Merge Eye Care PACS™
v. 5.3

DICOM CONFORMANCE STATEMENT

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INDICATIONS FOR USE:

Eye Care PACS is a comprehensive software platform for the import, integration, and review of patient data and clinical information in an eye care environment. Eye Care PACS allows for the collection, management, enhancement, and review of patient demographics, image data, diagnostic data, and clinical reports from a variety of medical devices through either a direct connection with the instruments or through computerized networks.

CAUTION: Not for diagnostic use on a mobile device such as a smart phone or a tablet.

CAUTION: U.S. federal law restricts this device to sale by, or on the order of, a physician.

CANADIAN DEVICE IDENTIFIER: MERGE EYE CARE PACS

For application support or to report issues with user documentation, contact Customer Support:

- Direct Merge Eye Care PACS Support: 877-741-5369

- Outside of North America: +31.40.299.0773

- Email: MergeSupport@us.ibm.com

- Web site: http://www.merge.com/Solutions/Eye-Care/Merge-Eye-Care-PACS.aspx

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Doc #	Revision	Date	Description
SPY-7259	2.0	8/31/17	Added Storage Commitment Service Class to page 6. Added OPT to Storage SCP and SCU on page 8. Added Storage Commitment SCU to page 9. Added Storage Commitment note to Storage Commitment SCU on page 11. Added Number of Study Related Instances tag note to page 20.

The latest revision of this document can be found in **Merge Communities**.

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Introduction

Intended Audience

The user of this document is involved with system integration and/or software design. We assume that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 Standards.

Integration

The integration of any device into a system of interconnected devices goes beyond the scope of the DICOM 3.0 standard and of this conformance statement, when interoperability is desired. The responsibility for analyzing the applications requirements and developing a solution that integrates the Merge Eye Care PACS application with other vendors' systems is the user's responsibility and should not be underestimated.

Validation

Testing the complete range of possibilities between the Merge Eye Care PACS application and non-Merge Eye Care PACS devices, before the connection is declared operational, is deemed to be a necessity. The user should ensure that any non-Merge Eye Care PACS provider accepts full responsibility for all validation required for their connection with the Merge Eye Care PACS application. The accuracy of image data once it has crossed the interface between the Merge Eye Care PACS equipment and the Merge Eye Care PACS device as well as the stability of the image data for the intended applications is the responsibility of the non-Merge Eye Care PACS provider.

Future Evolution

As the DICOM 3.0 standard evolves to meet the user's growing requirements and to incorporate new features and technologies, Merge Healthcare reserves the right to follow the evolution of the standard or to discontinue the delivery of this application.

Purpose of this Document

This document is the DICOM Conformance Statement for the DICOM services of Merge Eye Care PACS. Its purpose is to specify compliance with the DICOM standard on the following Merge Eye Care PACS supported service classes:

- Verification Service Class as SCU and SCP.

- Visible Light Photographic Image Storage SOP Class as SCU (XC modality).

- Ophthalmic Photography 8 Bit Image Storage SOP Class as SCU (OP modality).

- Storage Service Class as SCP (XC, OP, and OPT modalities).

- Storage Commitment Service Class Push Model as an SCU.

- Study Root Query/Retrieve Information Model - FIND as an SCU.

- Study Root Query/Retrieve Information Model - MOVE as an SCU.

- Study Root Query/Retrieve Information Model - FIND as an SCP.

- Study Root Query/Retrieve Information Model - MOVE as an SCP.

- Modality Worklist Service Class as a SCU.

Sources for this Document

- ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) PS 3.3 and PS 3.4, 2004.

- ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) Supplement 110: Ophthalmic Tomography Image Storage SOP Class

