10	Case 1*	SCU	No
StandaloneOverlayStorage	1.2.840.10008.5.1.4.1.1.8	Case 2*	SCU	No
StandalonePETCurveStorage	1.2.840.10008.5.1.4.1.1.129	Case 1*	SCU	No
StandaloneVOILUTStorage	1.2.840.10008.5.1.4.1.1.11	Case 1*	SCU	No
TwelveLeadECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.1	Case 1*	SCU	No
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	Case 2*	SCU	No
UltrasoundImageStorageRetired	1.2.840.10008.5.1.4.1.1.6	Case 2*	SCU	No
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	Case 2*	SCU	No
UltrasoundMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.3	Case 2*	SCU	No
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	Case 2*	SCU	No
VLImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.1	Case 2*	SCU	No
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	Case 2*	SCU	No
VLMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.2	Case 2*	SCU	No

VLPhotographicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.4	Case 2*	SCU	No
VLSlideCoordinatesMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.3	Case 2*	SCU	No
XRayAngiographicBiPlaneImageStorageRetired	1.2.840.10008.5.1.4.1.1.12.3	Case 2*	SCU	No
XrayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	Case 2*	SCU	No
XrayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	Case 2*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

*Note: Case 2 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.7. Presentation contexts to transfer instances

3.3.5. Real world activity: Receive notifications – patient/study

3.3.5.1. Associated Real World Activity

IQPACS Image Store is able to receive an unsolicited notification of a change in the Detached Patient Management SOP Instance, Detached Visit Management SOP Instance or Detached Study Management SOP Instance, using the N-EVENT-REPORT service.

The attributes that the IQPACS Image Store will be able to interpret as a SCU are shown in the following tables:

Attribute	Tag
Specific Character Set	(0008,0005)
Instance Creation Date	(0008,0012)
Instance Creation Time	(0008,0013)
Instance Creator UID	(0008,0014)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Issuer Of Patient ID	(0010,0021)
Other Patient IDs	(0010,1000)
Other Patient Names	(0010,1001)
Birth Name	(0010,1005)
Mother Birth Name	(0010,1060)
Medical Record Locator	(0010,1090)
Occupation	(0010,2180)
Birth Date	(0010,0030)
Birth Time	(0010,0032)
Sex	(0010,0040)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Address	(0010,1040)
Military Rank	(0010,1080)
Branch Of Service	(0010,1081)
Country Residence	(0010,2150)
Region Residence	(0010,2152)
Telephone Numbers	(0010,2154)
Ethnic Group	(0010,2160)

Religious Preference	(0010,21F0)
Comments	(0010,4000)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Smoking Status	(0010,21A0)
Patient History	(0010,21B0)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Special Needs	(0038,0050)
Patient State	(0038,0500)

Table 3.8. Patient notification event information

Event Type Name	Attribute	Tag
Visit Created	Specific Character	(0008,0005)
	Instance Creation Date	(0008,0012)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Instance Creation Time	(0008,0013)
	Instance Creator UID	(0008,0014)
	Admission ID	(0038,0010)
	All other defined Attributes	
Visit Scheduled	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Scheduled Admission Date	(0038,001A)
	Scheduled Admission Time	(0038,001B)
	Scheduled Patient Institution Residence	(0038,001E)
	Specific Character	(0008,0005)
Patient Admitted	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Admitting Date	(0038,0020)
	Visit Status ID	(0038,0008)
	Referring Physician's Name	(0008,0090)
	Route of Admissions	(0038,0016)
	Admitting	(0038,0021)
Patient Transferred	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Current Patient Location	(0038,0300)
	Patient's Institution Residence	(0038,0400)
	Referenced Patient	(0008,1120)
Patient Discharged	>Referenced SOP Class UID -/1C	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)

	Discharge Time	(0038,0032)
	Discharge Date	(0038,0030)
Visit Deleted	Admission ID	(0038,0010)
Visit Updated	All	

Table 3.9. Visit notification event information

Attribute	Tag
Study Instance UID	(0020,000D)
Accession Number	(0008,0050)
Study ID	(0020,0010)
Study ID Issuer	(0032,0012)
Other Study Numbers	(0020,1070)
Study Status ID	(0032,000A)
Study Priority ID	(0032,000C)
Study Comments	(0032,4000)
Scheduled Start Date	(0032,1000)
Scheduled Start Time	(0032,1001)
Scheduled Stop Date	(0032,1010)
Scheduled Stop Time	(0032,1011)
Scheduled Location	(0032,1020)
Scheduled Location ATitle	(0032,1021)
Reason For Study	(0032,1030)
Requesting Physician	(0032,1032)
Requesting Service	(0032,1033)
Requested Procedure Description	(0032,1060)
Requested Contrast Agent	(0032,1070)
Study Arrival Date	(0032,1040)
Study Arrival Time	(0032,1041)
Study Date	(0008,0020)
Study Time	(0008,0030)
Study Completion Date	(0032,1050)
Study Completion Time	(0032,1051)
Study Verified Date	(0032,0032)
Study Verified Time	(0032,0033)
Modalities In Study	(0008,0061)
Series In Study	(0020,1000)
Acquisitions In Study	(0020,1004)
Name Physician Reading	(0008,1060)
Study Read Date	(0032,0034)
Study Read Time	(0032,0035)
Referenced Visit Sequence	(0008,1125)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Patient Sequence	(0008,1120)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Results Sequence	(0008,1100)
Referenced Performed Procedure Step Sequence	(0008,1111)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Requested Procedure Code Sequence	(0032,1064)
>Code Value	(0008,0100)

>Coding Scheme Designator	(0008,0102)
>Coding Scheme Version	(0008,0103)
>Code Meaning	(0008,0104)
Instance Creation Time	(0008,0013)
Instance Creator UID	(0008,0014)
Specific Character Set	(0008,0005)

Table 3.10. Study notification event information

3.3.5.2. Presentation Contexts

The presentation context used for receiving notifications is presented in the following table:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1	Case 1*	SCU	No
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1	Case 1*	SCU	No
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.11. Presentation contexts to receive notifications

3.3.6. Real world activity: Obtain information – patient/study

3.3.6.1. Associated Real World Activity

The IQPACS Image Store can be configured so that when receiving a new patient/visit/study to get information from the RIS, using N-GET Detached Patient Management N-GET Detached Visit Management or N-GET Detached Study Management service.

