NORTH STAR IMAGING

DICONDE
CONFORMANCE STATEMENT

efX Software Suite
DICONDE Conformance
version 2.5
North Star Imaging, Inc.

1 DICOM conformance statement overview

The North Star Imaging's efX Software is an imaging viewing software with focus on viewing DX, CR, CT data.

1.1 Table 1: Network Services

Table 1 : Network Services

Name	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computer Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes
Digital Mammography X-Ray Image Storage – for Presentation	Yes	Yes
Digital Mammography X-Ray Image Storage – for Processing	Yes	Yes
Digital Intra – oral X-Ray Image Storage – for Presentation	Yes	Yes
Digital Intra – oral X-Ray Image Storage – for Processing	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	Yes	Yes
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image storage	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Query / Retrieve		

Component Root Query/Retrieve Information Model - FIND	Yes	Yes
Component Root Query/Retrieve Information Model - MOVE	Yes	Yes
Study Root QR Information Model - FIND	Yes	Yes
Study Root QR Information Model - MOVE	Yes	Yes
Verification	Yes	Yes

1.2 Table 2: Media Services

Table 2 : Media Services

Media Storage Application Profile	Write Files (FSC or FSU) Create or Update	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R	Yes	Yes
Magneto-Optical Disk		
General Purpose Drive	Yes	Yes
DVD		
General Purpose DVD - RAM	Yes	Yes
USB and Flash Memory		
General Purpose USB Device	Yes	Yes

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3 Introduction

- NSI manufactures Industrial 2D Digital X-ray and 3D X-ray Computed Tomography systems.
- X-ray/CT scanning allows users to inspect both the external and internal structures of an object without opening or otherwise destroying the item. X-ray/CT scanning is frequently used for R&D, Failure Analysis, Quality Control, Internal Measurements, High Speed 3D Scanning, 3D Metrology and more.
- NSI's Inspection Services Group offers need based scanning services for anyone needing X-ray/CT inspection.

3.1 Revision History

Table 3 : Revision History

Revision	Date	Author	Description
1	3/6/2014	Mark Aziz	• Initial Revision
1.1	9/23/2015	Mark Aziz	• Update Formatting • Added terms and definitions • Added DICONDE / ASTM compliance statements • Updated real-world events tables

1.2	9/29/2015	Mark Aziz	• Added support for :
			  ○ responding to search and retrieval requests
			  ○ Multi-frame secondary capture IOD
			• Updated document format
			• Updated references

2.0	10/24/2018	William Ahrendt	• Updated document format
2.3	01/31/2022	William Ahrendt	• Updated link to DICOM standard • Updated version of windows efX runs on to Windows 10 64-bit
2.3	12/12/2022	William Ahrendt	• Updated references to versions • Updated operating systems supported by efX

3.2 Audience

- The Audiences for this document are those concerned with DICOM system integration, Software engineers, North Star Customers interested in understanding North Star DICOM / DICONDE capabilities.
- It is assumed that the reader is familiar with the DICOM Standard.

- For further reading, please visit: https://www.dicomstandard.org/current/ to get a copy of the DICOM Standard.

3.3 Remarks

3.3.1 DICOM Conformance

- This Conformance statement Document describes the DICOM implementations of North Star Imaging Inc.
- This Conformance statement is not intended to replace standard validation with other DICOM Nodes / Services to ensure proper exchange of information.
- For more information, please contact North Star Imaging Inc.

3.3.2 DICONDE compliance

3.3.2.1 BSS7108 Compliance

- This serves as a statement of compliance that efX Software produced by North Star Imaging is compliant with BSS7108 (ORG) - Boeing Specification Support Standard for Qualification of Digital Detector Array Systems For Casting Inspection – Section 5.3.3 item (9).
- To fulfill compliance to BSS7108 Section 5.3.3 item (9), an example DICONDE (DCM) DR file generated by the efX Software may be attached to this statement of compliance.

3.3.2.2 ASTM E 2339 – 11 Compliance

- This serves as a statement of compliance that efX Software produced by North Star Imaging is compliant with ASTM E 2339-11 (Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation)

3.3.2.3 ASTM E 2699 – 13 Compliance

- This serves as a statement of compliance that efX Software produced by North Star Imaging is compliant with E 2699-13 (Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for Digital Radiographic (DR) Test Methods).