Implementation Model

The Merge Eye Care PACS is an image review application capable to perform on the TCP/IP DICOM network the following operations: storage of images (Information Objects - IOs), query and retrieval of IOs
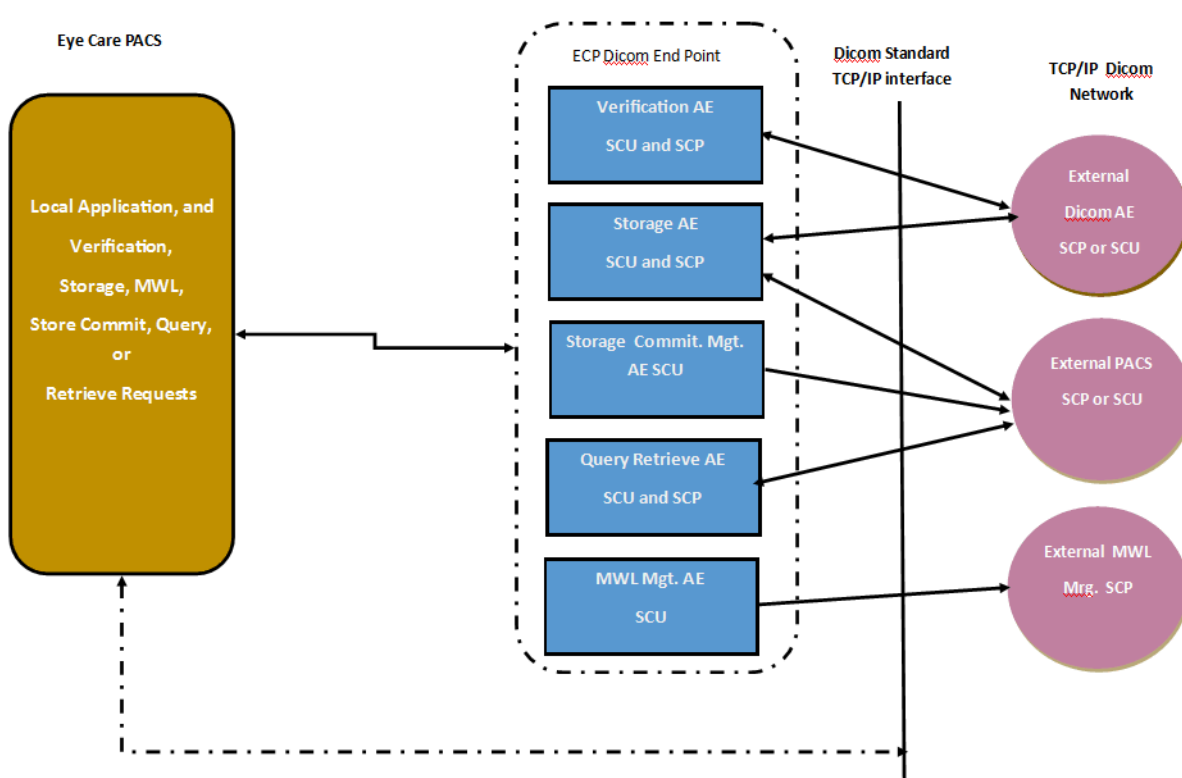
Application Data Flow Diagram

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Functional Definitions of AEs

Verification SCP and SCU

Merge Eye Care PACS Verification is implemented for testing the availability of external DICOM devices and for answering similar testing queries from external DICOM devices. The DICOM C-Echo Service is used to provide the service.

As SCU it executes the following operations:

1. Initiates a DICOM association to send the request.

2. Issues a C-ECHO request.

3. Waits for the response.

4. If failed, repeats steps 2 and 3 several times before deciding on verification failure.

5. Closes the Association.

As SCP it executes the following operations:

1. Listens for a DICOM association request.

2. Accepts a C-ECHO request.

3. Responds to the C-ECHO request.

4. Listens for DICOM association release.

Storage SCP and SCU

Merge Eye Care PACS Store SCU and SCP are implemented as application entities for transmitting and receiving DICOM OP, XC, and OPT images. The DICOM Storage Service of OP, XC or OPT images are used to send or receive demographic information and pixel data to or from an external application or an image manager / archive.

As SCU it executes the following operations:

1. Initiates a DICOM association to send an OP, XC, or OPT SOP Instance.

2. Sends the SOP Instance(s) with the pixel data processed as defined in the configuration of the external user.

3. Closes the Association.

As SCP it executes the following operations:

1. Listens for a DICOM association request.

2. Accepts a STORE request.

3. Receives the DICOM conformant SOP Instance with the demographic information and pixel data.

4. If the SOP Instance is correctly received, stores it in a predefined directory.

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5. Sends a final response for the operation with success or failure status.

6. Listens for DICOM association release.

Storage Commitment SCU

Merge Eye Care PACS Storage Commitment SCU is implemented to request a SCP to commit to the safekeeping of a set of SOP instances.