The attributes that the IQPACS Image Store will be able to interpret as a SCU are shown in the following tables:

Attribute	Tag
Specific Character Set	(0008,0005)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Visit Sequence	(0008,1125)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Birth Time	(0010,0032)
Patient's Sex	(0010,0040)
Issuer Of Patient ID	(0010,0021)
Other Patient IDs	(0010,1000)

Other Patient Names	(0010,1001)
Birth Name	(0010,1005)
Mother Birth Name	(0010,1060)
Medical Record Locator	(0010,1090)
Occupation	(0010,2180)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Address	(0010,1040)
Military Rank	(0010,1080)
Branch Of Service	(0010,1081)
Country Residence	(0010,2150)
Region Residence	(0010,2152)
Telephone Numbers	(0010,2154)
Ethnic Group	(0010,2160)
Religious Preference	(0010,21F0)
Comments	(0010,4000)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Smoking Status	(0010,21A0)
Patient History	(0010,21B0)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Special Needs	(0038,0050)
Patient State	(0038,0500)

Table 3.12. Detached Management SOP Class N-GET Attributes – patient

Attribute	Tag
Specific Character Set	(0008,0005)
Referenced Patient Sequence	(0008,1120)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referring Physician's Name	(0008,0090)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
All other Attributes 3	

Table 3.13. Detached Management SOP Class N-GET Attributes – visit

Attribute	Tag
Specific Character Set	(0008,0005)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Visit Sequence	(0008,1125)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)

Patient's Birth Time	(0010,0032)
Patient's Sex	(0010,0040)
Issuer Of Patient ID	(0010,0021)
Other Patient IDs	(0010,1000)
Other Patient Names	(0010,1001)
Birth Name	(0010,1005)
Mother Birth Name	(0010,1060)
Medical Record Locator	(0010,1090)
Occupation	(0010,2180)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Address	(0010,1040)
Military Rank	(0010,1080)
Branch Of Service	(0010,1081)
Country Residence	(0010,2150)
Region Residence	(0010,2152)
Telephone Numbers	(0010,2154)
Ethnic Group	(0010,2160)
Religious Preference	(0010,21F0)
Comments	(0010,4000)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Smoking Status	(0010,21A0)
Patient History	(0010,21B0)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Special Needs	(0038,0050)
Patient State	(0038,0500)

Table 3.14. Detached Management SOP Class N-GET Attributes - study

3.3.6.2. Presentation Contexts

The presentation context used for getting patient or study related information is presented in the following table:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1	Case 1*	SCU	No
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1	Case 1*	SCU	No
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.15. Presentation contexts to obtain information

3.3.7. Real World Activity: Notify to another DICOM Node the existence, contents and source location of the images in a Study.

3.3.7.1. Associated real world activity

The IQPACS Image Store is capable of issuing Basic Study Content Notification, invoked using the DIMSE C-STORE request in order to notify RIS (or other DICOM nodes) the content of a study.

When the content of a study is modified (the number of studies or images in the study is modified), a Basic Study Content Notification message is sent to the RIS node in order to announce the study content. Using this message the Retrieve Application Entity Title is filled with the IQPACS Image Store AETitle.

The transmitted information is presented in the following table:

Attribute	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Study ID	(0020,0010)
Study Instance UID	(0020,000D)
Referenced Series Sequence	(0008,1115)
>Series Instance UID	(0020,000E)
>Retrieve AE Title	(0008,0054)
>Modality	(0008,0060)
>Referenced Image Sequence	(0008,1140)
>>Referenced SOP Class UID	(0008,1150)
>>Reference SOP Instance UID	(0008,1155)
>>Retrieve AE	(0008,0054)

Table 3.16. Basic Study Content Notification attributes

3.3.7.2. Presentation Contexts

The presentation context shown in the following table is used for Basic Study Content Notification

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
Basic Study Content Notification	1.2.840.10008.1.9	Case 1*	SCU	No

Table 3.17. Presentation contexts to notify the existence, contents and source location of the images in a Study

3.3.8. Real World Activity: Modality Performed Procedure Step forward

3.3.8.1. Associated Real World Activity

The IQPACS Image Store acts as a MPPS SCU when it forwards (based on auto-routing rules configured by the PACS administrator) MPPS N-CREATE or MPPS N-SET messages. In these cases, the IQPACS Image Store acts as he creates an instance of the Modality Performed Procedure Step SOP Class or provide information about a specific real-world Performed Procedure Step.

The attributes that the IQPACS Image Store will be able to interpret as a SCU are shown in the following tables. As the IQPACS Image Store acts as a SCU for N-CREATE and N-SET MPPS only when forwarding these types of messages, the messages and all the attributes will be

forwarded as they are received, with no modifications. Therefore, all the attributes specified in the DICOM specifications are supported.

Description	Tag	N-CREATE	N-SET
Specific Character Set	(0008,0005)	Yes	No
Performed Procedure Step Relationship			
Scheduled Step Attribute Sequence	(0040,0270)	Yes	No
>Study Instance UID	(0020,000D)	Yes	No
>Referenced Study Sequence	(0008,1110)	Yes	No
>>Referenced SOP Class UID	(0008,1150)	Yes	No
>>Referenced SOP Instance UID	(0008,1155)	Yes	No
>Accession Number	(0008,0050)	Yes	No
>Placer Order Number/Imaging Service Request	(0040,2016)	Yes	No
>Filler Order Number/Imaging Service Request	(0040,2017)	Yes	No
>Requested Procedure ID	(0040,1001)	Yes	No
>Requested Procedure Description	(0032,1060)	Yes	No
>Scheduled Procedure Step ID	(0040,0009)	Yes	No
>Scheduled Procedure Step Description	(0040,0007)	Yes	No
>Scheduled Protocol Code Sequence	(0040,0008)	Yes	No
>>Code Value	(0008,0100)	Yes	No
>>Coding Scheme designator	(0008,0102)	Yes	No
>>Coding Scheme Version	(0008,0103)	Yes	No
>>Code Meaning	(0008,0104)	Yes	No
>>All other Attributes from Scheduled Protocol Code Sequence		Yes	No
Patient's Name	(0010,0010)	Yes	No
Patient ID	(0010,0020)	Yes	No
Patient's Birth Date	(0010,0030)	Yes	No
Patient's Sex	(0010,0040)	Yes	No
Referenced Patient Sequence	(0008,1120)	Yes	No
>Referenced SOP Class UID	(0008,1150)	Yes	No
>Referenced Instance UID	(0008,1155)	Yes	No
Performed Procedure Step Information			
Performed Procedure Step ID	(0040,0253)	Yes	No
Performed Station AE Title	(0040,0241)	Yes	No
Performed Station Name	(0040,0242)	Yes	No
Performed Location	(0040,0243)	Yes	No
Performed Procedure Step Start Date	(0040,0244)	Yes	No
Performed Procedure Step Start Time	(0040,0245)	Yes	No
Performed Procedure Step Status	(0040,0252)	Yes	Yes
Performed Procedure Step Description	(0040,0254)	Yes	Yes
Performed Procedure Type Description	(0040,0255)	Yes	Yes
Procedure Code Sequence	(0008,1032)	Yes	Yes