3.3.2.4 ASTM E 2767 – 13 Compliance

- This serves as a statement of compliance that efX Software produced by North Star Imaging is compliant with E 2767-13 (Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for X-ray Computed Tomography (CT) Test Methods).

3.4 Terms and Definitions

Abstract Syntax	The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Find SOP Class, Digital Radiography Image Storage SOP Class.
Application Entity (AE)	An end point of a DICOM information exchange, including the DICOM network or media interface software, i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.
Application Entity Title (AET)	The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.
Application Context	The specification of the type of communication used between Application Entities. Example: DICOM network protocol.
Association	A network communication channel set up between Application Entities. Attribute A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements.
Information Object Definition (IOD)	The specified set of Attributes that comprise a type of data object does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: DR Image IOD, CT Image IOD.
Joint Photographic Experts Group (JPEG)	A set of standardized image compression techniques, available for use by DICOM applications.
Media Application Profile	The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)
Module	A set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation	First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.
Presentation Context	The set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
Protocol Data Unit (PDU)	A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages
Service Class Provider (SCP)	Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User).
Service Class User (SCU)	Role of an Application Entity that uses a DICOM network service; typically, a client.
Service/Object Pair Class (SOP Class)	The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: DR Image Storage Service.
Service/Object Pair Instance (SOP Instance)	An information object: a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.
Tag	A 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Component ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]
Transfer Syntax	The encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.
Unique Identifier (UID)	A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
Value Representation (VR)	The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving

application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM / DICONDE Communication

Two Application Entities (systems / software applications) that want to communicate with each other over a network using DICOM/DICONDE protocol must first agree on several things during an initial network "handshake".

One of the two systems must initiate an Association (a connection to the other system), and ask if specific services, information, and encoding can be supported by the other system (Negotiation).

DICOM specifies several network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes.

The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the systems to agree on Roles - which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server).

The Association Negotiation finally enables exchange of maximum network packet (PDU) size and network service options (called Extended Negotiation information). The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include the queries for lists of stored studies and images as well as the transferring of image objects.

Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition and sent using the negotiated Transfer Syntax.

There is a Default Transfer Syntax that all systems must accept, and each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

3.6 Abbreviations

Abbreviations are as follows:

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSDS	Grayscale Softcopy Presentation State
IAN	Instance Availability Notification
IOD	Information Object Definition
ISO	International Standard Organization
JPEG	Joint Photographic Experts Group
PDU	DICOM Protocol Data Unit
LUT	Look Up Table
P-LUT	Presentation Look Up Table
Q/R	Query Retrieve
R	Required (Key Attribute)
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SCN	Study Content Notification
SOP	DICOM Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transfer Support Security
U	Unique (Key Attribute)
UID	Unique Identifier
VR	Value Representation

3.7 References

- Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1- 3.16, 2015
- Boeing Specification Support Standard for Qualification of Digital Detector Array Systems For Casting Inspection (BSS 7108) – ORG, 19 NOV 2013
- Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) - ASTM E 2339 – 11
- Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for Digital Radiographic (DR) Test Methods - ASTM E 2699 - 13
- Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for X-ray Computed Tomography (CT) Test Methods - ASTM E 2767 - 13

4 Networking

This section contains the networking related services for the efX Software application.

4.1 Implementation Model

The implementation model consists of three sections:

1. The application Data flow diagram, specifying the relationship between Application Entities and the "external world" or Real-World activities.
2. A functional description of each Application Entity
3. The sequencing constraints among them.

4.1.1 Application Data Flow Diagram

- The efX Software application is a windows based application that runs on Windows 10, 64-bit.
- A remote DICOM / DICONDE Application Entity initiate an association with efX Software for DICOM / DICONDE Storage Service Class. efX Software will accept the association if the remote DICOM / DICONDE Application Entity is registered with efX Software.
- When and if efX Software accepts the association, the remote DICOM / DICONDE Application Entity will transmit the DICOM Information objects to efX Software, which will save it to the LDFS (see Figure 1: Application data flow diagram).
- When and if efX Software rejects the association, it will send a rejection PDU to the remote DICOM / DICONDE Application entity initiating the association.
- efX Software Application Entity may initiate an association with another DICOM / DICONDE Application Entity. If and when the Association is accepted, efX Software will transmit the DICOM Image information objects (IODs) to the remote DICOM / DICONDE Application Entity. efX Software may also transmit Query requests and C-Move commands to the other DICOM / DICONDE Application Entity.
- Figure 1: Application data flow diagram below describes the Application Data Flow Diagram.