It executes the following operations:

1. Initiates a DICOM association to send an OP or XC SOP Instance, with Storage Commitment Push enabled to the SCP.

2. Sends the SOP Instance(s) with the pixel data processed as defined in the configuration.

3. Issues an N-ACTION request with the list of SOP Instance to be committed to the SCP.

4. Accepts an N-ACTION response to determine if the SCP will commit to the storage of the SOP Instances referenced.

5. Waits for an N-EVENT-REPORT request on the same association and compares the SOP Instances to the N-ACTION request and response with an N-EVENT-REPORT response. If all images are committed, the study is marked as successfully stored to the DICOM Server. If the N-EVENT-REPORT is returned with a failure status, these images will be retransmitted in the next attempt of storage.

6. Closes the association.

Query SCU

Merge Eye Care PACS Query SCU is implemented as an application entity for querying a Query SCP about the existence, in its database, of SOP Instances corresponding to some filtering criteria. The DICOM C- FIND Service of the Query/Retrieve Service Class is used to execute the Query request. The Query SCP is usually part of a PACS managing a database of SOP Instances.

It executes the following operations:

1. Initiates a DICOM association to request the Query Operation.

2. Prepares the C- FIND request with the requested filtering criteria (the query attributes).

3. Sends the C- FIND request to the Query SCP.

4. Waits for and accepts all the responses to the C- FIND request.

5. Closes the Association.

6. Makes the received responses available to the local application and display for further use.

Retrieve SCU

Merge Eye Care PACS Retrieve SCU is implemented as an application entity for moving a SOP Instance that is available on a Retrieve SCP to some DICOM destination capable to store the SOP Instance to be moved (the destination may be the station that initiates the request). The DICOM C-MOVE Service of the

Query/Retrieve Service Class is used to request the Retrieve operation. The Retrieve SCP is usually part of a PACS managing a database of SOP Instances.

It executes the following operations:

1. Initiates a DICOM association to request the Retrieve Operation.

2. Prepares the C-MOVE request with the requested MOVE attributes to retrieve the images.

3. Sends the C-MOVE request to the Retrieve SCP and performs Storage SCP to receive the images.

4. Waits for the acknowledgement of completion of the Retrieve Operation (may be OK or fail).

5. Closes the Association.

NOTE: Merge Eye Care PACS only retrieves if the PACS server supports both Study and Series-level retrieval.

Modality Worklist SCU

Merge Eye Care PACS Modality Worklist SCU is implemented as an application entity for retrieving the Modality Worklist from a Modality Worklist SCP. The DICOM C-Find Service of MWL is used to request the scheduled procedure steps.

It executes the following operations:

1. Initiates a DICOM association to request the Modality Worklist.

2. Prepares a C-FIND request with the requested query attributes.

3. Sends the C-FIND request to the Modality Worklist SCP and waits for the C-Find response.

4. Displays the key attributes in the response to the user.

5. Closes the Association.

Query SCP

Merge Eye Care PACS Query Retrieve SCP is implemented as an application entity for receiving Queries from external SCU about the existence, of SOP Instances corresponding to some filtering criteria.

It executes the following operations:

1. Listen for a Dicom association request.

2. Receive the C- FIND request with the requested filtering criteria (the query attributes).

3. Sends the C- FIND response to the Query SCU with success or failure status.

4. Listens for Dicom Association release.

Retrieve SCP

Merge Eye Care PACS Query Retrieve SCU is implemented as an application entity for moving a SOP Instance that is available on local database to some DICOM destination capable to store the SOP Instance to be moved (the destination may be the station that initiates the request). The DICOM C-MOVE Service of the Query/Retrieve Service Class is used to handle the Retrieve operation.

It executes the following operations:

1. Listen for a Dicom association request.

2. Receive C-MOVE requests with the requested filtering criteria (the query attributes).

3. Prepares the C-MOVE response with the requested MOVE attributes to retrieve the images.

4. Sends the C-MOVE response to the Retrieve SCU with success or failure status.

5. Listens for Dicom Association release.

Sequencing of Real World Activities

Verification

As SCU

The verification is periodically activated by the application to check the status of DICOM server involved.

As SCP

The verification SCP is always active and waiting for C-ECHO Service requests. Whenever such a request is accepted, a C-Echo Service response is sent to the source of the request.

Storing images

As SCP

The Storage SCP is always active and waiting for C-STORE Service requests. Whenever such a request is accepted, the transfer of the SOP Instance is attempted and at its completion, the SOP Instance is stored in a predefined directory and a C- STORE response is sent to the source of the requests. The response carries status information that may be OK or FAIL with indication of cause of the failure.