>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
Performed Procedure Step End Date	(0040,0250)	Yes	Yes
Performed Procedure Step End Time	(0040,0251)	Yes	Yes
Comments on the Performed ProcedureStep	(0040,0280)	Yes	Yes
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	Yes	Yes
>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
Image Acquisition Results			
Modality	(0008,0060)	Yes	No
Study ID	(0020,0010)	Yes	No
Performed Protocol Code Sequence	(0040,0260)	Yes	Yes
>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
>All other Attributes from Performed Protocol Code Sequence		Yes	No
Performed Series Sequence	(0040,0340)	Yes	Yes
>Performing Physician's Name	(0008,1050)	Yes	Yes
>Protocol Name	(0018,1030)	Yes	Yes
>Operator's Name	(0008,1070)	Yes	Yes
>Series Instance UID	(0020,000E)	Yes	Yes
>Series Description	(0008,103E)	Yes	Yes
>Retrieve AE Title 2C/2	(0008,0054)	Yes	Yes
>Referenced Image Sequence	(0008,1140)	Yes	Yes
>>Referenced SOP Class UID	(0008,1150)	Yes	Yes
>>Referenced SOP Instance UID	(0008,1155)	Yes	Yes
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	Yes	Yes
>>Referenced SOP Class UID	(0008,1150)	Yes	Yes
>>Referenced SOP Instance UID	(0008,1155)	Yes	Yes
>All other attributes from Performed Series Sequence		Yes	Yes
All other attributes from Radiation Dose Module and Billing and Material Code Module		Yes	Yes

Table 3.18. MPPS Attributes

3.3.8.2. Presentation Contexts

The presentation context used is presented in the following table:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.19. Presentation contexts for MPPS

3.4. Association Acceptance Policy

The associations that can be accepted by the IQPACS Image Store can be established at the configuration level. The Image Store is able to accept associations in the following situations:

- for storing instances received from modalities or other DICOM nodes (C-STORE)
- Interrogation (C-FIND)
- Request to move instances (C-MOVE)
- MPPS notifications
- Study Content Notifications
- Provide detached patient/study information/notification
- C-GET requests

At the configuration level, these services can be denied by the system administrator if this is considered to be necessary.

3.4.1. Real World Activity: Respond to Verification Request

3.4.1.1 Associated Real World Activity

When IQPACS Image Store receives a request to verify a current DICOM association (C-ECHO-RQ), it responds with the C-ECHO-RSP primitive.

3.4.1.2 Presentation Contexts

The presentation context used for verification is presented in the following table:

Abstract Syntax		Transfer Syntax		Role	Extended negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No

Table 3.20. Presentation contexts to verification request

3.4.2. Real World Activity: Respond to Query Database Request

3.4.2.1 Associated Real World Activity

When queried by an external application entity, the IQPACS Image Store is able to perform matching for the attributes in the table below, contained in the Identifier of a C-FIND request.

The level of the query	Optional Key	Comments	Tags	
Patient level	PatientBirthDate		(0010,0030)	
	PatientBirthTime		(0010,0032)	
	PatientSex		(0010,0040)	
	IssuerOfPatientID		(0010,0021)	
	OtherPatientIDs		(0010,1000)	
	OtherPatientNames		(0010,1001)	
	PatientBirthName		(0010,1005)	
	PatientMotherBirthName		(0010,1060)	
	MedicalRecordLocator		(0010,1090)	
	Occupation		(0010,2180)	
	ConfidentialityPatientData		(0040,3001)	
	PatientSize		(0010,1020)	
	PatientWeight		(0010,1030)	
	PatientAddress		(0010,1040)	
	MilitaryRank		(0010,1080)	
	BranchOfService		(0010,1081)	
	CountryOfResidence		(0010,2150)	
	PatientPhoneNumbers		(0010,2154)	
	EthnicGroup		(0010,2160)	
	PatientReligiousPreference		(0010,21F0)	
	PatientComments		(0010,4000)	
	MedicalAlerts		(0010,2000)	
	ContrastAllergies		(0010,2110)	
	SmokingStatus		(0010,21A0)	
	AdditionalPatientHistory		(0010,21B0)	
	PregnancyStatus		(0010,21C0)	
	LastMenstrualDate		(0010,21D0)	
	SpecialNeeds		(0038,0050)	
	PatientState		(0038,0500)	
	InstanceCreationDate		(0008,0012)	
	InstanceCreationTime		(0008,0013)	
	Study level	StudyDescription		(0008,1030)
		ModalitiesInStudy		(0008,0061)
StudyStatusID			(0032,000A)	
StudyPriorityID			(0032,000C)	
StudyComments			(0032,4000)	
StudyArrivalDate			(0032,1040)	
StudyArrivalTime			(0032,1041)	
StudyCompletionDate			(0032,1050)	
StudyCompletionTime			(0032,1051)	
StudyVerifiedDate			(0032,0032)	
StudyVerifiedTime			(0032,0033)	
SeriesInStudy			(0020,1000)	
AcquisitionsInStudy			(0020,1001)	
StudyIDIssuer			(0032,0012)	
OtherStudyNumbers			(0020,1070)	
NameOfPhysicianReadingStudy			(0008,1060)	
StudyReadDate			(0032,0034)	
StudyReadTime			(0032,0035)	