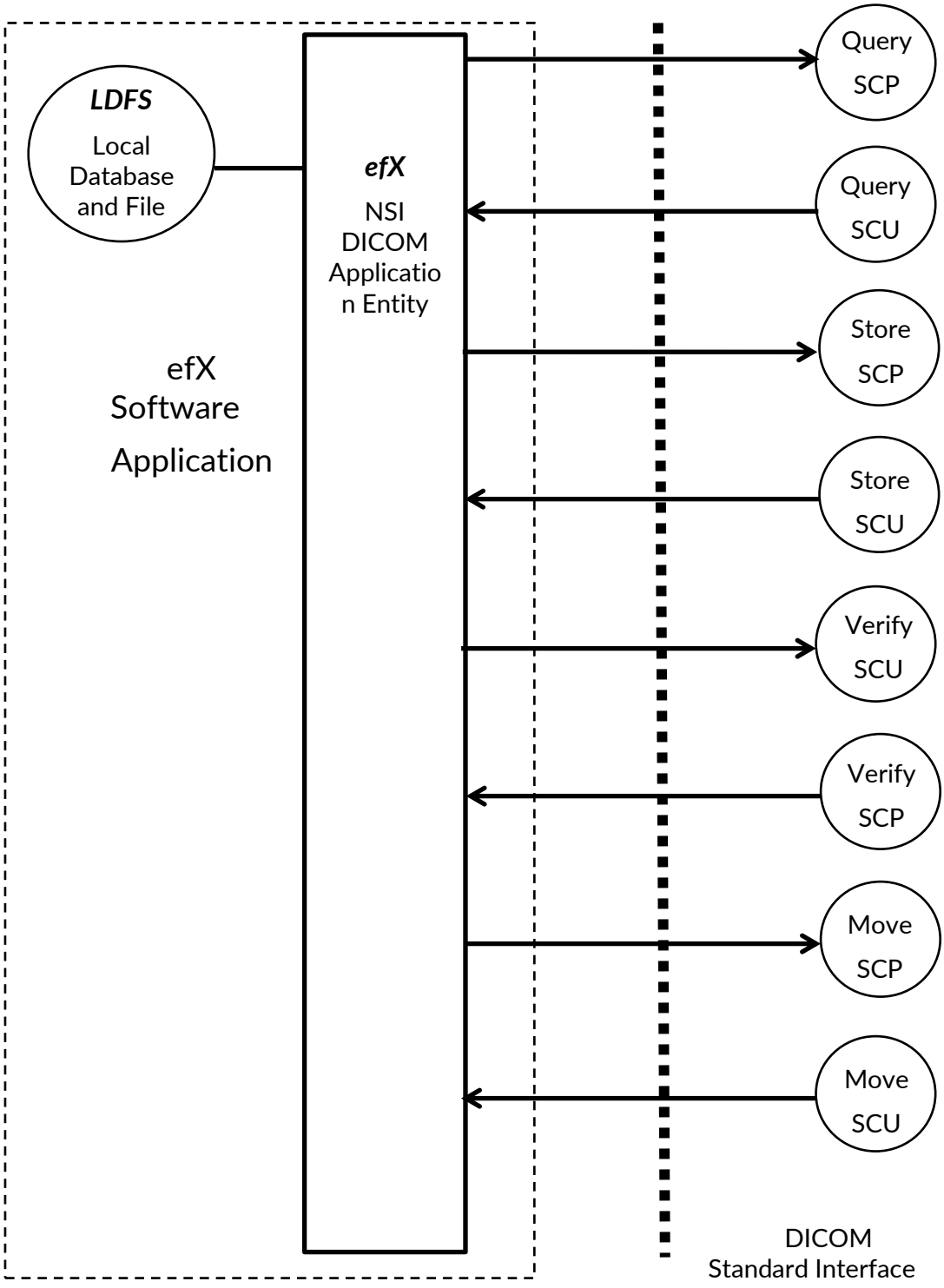

Figure 1: Application data flow diagram

4.1.2 Functional Definitions

4.1.2.1 Functional Definition of the efX Application Entity

The efX Software Application (efX AE) can:

1. Initiate and receive DICOM / DICONDE association requests from remote Application Entities.
2. Query and retrieve other Application Entities for DICOM Objects.
3. Send and receive DICOM / DICONDE Images from other Application Entities.
4. Respond to query and retrieve requests from other Application Entities.
5. Forward DICOM Objects to another Application Entity.