Storage Commitment SCU

The Storage Commit N-ACTION will automatically be initiated after all the images of a study have been successfully transmitted to the Archive. Eye Care PACS supports Storage Commitment only if the Storage Commitment Result is sent on the same association.

Querying for Patient, Series and Study Demographic Data

Querying is manually activated after selecting the filtering criteria. Once Query Responses are received, they are available for further operations and displayed to the user.

Querying Source for Patient, Series and Study Demographic Data

When the Eye Car PACS receives a query request (C-FIND) it will resolve the request against the underlying database and return all found information to the query initiator. Eye Care PACS supports query transactions for all stored DICOM composite objects.

Retrieving SOP Instances

Either a user views the list of Studies, returned from the query response, and manually selects a Study to activate the retrieval of the images for the complete Study. Or a retrieve is performed automatically by the application before any user selection of a specific study, according to the list of studies currently reviewed by the user.

Modality Worklist Retrieve

The MWL C-FIND request is manually initiated via the UI. The C-FIND responses are received and displayed on the UI. The key matching fields that can be modified via the UI are Patient ID, Patient Name, Scheduled Procedure Start Date and Accession Number.

AE Specifications

Supported Services

Merge Eye Care PACS provides Standard Conformance to the DICOM V3.0 SOP Classes as listed in the tables below:

Table 1: Verification SOP classes as SCU and SCP

SOP Class	SOP Class UID
Verification	1.2.840.10008.1.1

Table 2: Storage SOP classes as SCP

SOP Class	SOP Class UID
Ophthalmic Photography 8 Bit Image Storage (OP modality)	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Photography 16 Bit Image Storage (OP modality)	1.2.840.10008.5.1.4.1.1.77.1.5.2
Visual Light Photographic Image Storage (XC modality)	1.2.840.10008.5.1.4.1.1.77.1.4
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Ophthalmic Tomography Image (OPT modality)	1.2.840.10008.5.1.4.1.1.77.1.5.4
Secondary Capture Image Storage A	1.2.840.10008.5.1.4.1.1.7

Table 3: Storage Commitment Step SOP Class as SCU

SOP Class	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

Table 4: Query/Retrieve SOP classes as SCU

SOP Class	SOP Class UID
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

Table 5: Query/Retrieve SOP classes as SCP

SOP Class	SOP Class UID
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

Support for Modality Worklist Information Management as a SCU is listed in the table below:

Table 6: Modality Worklist SOP Class as SCU

SOP Class	SOP Class UID
Modality Worklist Information Model – Find	1.2.840.10008.5.1.4.31

Association Establishment Policies

General

Before any DICOM information can be exchanged between the Merge Eye Care PACS (SCU or SCP) and the external, SCP or SCU AE, an association stage takes place to negotiate the capabilities of the SCU and SCP.

The maximum PDU length for an association initiated by the Merge Eye Care PACS is 65542 bytes. Only the SCU side releases an Association. Either the SCU or the SCP AE may abort the Association

Number of Associations

The Merge Eye Care PACS is able to open one association for each DICOM Service. There is no inherent limit to the number of associations other than limits imposed by the computer operating system.

Asynchronous Nature

Merge Eye Care PACS allows a single outstanding operation on any association. The Merge Eye Care PACS as a SCU will wait for a response from the SCP AE before attempting another operation during the same association. As a SCP it will not accept a new operation on an existing association before the active one is completed.

However, the Merge Eye Care PACS Query Management Component may cancel the C-FIND service by issuing a C-CANCEL-FIND request any time during the processing of the C-FIND service by the SCP.

Implementation Identifying Information

Merge Eye Care PACS will respond with the following implementation identifying parameters:

Implementation Class UID: 2.16.840.1.113669.2013.1.3.1

Implementation Version Name: MergeECP4.1.0

Application Context Name: 1.2.840.10008.3.1.1.1 (DICOM Application Context)

All associations will use a single implementation Class UID.

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Association Initiation Policy

Merge Eye Care PACS attempts to initiate a new association for every service.