	ScheduledStudyStartDate		(0032,1000)
	ScheduledStudyStartTime		(0032,1001)
	ScheduledStudyStopDate		(0032,1010)
	ScheduledStudyStopTime		(0032,1011)
	ScheduledStudyLocation		(0032,1020)
	ScheduledStudyLocationAET		(0032,1021)
	ReasonforStudy		(0032,1030)
	RequestingPhysician		(0032,1032)
	RequestingService		(0032,1033)
	RequestedProcedureDescription		(0032,1060)
	RequestedContrastAgent		(0032,1070)
	InterpretationAuthor		(4008,010C)
	InterpretationDiagnosesCode		(4008,0117)
	InterpretationStatusID		(4008,0212)
	ObservationDateTime	match only	(0040,A032)
	ConceptNameCodeSq	match only	(0040,A043)
Series level	SeriesDate		(0008,0021)
	SeriesTime		(0008,0031)
	SeriesDescription		(0008,103E)
	Laterality		(0020,0060)
	BodyPartExamined		(0018,0015)
	PatientPosition		(0018,5100)
	PPSStartDate		(0040,0244)
	PPSStartTime		(0040,0245)
	Manufacturer		(0008,0070)
	StationName		(0008,1010)
	ManufacturerModelName		(0008,1090)
	PerformingPhysicianName		(0008,1050)
	OperatorName		(0008,1070)
	SeriesCommentsRetired		
Image (Instance) level	PatientOrientation		(0020,0020)
	ImageType		(0008,0008)
	AcquisitionNumber		(0020,0012)
	AcquisitionDate		(0008,0022)
	AcquisitionTime		(0008,0032)
	OverlayNumber		(0020,0022)
	CurveNumber		(0020,0024)
	LUTNumber		(0020,0026)
	ContentDate		(0008,0023)
	ContentTime		(0008,0033)
	Rows		(0028,0010)
	Columns		(0028,0011)
	BitsAllocated		(0028,0100)
	NumberOfFrames		(0028,0008)
	PresentationLabel		(0070,0080)
	PresentationDescription		(0070,0081)
	PresentationCreationDate		(0070,0082)
	PresentationCreationTime		(0070,0083)
	PresentationCreatorName		(0070,0084)
	CompletionFlag		(0040,A491)
	CompletionFlagDescription		(0040,A492)
	VerificationFlag		(0040,A493)
	ObservationDateTime		(0040,A032)

	ConceptNameCodeSq	match only	(0040,A043)
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Table 3.21. Optional Keys supported

Note: “Match only” means that the specified attribute will not be returned in a C-FIND response, only the matching will be verified for that attribute.

3.4.2.2. Presentation Context

The presentation context shown in the following table is used when IQPACS Image Store is queried by an external DICOM node:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
PatientRootQueryRetrieveInformationModel FIND	1.2.840.10008.5.1.4.1.2.1.1	Case 1*	SCU	No
StudyRootQueryRetrieveInformationModel FIND	1.2.840.10008.5.1.4.1.2.2.1	Case 1*	SCU	No
PatientStudyOnlyQueryRetrieveInformationModel FIND	1.2.840.10008.5.1.4.1.2.3.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.22. Presentation contexts to query database request

The following table lists the C-FIND status values, with their meaning, that may be returned by the IQPACS Image Store.

Service Status	Status Code	Meaning
Unable To Process	C000	The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database
Success	0000	Matching is complete
Pending	FF00	Matches are continuing

Table 3.23. C-FIND response values

The IQPACS Image Store ignores the Priority attribute in the C-FIND-RQ messages.

3.4.2.3. SOP Specific Conformance

The Optional Keys are returned only if they are specified in the request. The “match” is performed for every optional key supported.

The Instance Availability attribute (0008, 0056) is returned only for the study and image level query and the values returned are as follows:

- at the STUDY level:
 - if the study is stored in the online storage or in the archive storage the value returned is “NEARLINE”;
 - if the study is stored only in the offline storage the value returned is “OFFLINE”

- at the IMAGE level:
 - if the image is stored in the online storage, the value returned is “ONLINE”,
 - if the image is stored in the archive storage only (and it is not stored in the online storage), the value returned is “NEARLINE”;
 - “OFFLINE” if the images is stored in the offline archive only

IQPACS Image Store doesn't support case-insensitive matching for PN VR attributes.

3.4.3. Real World activity: Move instances

3.4.3.1. Associated Real World Activity

The IQPACS Image Store is able to move instances to a specified destination, when requested via a C-MOVE request.

3.4.3.2. Present Context

The presentation context shown in the following table is used when acting as a SCP for C-MOVE operations:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
PatientRootQueryRetrieveInformationModel MOVE	1.2.840.10008.5.1.4.1.2.1.2	Case 2*	SCU	No
StudyRootQueryRetrieveInformationModel MOVE	1.2.840.10008.5.1.4.1.2.2.2	Case 2*	SCU	No
PatientStudyOnlyQueryRetrieveInformation ModelMOVE	1.2.840.10008.5.1.4.1.2.3.2	Case 2*	SCU	No

*Note: Case 2 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.24. Presentation contexts to move instances

3.4.3.3. SOP Specific Conformance

When an external node initiates a C-MOVE request, the requested instances can be sent for storage with the transfer syntax the instances use, if it is in the list proposed by the requesting node. If not, the instance can be transformed in the transfer syntax requested by the external application entity.

Service Status	Status Code	Meaning
Move Destination Unknown	A801	Not included in the trusted nodes list
Unable To Calculate Number Of Matches	A701	
Unable To Process	C000	
Unable To Perform SubOperation	A702	
Identifier Does Not Match SOPClass	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class
Success	0000	Matching is complete

Pending	FF00	Matches are continuing
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Table 3.25. C-MOVE response values

The IQPACS Image Store ignores the Priority attribute in the C-MOVE-RQ messages.