4.1.3 Sequencing Real World Activities

Please refer to the sequencing of Real World Activities in the AE Specification below.

4.2 AE Specifications

Details of the efX Software Application Entity are specified in this section.

4.2.1 efX Application Entity

4.2.1.1 SOP Classes

The Application Entity provides Standard Conformance to the following SOP Classes:

Table 4 : SOP Classes for AE Storage

Name	UID	User of Service (SCU)	Provider of Service (SCP)
Verification	1.2.840.10008.1.1	Yes	Yes
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Digital Intra – oral X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes

Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Component Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Component Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Component Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.1.3	Yes	Yes
Study Root QR Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root QR Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Study Root QR Information Model - GET	1.2.840.10008.5.1.4.1.2.2.3	Yes	Yes

4.2.1.2 Association Policies

4.2.1.2.1 General

efX Software will initiate associations with other DICOM Application Entities. efX Software supports a maximum PDU value of 28,672 bytes.

Table 5 : DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of associations

- The efX Software application will accept a single DICOM association at a time.
- The efX Software application can initialize simultaneous Associations with any number of DICOM Application Entities.

Table 6 : Number of Associations as an association initiator

Maximum number of simultaneous associations	4294967296 (may be limited by Operating system)

Table 7 : Number of Associations as an association acceptor

Maximum number of simultaneous associations	4294967296 (may be limited by Operating system)

4.2.1.2.3 Asynchronous Nature

All efX Software transactions are Synchronous operations. There exists no Asynchronous transaction.

4.2.1.2.4 Implementation identification information

Below is the efX Software Implementation Class UID and Implementation Version Name

Table 8 : DICOM Implementation and Version

Implementation Class UID	1.2.840.800.635.8392.78.83.73
Implementation Version Name	XVIEW 2.5

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity - Sending C-Echo to a remote Application Entity

This Activity occurs when efX Software application (efX AE) sends a C-Echo command to another remote Application Entity