Proposed Presentation Contexts

As SCU/SCP, Merge Eye Care PACS proposes the presentation context listed in the table below:

Table 7: Proposed Presentation Context

Abstract Syntax		Transfer Syntax			
SOP Class Name	**SOP Class UID**	**Name**	**UID**	**Role**	**Ext. Negotiation**
One item from list in Supported Services	One item from list in Supported Services	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU/ SCP	None

Or

Abstract Syntax		Transfer Syntax			
SOP Class Name	**SOP Class UID**	**Name**	**UID**	**Role**	**Ext. Negotiation**
One item from list in Supported Services	One item from list in Supported Services	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU/ SCP	None

Or

Abstract Syntax		Transfer Syntax			
SOP Class Name	**SOP Class UID**	**Name**	**UID**	**Role**	**Ext. Negotiation**
One item from list in Supported Services	One item from list in Supported Services	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU/ SCP	None

As C-STORE SCP, Merge Eye Care PACS accepts the presentation contexts listed in the table below:

Table 8: Proposed Presentation Context

Abstract Syntax		Transfer Syntax			
SOP Class Name	SOP Class UID	Name	UID	Role	Ext. Negotiation
Any item from list in Supported Services as SCP: 1.2.840.10008.xxx		DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Lossless, non-hierarchical, first-order Prediction	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Lossy	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless	1.2.840.10008.1.2.4.91	SCP	None

Called/Calling AE-Titles

As SCU, the calling and called AE Titles that Merge Eye Care PACS will use are configurable at installation, and can be modified later.

As SCP, the default called AETitle that Merge Eye Care PACS will use is the machine name of the server on which it is installed. This can be changed in configuration. The list of calling AETitles accepted by the SCP is configurable; it is possible to configure the SCP to accept any calling AETitle.

The configured values of calling AETitle and of called AETitle for SCP and SCP must be different.

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Association Initiation by SCU Real World Activity

Initiation of associations is done by an SCU requesting a service from an SCP.

Verification

The Merge Eye Care PACS Verification AE initiates a new association for each request. Verification is performed automatically periodically by the application.

Query SCU

The Merge Eye Care PACS Query AE initiates a new association for each query request. This can be accomplished manually via the UI or automatically by the application.

Possible query level are study, series and patient

If the SCP AE rejects the Association, then the Merge Eye Care PACS issues a warning message.

Retrieve SCU

The Merge Eye Care PACS Retrieve AE initiates a new association for each retrieve request. This can be accomplished manually via the UI or automatically by the application.

Possible query levels are study and series levels.

If the SCP AE rejects the Association, then the Merge Eye Care PACS issues a warning message.

Query-SCP

The Merge Eye Care PACS Query AE accepts a new association for each query request, from any source.

Possible query level are study, series and patient.

Retrieve-SCP

The Merge Eye Care PACS Retrieve AE accepts a new association for each retrieve request, from any source.

Possible query levels are study and series levels.

Store/Storage Commitment

The Merge Eye Care PACS Store/Storage Commitment AE initiates a new association after the successful transmission of all the images belonging to a Performed Procedure Step. This is automatically initiated and no user interaction is required.

If the SCP AE rejects the Association, then Merge Eye Care PACS issues a warning message.

Modality Worklist

The Merge Eye Care PACS Management Component (SCU) will initiate a separate Association for each Worklist of items to be obtained. It can be manually initiated via the UI.

If the SCP AE rejects the Association, then Merge Eye Care PACS issues a warning message.

Association Acceptance by SCP Real World Activity

SCPs are listening on their defined ports for association requests.

Verification

The Merge Eye Care PACS Verification SCP AE accepts a new association for each incoming Verification Service request, from any source.

Storage

The Merge Eye Care PACS Image Storage SCP AE accepts a new association for each request of image storage incoming from any calling Image Storage SCU AE. However it will accept to store only those SOP Classes as specified in Table 2.

SOP Specific Conformance

SOP Specific Conformance - Verification SCU and SCP

The Merge Eye Care PACS provides standard conformance to the DICOM Verification Service Class (1.2.840.10008.1.1) as SCU and SCP, as defined in Appendix A, DICOM Standards, PS 3.4-2004.

Merge Eye Care PACS Verification SCU will process the C-ECHO confirmation and response Status codes. The status codes listed below in the table are recognized by the SCU:

Table 9: Echo SCU Status Codes

Code	Status	Meaning
0000H	Success	The SCP is successfully running it's DICOM Application and can be accessed.

The Merge Eye Care PACS Verification SCP will either reject the association request or respond with code 0000H in the response message.