3.4.4. Real World Activity: Store Images

3.4.4.1 Associated Real World Activity

The IQPACS Image Store is responsible with storing the instances received from modalities, diagnosis workstations or any other DICOM nodes. The IQPACS Image Store will issue a failed response if it is unable to store the instance. The incorrect formatted data will not be taken into account and will not be stored.

3.4.4.2 Presentation Contexts

The presentation contexts shown in the following tables are acceptable for the IQPACS Image Store to store the corresponding images.

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
AmbulatoryECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.3	Case 1*	SCU	No
BasicTextSR	1.2.840.10008.5.1.4.1.1.88.11	Case 1*	SCU	No
BasicVoiceAudioWaveformStorage	1.2.840.10008.5.1.4.1.1.9.4.1	Case 1*	SCU	No
CardiacElectrophysiologyWaveformStorage	1.2.840.10008.5.1.4.1.1.9.3.1	Case 1*	SCU	No
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33	Case 1*	SCU	No
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	Case 2*	SCU	No
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	Case 2*	SCU	No
DigitalIntraoralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	Case 2*	SCU	No
DigitalIntraoralXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.3.1	Case 2*	SCU	No
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	Case 2*	SCU	No
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	Case 2*	SCU	No
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	Case 2*	SCU	No
DigitalXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.1.1	Case 2*	SCU	No
EnhancedMRIImageStorage	1.2.840.10008.5.1.4.1.1.4.1	Case 2*	SCU	No
EnhancedSR	1.2.840.10008.5.1.4.1.1.88.22	Case 1*	SCU	No
GeneralECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.2	Case 1*	SCU	No

GrayscaleSoftcopyPresentationStateStorage	1.2.840.10008.5.1.4.1.1.11.1	Case 1*	SCU	No
HemodynamicWaveformStorage	1.2.840.10008.5.1.4.1.1.9.2.1	Case 1*	SCU	No
KeyObjectSelectionDocument	1.2.840.10008.5.1.4.1.1.88.59	Case 1*	SCU	No
MammographyCADSR	1.2.840.10008.5.1.4.1.1.88.50	Case 1*	SCU	No
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	Case 2*	SCU	No
MRSpectroscopyStorage	1.2.840.10008.5.1.4.1.1.4.2	Case 2*	SCU	No
MultiframeColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	Case 2*	SCU	No
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2	Case 2*	SCU	No
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	Case 2*	SCU	No
MultiframeSingleBitSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.1	Case 2*	SCU	No
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	Case 2*	SCU	No
NuclearMedicineImageStorageRetired	1.2.840.10008.5.1.4.1.1.5	Case 2*	SCU	No
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	Case 2*	SCU	No
RawDataStorage	1.2.840.10008.5.1.4.1.1.66	Case 1*	SCU	No
RTBeamsTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.4	Case 1*	SCU	No
RTBrachyTreatmentRecordStorage	1.2.840.10008.5.1.4.1.1.481.6	Case 1*	SCU	No
RTDoseStorage	1.2.840.10008.5.1.4.1.1.481.2	Case 1*	SCU	No
RTImageStorage	1.2.840.10008.5.1.4.1.1.481.1	Case 2*	SCU	No
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	Case 1*	SCU	No
RTStructureSetStorage	1.2.840.10008.5.1.4.1.1.481.3	Case 1*	SCU	No
RTTreatmentSummaryRecordStorage	1.2.840.10008.5.1.4.1.1.481.7	Case 1*	SCU	No
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	Case 2*	SCU	No
StandaloneCurveStorage	1.2.840.10008.5.1.4.1.1.9	Case 1*	SCU	No
StandaloneModalityLUTStorage	1.2.840.10008.5.1.4.1.1.10	Case 1*	SCU	No
StandaloneOverlayStorage	1.2.840.10008.5.1.4.1.1.8	Case 2*	SCU	No
StandalonePETCurveStorage	1.2.840.10008.5.1.4.1.1.129	Case 1*	SCU	No
StandaloneVOILUTStorage	1.2.840.10008.5.1.4.1.1.11	Case 1*	SCU	No
TwelveLeadECGWaveformStorage	1.2.840.10008.5.1.4.1.1.9.1.1	Case 1*	SCU	No
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	Case 2*	SCU	No
UltrasoundImageStorageRetired	1.2.840.10008.5.1.4.1.1.6	Case 2*	SCU	No
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	Case 2*	SCU	No
UltrasoundMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.3	Case 2*	SCU	No
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	Case 2*	SCU	No
VLImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.1	Case 2*	SCU	No
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	Case 2*	SCU	No

VLMultiframeImageStorageRetired	1.2.840.10008.5.1.4.1.1.77.2	Case 2*	SCU	No
VLPhotographicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.4	Case 2*	SCU	No
VLSlideCoordinatesMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.3	Case 2*	SCU	No
XRayAngiographicBiPlaneImageStorageRetired	1.2.840.10008.5.1.4.1.1.12.3	Case 2*	SCU	No
XrayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	Case 2*	SCU	No
XrayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	Case 2*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

*Note: Case 2 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.26. Presentation contexts to store instances

3.4.4.3. SOP Specific Conformance

The application can also generate a new patient ID when storing images locally when one of the following situations occur:

- If the PatientID for the received images is missing it is automatically generated.
- If the series/study containing the instance is already attached to an existing patient, the patientID will be copied from the existing patient. This is also applicable to the StudyInstanceUID, SeriesInstanceUID, SOPInstanceUID attributes.
- If, at the configuration level, the user chooses to generate a new PatientID for any image received.

For every C-STORE-RQ received, a successful or failed C-STORE response will be send. The Storage SCP always saves the successfully received SOP Instances, so that they will be stored locally. The C-STORE STATUS codes are presented in the following table:

Service Status	Status Code	meaning
Data Set Does Not Match SOP Class	A900	<ul style="list-style-type: none"> • if one of the following UIDs is missing: <ul style="list-style-type: none"> - StudyInstanceUID, - SeriesInstanceUID, - SOPInstanceUID, - SOPClassUID, • if the SOPClassUID or SOPInstanceUID from Command differs from the one in the Dataset
StorageOutOfResources	A700	if there is no space available for storing in the on-line archive
CannotUnderstand	C000	if a parsing error occurred
ProcessingFailure	B006	when errors occurred when saving the information in the database
CoercionOfDataElements	B000	depending on configurations done, the Image Store generates this message if some attributes were modified
Success	0000	successful storing
SOPClassNotSupported	B007	If the service is inactive

Table 3.27. C-STORE STATUS codes

3.4.5. Real World Activity: Respond to C-GET Requests

3.4.5.1. Associated Real World Activity

The IQPACS Image Store is able to send instances to a specified destination, when requested via a C-GET request.