SOP Specific Conformance - Storage SCP

The Merge Eye Care PACS Storage SCP fulfills the mandatory requirements of the SCP behavior as specified in DICOM standards. It accepts requests of Ophthalmic Photography 8 Bit Image Storage, Visual Light Photographic Image Storage, Ophthalmic Tomography Image Storage, and encapsulated PDF.

The SCP will store all Type 1, Type 2, and Type 3 Attributes and private Attributes and supports Level 2 storage (Full Fidelity) and does not perform any coercion of the received values. It does not validate the Attributes of the SOP Instance.

The received SOP Instances are stored in predefined directories and will be accessible at any later time.

The following response statuses may be returned by this AE:

Table 10: C-STORE Status Codes

Code	Status	Meaning
0000H	Success	The image was stored successfully.
01122H	Error	Class not supported. The image was rejected and the association is left open.
0110H	Error	Processing Failure. The image was rejected and the association is left open.
C001H	Error	Failure. The image was rejected and the association is left open.
A700H	Refused Out of Resources	Failure to save the image.
A701H	Data Load Error	Failed to load the image or failed to parse DICOM header data. The image was not saved.
A702H	Duplicate Image Error	An image with the same SOP Instance UID is already stored by this AE. The image was not saved.
A703H	Duplicate Series Error	A series having the same Series Instance UID is already stored by this AE for a different Study. The image was not saved.
A704H	Patient Data Conflict Error	The Study is already saved in Eye Care PACS, but the Patient data in the incoming image is different from the Patient data of the Study in Eye Care PACS. The image was not saved.
A705H	Study Date Conflict Error	The Study is already saved in Eye Care PACS, but the Study date in the incoming image is different from the Study date in the Eye Care PACS database. The image was not saved.
0x0000	Success	Success - the image was successfully stored by ECP.
0x0111	Error	Duplicate Instance: The image with the same SOP Instance UID is already stored by this AE. The image was rejected.
0x0122	Error	Class not supported. The image was rejected.
0xC010	Error	Data Load Error. Failed to load the image or failed to parse DICOM header data.

Table 10: C-STORE Status Codes (Continued)

Code	Status	Meaning
0xA703	Error	Duplicate Series - the series having the same Series Instance UID as in the incoming image already saved, but for another Study.
0xA704	Error	Patient Data Conflict - the Study is already saved in the ECP, but the Patient data in the incoming image is different from Patient data of the Study in ECP database.
0xA705	Error	Study Data Conflict - the Study is already saved in the SCP, but Study date in the incoming image is different from Study date in ECP database.
0xA700	Error	Refused Out Of Resources - any other error while saving the image, other than specified above.

SOP Specific Conformance - Query SCU

The Query SCU provided standard conformance to the Study Root Query SOP Class.

The Query SCU generates queries using Hierarchical Search and does not generate Relational Queries. They are initiated manually via the UI.

Supported Query Keys

Query requests are at the study, series or patient Level and the Attributes patient Name, patient ID and study instance UID are used by the application in the query request. The Attributes returned by the SCP are displayed to the user.

The following conventions are used for the Matching Query Types Supported column:

*   - Wild Matching Supported

SV   - Single Value Matching Supported

U   - Universal Matching Supported

NOTE: It is recommended that Merge Eye Care PACS connect to a server that supports the **Number of Study Related Instances (0020,1208)** tag in their implementation.

Table 11: Query SCU N-FIND Request DICOM Attributes

Matching Study Level Key Attribute Name	Tag	Query Types Support
Query\Retrieve level	0008,0052	SV
Patient's Name	0010,0010	*, SV, U
Patient ID	0010,0020	SV, U
Study Instance UID	0020,000D	U

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Table 12: C-FIND Status Codes

Code	Status	Meaning
0000	Success	Matching is completed. Status message will be logged and results presented to the user.
A700	Failure	Refused: SCP was out of resources. Status message will be logged and the association closed. A failure indication will be presented to the user.
A900	Failure	Identifier does not match SOP Class. Status message will be logged and the association closed. A failure indication will be presented to the user.
Cxxx	Failure	Unable to Process. Status message will be logged and the association closed. A failure indication will be presented to the user.
FF00	Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys. Status message will be logged.
FF01	Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier. Status message will be logged.

When there is a connection failure or failure response the Merge Eye Care PACS will present an indication to the user.