3.4.5.2. Present Context

The presentation context shown in the following table is used when acting as a SCP for C-GET operations:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
PatientRootQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.1.3	Implicit VR Little Endian	SCU	No
StudyRootQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.2.3	Implicit VR Little Endian	SCU	No
PatientStudyOnlyQueryRetrieveInformationModelGET	1.2.840.10008.5.1.4.1.2.3.3	Implicit VR Little Endian	SCU	No

Table 3.28. Presentation contexts to send instances

3.4.5.3. SOP Specific Conformance

When an external node initiates a C-GET request, the requested instances can be sent for storage using C-STORE operations. The IQPACS Image Store will initiate C-STORE sub-operations over the same association for all stored SOP Instances related to the Patient ID, List of Study Instance UIDs, List of Series Instance UIDs, or List of SOP Instance UIDs depending on the Query/Retrieve level specified in the C-GET request.

Service Status	Status Code	Meaning
Failure Refused: Out of Resources – Unable to calculate number of matches	A701	
Failure Refused: Out of Resources – Unable to perform sub-operations	A702	A sub-operation is considered Failed if the SCP is unable to initiate a CSTORE sub-operation because the Query/Retrieve SCU did not offer an appropriate presentation context for a given stored SOP Instance.
Identifier Does Not Match SOP Class	A900	The C-GET query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class.
Unable To Process	C000	
Cancel: Sub-operations terminated due to Cancel Indication	FE00	

Warning: Sub-operations Complete – One or more Failures or Warnings	B000	
Success	0000	
Pending	FF00	Sub-operations are continuing.

Table 3.29. C-GET response values

When the number of Remaining sub-operations reaches zero, the IQPACS Image Store will generate a final response with a status equal to Success, Warning, Failed, or Refused. The status contained in the C-GET response can be:

- **Success** if all sub-operations were successful
- **Warning** if one or more sub-operations were successful and one or more sub-operations were unsuccessful or had a status of warning
- **Warning** if all sub-operations had a status of Warning
- **Failed** or **Refused** if all sub-operations were unsuccessful

The IQPACS Image Store may receive a C-GET-CANCEL request at any time during the processing of the C-GET request. The IQPACS Image Store will interrupt all C-STORE sub-operation processing and return a status of Canceled in the C-GET response. The C-GET response with a status of Canceled will contain the number of Successful, Failed, and Warning C-STORE sub-operations. If present, the Remaining sub-operations count will contain the number of C-STORE sub-operations which were not initiated due to the C-GET-CANCEL request.

For retrieval of images with alternate encodings using a C-GET request at the Patient, Study, or Series level, the IQPACS Image Store will select the transfer syntaxes accepted in the C-STORE Association Negotiation.

3.4.6. Real World Activity: Provide patient/visit/study related information

3.4.6.1 Associated Real World Activity

IQPACS Image Store is able to provide patient or study related information to other DICOM nodes using N-GET Detached Patient Management, N-GET Detached Visit Management or N-GET Detached Study Management service.

3.4.6.2 Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1	Case 1*	SCU	No
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1	Case 1*	SCU	No
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.30. Presentation contexts to provide patient/study information

The attributes that the IQPACS Image Store will be able to interpret as a SCP are shown in the following tables:

Attribute	Tag
-----------	-----

Specific Character Set	(0008,0005)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Visit Sequence	(0008,1125)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Birth Time	(0010,0030)
Patient's Sex	(0010,0040)
Referenced Patient Alias	(0038,0004)

Table 3.31. Detached Management SOP Class N-GET Attributes – patient

Attribute	Tag
Specific Character Set	(0008,0005)
Referenced Patient Sequence	(0008,1120)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referring Physician's Name	(0008,0090)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
All other Attributes	

Table 3.32. Detached Management SOP Class N-GET Attributes – visit

Attribute	Tag
Specific Character Set	(0008,0005)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Referenced Visit Sequence	(0008,1125)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Referenced Patient Alias	(0038,0004)
SOP Instance UIDs	(0008,0018)
Accession Number	(0008,0050)
Other attributes	

Table 3.33. Detached Management SOP Class N-GET Attributes – study

3.4.7. Real World Activity: Accept notifications about patient/visit/study related information

3.4.7.1 Associated Real World Activity

IQPACS Image Store is able to modify patient or study related information when receiving notifications invoked by a SCP through the use of the DIMSE N-EVENT-REPORT Service used in conjunction with the appropriate Detached Patient Management SOP Instance, Detached Visit Management SOP Instance or Detached Study Management SOP Instance.

3.4.7.2 Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
DetachedPatientManagement	1.2.840.10008.3.1.2.1.1	Case 1*	SCU	No
DetachedVisitManagement	1.2.840.10008.3.1.2.2.1	Case 1*	SCU	No
DetachedStudyManagement	1.2.840.10008.3.1.2.3.1	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.34. Presentation contexts to accept notifications

The attributes that the IQPACS Image Store will be able to interpret as a SCU are shown in the following tables:

Attribute	Tag
Specific Character Set	(0008,0005)
Instance Creation Date	(0008,0012)
Instance Creation Time	(0008,0013)
Instance Creator UID	(0008,0014)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Issuer Of Patient ID	(0010,0021)
Other Patient IDs	(0010,1000)
Other Patient Names	(0010,1001)
Birth Name	(0010,1005)
Mother Birth Name	(0010,1060)
Medical Record Locator	(0010,1090)
Occupation	(0010,2180)
Patient Birth Date	(0010,0030)
Patient Birth Time	(0010,0032)
Patient Sex	(0010,0040)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Address	(0010,1040)
Military Rank	(0010,1080)
Branch Of Service	(0010,1081)
Country Residence	(0010,2150)
Region Residence	(0010,2152)
Telephone Numbers	(0010,2154)
Ethnic Group	(0010,2160)
Religious Preference	(0010,21F0)