SOP Specific Conformance - Move SCU

The MOVE SCU is conformant to specifications in DICOM Standards, Annex C QUERY/RETRIEVE SERVICE CLASS PS 3.4-2004, C-MOVE SCU (study root).

Retrieve is initiated manually by the user or automatically by the application.

Supported Retrieve Keys

Move requests are at series Level. The following search keys are supported:

Table 13: Retrieve SCU N-MOVE Request DICOM Attributes

Matching Series Level Move Key Attribute Name	Tag	Matching Key Types
Series Instance UID	0020,000E	U
Query/Retrieve Level		SERIES

The SCU will include all keys provided within the C-MOVE request.

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The destination of the move will be set to attribute 0000,0600 of the request message.

Table 14: C-MOVE Status Codes

Code	Status	Meaning
0000	Success	Operation completed with no failures
A701	Failure	Refused: SCP was out of resources and unable to calculate number of matches. Status message will be logged and the association closed.
A702	Failure	Refused: SCP was out of resources and unable to perform sub-operations. Status message will be logged and the association closed.
A801	Failure	Refused: Move Destination unknown. Status message will be logged and the association closed.
A900	Failure	Identifier does not match SOP Class. Status message will be logged and the association closed.
Cxxx	Failure	Unable to Process. Status message will be logged and the association closed.
B000	Warning	Sub-operations Complete - One or more Failures. Status message will be logged, association will stay open.
FF00	Pending	Sub-operations are continuing. Status message will be logged, association will stay open.

SOP Specific Conformance - Query SCP

The Query SCP provided standard conformance to the Study Root Query SOP Class.

The Query SCP generates queries using Hierarchical Search and does not generate Relational Queries.

Table 15: Study Root Image C-FIND Supported Attributes

Attribute Name	Tag	Query Types Support
Patient Level		
Patient Name	(0010, 0010)	*,SV
Patient ID	(0010, 0020)	*, SV
Patient's Birth Date	(0010, 0030)	SV
Study Level		
Study Date	(0008, 0020)	SV
Study Time	(0008, 0030)	SV
Accession Number	(0008, 0050)	SV

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Table 15: Study Root Image C-FIND Supported Attributes (Continued)

Attribute Name	Tag	Query Types Support
Study ID	(0020, 0010)	*, SV
Study Instance UID	(0020, 000D)	*, SV, U
Series Level		
Series Instance UID	(0020, 000E)	*, SV, U

Supported Query Keys

Query requests are at the study, series or patient Level and the Attributes patient Name, patient ID and study instance UID are used by the application in the query request. The Attributes returned by the SCP are displayed to the user.

The following conventions are used for the Matching Query Types Supported column:

*   - Wild Matching Supported

SV   - Single Value Matching Supported

U   - Universal Matching Supported

Table 16: C-FIND Status Codes

Code	Status	Meaning
0000	Success	Matching is completed. Status message will be logged and results presented to the user.
A700	Failure	Refused: SCP was out of resources. Status message will be logged and the association closed. A failure indication will be presented to the user.
A900	Failure	Identifier does not match SOP Class. Status message will be logged and the association closed. A failure indication will be presented to the user.
Cxxx	Failure	Unable to Process. Status message will be logged and the association closed. A failure indication will be presented to the user.
FF00	Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys. Status message will be logged.
FF01	Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier. Status message will be logged.

When there is a connection failure or failure response the Merge Eye Care PACS will present an indication to the user.

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SOP Specific Conformance - Move SCP

The MOVE SCP is conformant to specifications in DICOM Standards, Annex C QUERY/RETRIEVE SERVICE CLASS PS 3.4-2004, C-MOVE SCP (study root).

Retrieve is initiated manually by the user or automatically by the application.

Supported Retrieve Keys

Move requests are at series Level. The following search keys are supported:

Table 17: Retrieve SCP C-MOVE Request DICOM Attributes

Matching Series Level Move Key Attribute Name	Tag	Matching Key Types
Query/Retrieve Level - Study		
Study Instance UID	0020, 000D	U
Query/Retrieve Level - Series		
Series Instance UID	0020,000E	U

The SCP will include all keys provided within the C-MOVE request.

The destination of the move will be set to attribute 0000,0600 of the request message.