Comments	(0010,4000)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Smoking Status	(0010,21A0)
Patient History	(0010,21B0)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Special Needs	(0038,0050)
Patient State	(0038,0500)

Table 3.35. Patient notification event information

Attribute	Tag
Specific Character Set	(0008,0005)
Instance Creation Date	(0008,0012)
Instance Creation Time	(0008,0013)
Instance Creator UID	(0008,0014)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Issuer Of Patient ID	(0010,0021)
Other Patient IDs	(0010,1000)
Other Patient Names	(0010,1001)
Birth Name	(0010,1005)
Mother Birth Name	(0010,1060)
Medical Record Locator	(0010,1090)
Occupation	(0010,2180)
Patient Birth Date	(0010,0030)
Patient Birth Time	(0010,0032)
Patient Sex	(0010,0040)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Address	(0010,1040)
Military Rank	(0010,1080)
Branch Of Service	(0010,1081)
Country Residence	(0010,2150)
Region Residence	(0010,2152)
Telephone Numbers	(0010,2154)
Ethnic Group	(0010,2160)
Religious Preference	(0010,21F0)
Comments	(0010,4000)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Smoking Status	(0010,21A0)
Patient History	(0010,21B0)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Special Needs	(0038,0050)
Patient State	(0038,0500)

Table 3.36. Study notification event information

Event Type Name	Attribute	Tag
Visit Created	Specific Character Set	(0008,0005)
	Instance Creation Date	(0008,0012)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Instance Creation Time	(0008,0013)
	Instance Creator UID	(0008,0014)
	Admission ID	(0038,0010)
Visit Scheduled	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Scheduled Admission Date	(0038,001A)
	Scheduled Admission Time	(0038,001B)
	Scheduled Patient Institution Residence	(0038,001E)
	Specific Character Set	(0008,0005)
Patient Admitted	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Admitting Date	(0038,0020)
	Visit Status ID	(0038,0008)
	Referring Physician's Name	(0008,0090)
	Route of Admissions	(0038,0016)
	Admitting Time	(0038,0021)
Patient Transferred	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Current Patient Location	(0038,0300)
	Patient's Institution Residence	(0038,0400)
Patient Discharged	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Visit Status ID	(0038,0008)
	Discharge Time	(0038,0032)
	Discharge Date	(0038,0030)
Visit Deleted	Admission ID	(0038,0010)
Visit Updated	All updated Attributes	

Table 3.37. Visit notification event information

3.4.8. Real World Activity: Receive Modality Performed Procedure Step

3.4.8.1. Associated Real World Activity

The IQPACS Image Store is able to receive MPPS N-CREATE or MPPS N-SET messages. The IQPACS Image Store will not interpret these messages in any way, only he can forward the messages to other DICOM node, if this is specified at the configuration level. Therefore, all the attributes specified in the DICOM specifications are supported. The attributes that the IQPACS Image Store will be able to interpret as a SCU are shown in the table below:

Description	Tag	N-CREATE	N-SET
Specific Character Set	(0008,0005)	Yes	No
Performed Procedure Step Relationship			
Scheduled Step Attribute Sequence	(0040,0270)	Yes	No
>Study Instance UID	(0020,000D)	Yes	No
>Referenced Study Sequence	(0008,1110)	Yes	No
>>Referenced SOP Class UID	(0008,1150)	Yes	No
>>Referenced SOP Instance UID	(0008,1155)	Yes	No
>Accession Number	(0008,0050)	Yes	No
>Placer Order Number/Imaging Service Request	(0040,2016)	Yes	No
>Filler Order Number/Imaging Service Request	(0040,2017)	Yes	No
>Requested Procedure ID	(0040,1001)	Yes	No
>Requested Procedure Description	(0032,1060)	Yes	No
>Scheduled Procedure Step ID	(0040,0009)	Yes	No
>Scheduled Procedure Step Description	(0040,0007)	Yes	No
>Scheduled Protocol Code Sequence	(0040,0008)	Yes	No
>>Code Value	(0008,0100)	Yes	No
>>Coding Scheme designator	(0008,0102)	Yes	No
>>Coding Scheme Version	(0008,0103)	Yes	No
>>Code Meaning	(0008,0104)	Yes	No
>>All other Attributes from Scheduled Protocol Code Sequence		Yes	No
Patient's Name	(0010,0010)	Yes	No
Patient ID	(0010,0020)	Yes	No
Patient's Birth Date	(0010,0030)	Yes	No
Patient's Sex	(0010,0040)	Yes	No
Referenced Patient Sequence	(0008,1120)	Yes	No
>Referenced SOP Class UID	(0008,1150)	Yes	No
>Referenced Instance UID	(0008,1155)	Yes	No
Performed Procedure Step Information			
Performed Procedure Step ID	(0040,0253)	Yes	No
Performed Station AE Title	(0040,0241)	Yes	No
Performed Station Name	(0040,0242)	Yes	No
Performed Location	(0040,0243)	Yes	No
Performed Procedure Step Start Date	(0040,0244)	Yes	No
Performed Procedure Step Start Time	(0040,0245)	Yes	No
Performed Procedure Step Status	(0040,0252)	Yes	Yes
Performed Procedure Step Description	(0040,0254)	Yes	Yes
Performed Procedure Type	(0040,0255)	Yes	Yes