Table 18: C-MOVE Status Codes

Code	Status	Meaning
0000	Success	Operation completed with no failures
A701	Failure	Refused: SCP was out of resources and unable to calculate number of matches. Status message will be logged and the association closed.
A702	Failure	Refused: SCP was out of resources and unable to perform sub-operations. Status message will be logged and the association closed.
A801	Failure	Refused: Move Destination unknown. Status message will be logged and the association closed.
A900	Failure	Identifier does not match SOP Class. Status message will be logged and the association closed.
Cxxx	Failure	Unable to Process. Status message will be logged and the association closed.
B000	Warning	Sub-operations Complete - One or more Failures. Status message will be logged, association will stay open.
FF00	Pending	Sub-operations are continuing. Status message will be logged, association will stay open.

Association Acceptance Policy

Only the SCPs have an association-acceptance policy. It is as following:

- Verification association requests will be accepted from any AE.

- Storage association requests will be accepted from any AE. However the SCP will accept to store only as specified in **Table 2**.

Communication Profiles

Supported Communication Stacks

Merge Eye Care PACS provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the DICOM standard.

TCP/IP Stack

Merge Eye Care PACS (SCU) uses TCP/IP for the protocol stacks. TCP/IP Port is configurable.

Physical Medium Support

Merge Eye Care PACS supports 10/100/1000BaseT. They are automatically configured via a detection mechanism.

Extensions/Specializations/Privatizations

None.

Configuration

Configurable Parameters

Merge Eye Care PACS allows configuration of some parameters, as indicated in the attributes lists.

Local AE Titles, Remote AE Titles, TCP Port Numbers, IP Addresses, are examples of configurable variables. The list is not all inclusive, but representative.

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Support of Extended Character Sets

None.

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this document:

Term	Definition
Abstract Syntax	A DICOM term that is identical to a DICOM SOP Class, a combination of service class and a type of information object.
Application Entity (AE)	A DICOM term for defining a particular user at an IP address.
Association	A DICOM term for a communication context that is used by two Application Entities to "talk to" one another.
Association Negotiation	The handshaking that occurs between two DICOM Application Entities to set up an association.
Attributes	Each DICOM information object has its own set of characteristics or attributes. Each attribute may have a value (See IOD), depending on its category.
Big Endian	A term for encoding the most-significant byte first and remaining bytes in descending order of significance.
Calling AE Title	The name used by the receiver in DICOM protocol to indicate which Application Entity it received the data from. It is also the AE that is initiating the transfer.
Called AE Title	The name used by the sender in DICOM protocol to indicate which Application Entity it wants to transmit its data to. It is also the AE that is receiving the transfer.
Conformance Statement	A document whose organization and content are mandated by the DICOM Standard, which allows users to communicate how they have chosen to comply with the Standard in their implementations.
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Elements: represents an abstraction of a common set of things that a user would do, in different contexts, to a data element, and would likely use over and over.
DIMSE-C	DIMSE Services that are performed on Composite Information
DIMSE-N	DIMSE Services that are performed on Normalized Information

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Term	Definition
IHE	Integrating the Healthcare Enterprise.
IO	Information Object.
IOD	Information Object Definition: a software representation of a real object. An information object is generally a list of characteristics (attributes) that completely describe the object as far as the software is concerned.
Little Endian	A term for encoding the least-significant byte first and remaining bytes in ascending order of significance.
Meta SOP Class	A group of SOP Classes that are used together to provide a high-level functionality.
Module	A logical group of the valid attributes of DICOM information objects.
NEMA	National Electrical Manufacturers Association
OP	Ophthalmic Photography
OPT	Ophthalmic Tomography
Presentation Context	The combination of Transfer Syntax and Abstract Syntax. The Presentation Context defines both what data will be sent (Abstract Syntax) and how the data are encoded (Transfer Syntax).
PDU	Protocol Data Unit: a data object that is exchanged by protocol machines (entities) within a given layer of the protocol stack.
Service Class	A DICOM method for describing a group of operations that a user might want to perform on particular information objects.
SCP	Service Class Provider: a device that provides the services of a DICOM Service Class.
SCU	Service Class User: a device that utilizes the DICOM Service Class provided by another device.
SOP	Service-Object Pair: the combination of a DICOM Information Object and the Service Class that operates upon that object.
TCP/IP	Transmission Control Protocol/Internet Protocol
Transfer Syntax	A part of the DICOM Presentation Context that indicates how an operation and a data object should be encoded.
UID	Unique Identifier: a globally unique identifier that is assigned to every DICOM information object.
VR	Value Representation. A VR is the defined format of a particular data element.
XC	External-camera Photography

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