Description			
Procedure Code Sequence	(0008,1032)	Yes	Yes
>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
Performed Procedure Step End Date	(0040,0250)	Yes	Yes
Performed Procedure Step End Time	(0040,0251)	Yes	Yes
Comments on the Performed ProcedureStep	(0040,0280)	Yes	Yes
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	Yes	Yes
>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
Image Acquisition Results			
Modality	(0008,0060)	Yes	No
Study ID	(0020,0010)	Yes	No
Performed Protocol Code Sequence	(0040,0260)	Yes	Yes
>Code Value	(0008,0100)	Yes	Yes
>Coding Scheme Designator	(0008,0102)	Yes	Yes
>Coding Scheme Version	(0008,0103)	Yes	Yes
>Code Meaning	(0008,0104)	Yes	Yes
>All other Attributes from Performed Protocol Code Sequence		Yes	No
Performed Series Sequence	(0040,0340)	Yes	Yes
>Performing Physician's Name	(0008,1050)	Yes	Yes
>Protocol Name	(0018,1030)	Yes	Yes
>Operator's Name	(0008,1070)	Yes	Yes
>Series Instance UID	(0020,000E)	Yes	Yes
>Series Description	(0008,103E)	Yes	Yes
>Retrieve AE Title 2C/2	(0008,0054)	Yes	Yes
>Referenced Image Sequence	(0008,1140)	Yes	Yes
>>Referenced SOP Class UID	(0008,1150)	Yes	Yes
>>Referenced SOP Instance UID	(0008,1155)	Yes	Yes
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	Yes	Yes
>>Referenced SOP Class UID	(0008,1150)	Yes	Yes
>>Referenced SOP Instance UID	(0008,1155)	Yes	Yes
>All other attributes from Performed Series Sequence		Yes	Yes
All other attributes from Radiation Dose Module and Billing and Material Code Module		Yes	Yes

Table 3.38. MPPS Attributes

3.4.8.2. Presentation Contexts

The presentation context used is presented in the following table:

Abstract Syntax		Transfer Syntax	Role	Extended negotiation
Name	UID			
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Case 1*	SCU	No

*Note: Case 1 – The transfer syntaxes supported are listed in **table 3.40**

Table 3.39. Presentation context for MPPS

3.5 Transfer Syntax Selection Policies

When initiating an association the transfer syntaxes supported are depicted in the table below:

	Transfer Syntax	
	Name	UID
Case 1 (TS supported)	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
	Explicit VR Big Endian	1.2.840.10008.1.2.2
Case 2 (TS supported)	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
	Explicit VR Big Endian	1.2.840.10008.1.2.2
	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
	JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
	JPEG Lossless Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
	JPEG Lossless Non-Hierarchical, First Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
	JPEG 2000 Lossless Image Compression	1.2.840.10008.1.2.4.90
	JPEG 2000 Lossy Image Compression	1.2.840.10008.1.2.4.91
	RLE Lossless	1.2.840.10008.1.2.5

Table 3.40. Supported transfer syntaxes

4. COMMUNICATION PROFILES

4.1. Supported Communications Stacks (parts 8, 9)

The IQPACS Image Store provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard.

4.2. TCP/IP Stack

The IQPACS Image Store inherits its TCP/IP stack from the operating system.

4.2.1. Physical Media Support

IQPACS Image Store is indifferent to the physical media over which TCP/IP operates. It inherits the medium from the operating system upon which it executes. The Image Store platform has been quality assurance tested to work with 10 and 100 Base-T Ethernet media. Therefore, the use of these media is recommended as the primary point of delivering the network traffic to the server platform.

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

5.1. Storing avi and mpeg data

IQPACS uses RawDataStorageSOPClass for storing AVI and MPEG data using the following proprietary tags:

Tags	Name	VR, VM	Details
(7FE0, 0711)	MovieData	VR = OB, VM = 1	contains AVI/MPEG
(7FE0, 0107)	MovieFormat	VR = SH, VM = 1	file type (either AVI or MPEG)
(7FE0, 0108)	MovieName	VR = LO, VM = 1	the movie name
(7FE0, 0109)	MovieFile	VR = LO, VM = 1	location where the movie is saved

Table 5.1. Proprietary tags

5.2. Defining the rights for diagnosing

Tags	Name	VR, VM	Details
0040, 1100)	PhysicianOfDiagnose	VR=ST, VM=1	if present, it contains the user's name with rights for diagnosing the image

Table 5.2. Physician of diagnose

6. CONFIGURATION

6.1. AE Title/Presentation Address Mapping

The AE Title and port for the IQPACS Image Store are defined at the configuration level. The default TCP port for the IQPACS Image Store is 104.

In order for communication to be established with other DICOM application entities, the AE Title, port and IP address (or host name) must be defined for each application. These applications are therefore named DICOM nodes and can be modalities, diagnosis workstations, other image server or any other DICOM compliant application. This information is configurable and can be modified at any time.

6.2. Configurable Parameters

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes	5000 msec
General DIMSE level time-out values	Yes	60000 msec – incoming 60001 msec – outgoing
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	Yes	5000
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	Yes	5000
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	-
Close delay	Yes	500 msec
AE Specific Parameters		
Maximum PDU size the AE can receive	Yes	16352 bytes
Maximum PDU size the AE can send	Yes	16352 bytes
AE specific DIMSE level time-out values	Yes	
Number of simultaneous Associations by Service and/or SOP Class	Yes	unlimited

Table 6.1. Configuration parameters table

RIS node address is configurable.

The automatic policies for deleting the studies from the temporary or archive storage are configurable.

For the temporary storage, the studies will be deleted after a percentage of used space is reached. The number of studies that will be deleted when this space is reached is also configurable.

There are additional protection rules for the images stored. You can protect the images until the study is in one of the following states:

- Completed state
- Verified state
- Read state
- Dictated state
- Transcribed state
- Approved state
- Protect until archived or stored offline

For the archive storage you can protect the studies for a number of years, or until the studies are stored offline or you can choose not to delete the studies.

The server administrator can configure the auto-routing rules for instances or messages. There are two distinct types of auto-routing rules: for different types of received images/messages to be routed automatically to other DICOM nodes or for instances/messages that are received from a specified DICOM node to be routed to other DICOM node(s).

7. SUPPORT OF EXTENDED CHARACTER SETS

The IQPACS Image Store also supports:

- ISO-IR 100 Latin-1
- ISO-IR 101 Latin-2
- ISO-IR 109 Latin-3
- ISO-IR 110 Latin-4
- ISO-IR 144 Cyrillic
- ISO-IR 127 Arabic
- ISO-IR 126 Greek
- ISO-IR 138 Hebrew
- ISO-IR 148 Latin-5 (Turkish)
- EUC-JP Japanese
- TIS-620 Thai

8. CODES AND CONTROLLED TERMINOLOGY

Not applicable