4.2.1.3.1.1 Description and Sequencing of activities

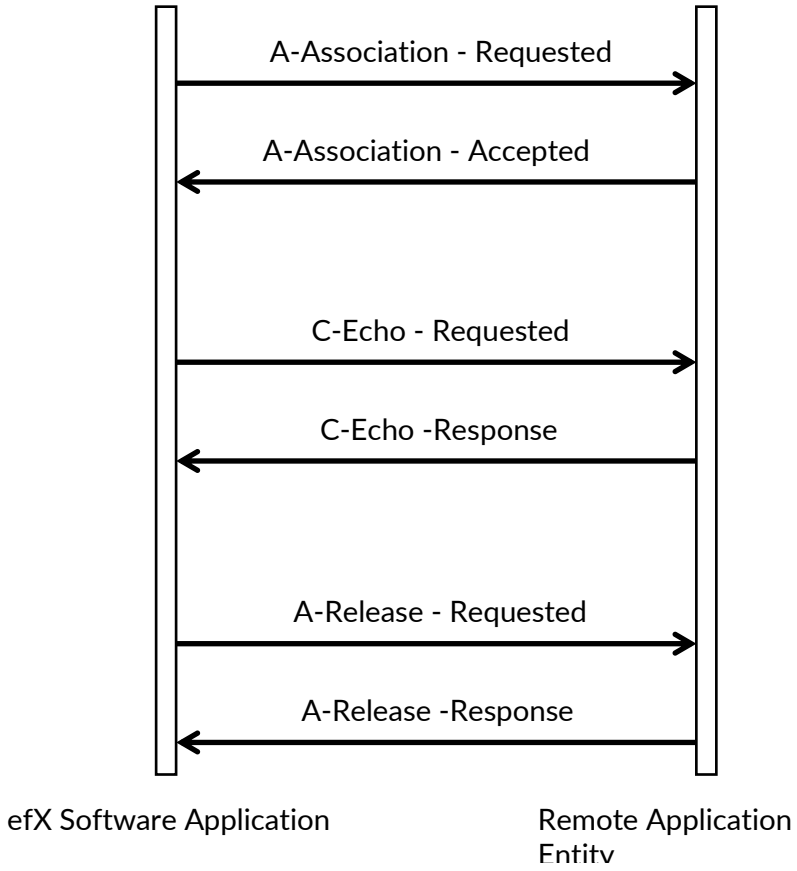

Figure 2: Sequence of events when sending C-Echo to remote AE

- The user selects the remote Application Entity from the appropriate list in efX Software, and attempts to establish an association with that remote Application Entity.
- Once the association is accepted by the remote Application Entity, the Echo command is sent from efX Software to the remote Application Entity.
- Once the C-Echo response is validated, then efX Software will request to release the association.

4.2.1.3.1.2 Proposed Presentation context

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 9 : Proposed Presentation context for sending C-Echo to a remote Application Entity

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None

4.2.1.3.1.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 10 : DICOM Command response status handling behavior for sending C-Echo to a remote AE

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The Echo is successfully completed
*	*	Any other status code	The Association is aborted using A-Abort and the request fails.

The behavior of Storage AE running communication failure is summarized in the Table below

Table 11 : DICOM command communication failure behavior for sending C-Echo to a remote AE

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.3.2 Activity - Sending DICOM / DICONDE objects to a remote Application Entity

- This Activity occurs when efX Software application (efX AE) sends Image(s) to another remote Application Entity.

4.2.1.3.2.1 Description and Sequencing of activities

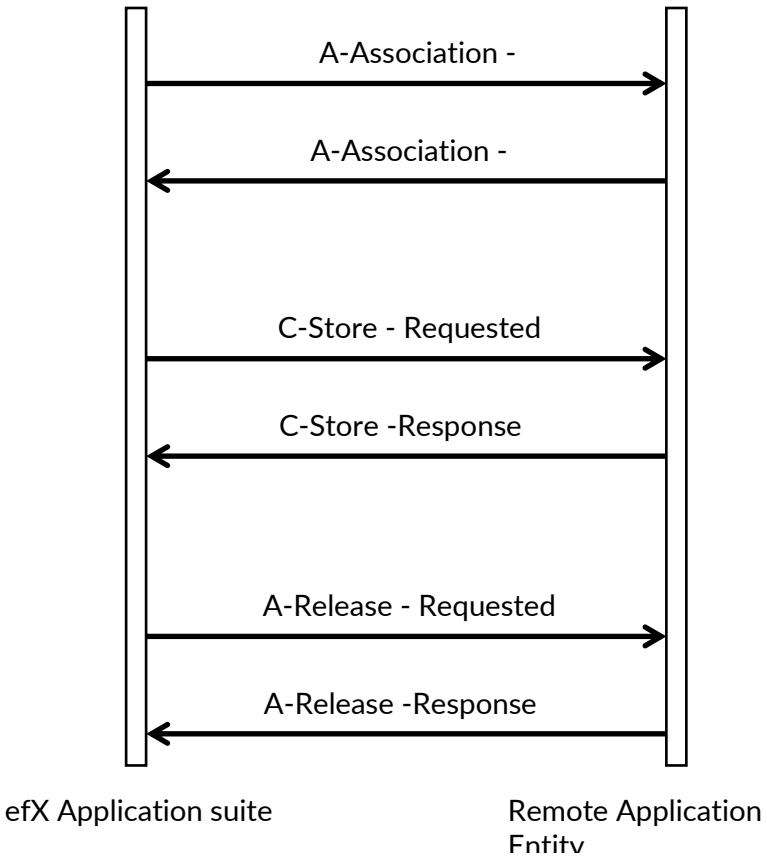

Figure 3: Sequence of events when sending DICONDE object(s) to remote AE

- The user would select a group or a single image, and request them to be sent to a remote AE title. Each request is forwarded to a job queue and processed individually.
- If efX Software successfully establishes an association to the remote Application Entity, it will transfer each marked image one after the other to through an association.
- The Status of the transfer will be available and reported back to the user.
- In case of failure for any reason including unsuccessful status from the C-Store command to the remote Entity, the operation will terminate, and the user will be informed, and the issue will be logged.

4.2.1.3.2.2 Proposed Presentation context

efX Software is capable of proposing the presentation contexts shown in the following table based on the DICOM/DICONDE objects being transmitted:

Table 12 : Proposed Presentation context for sending DICOM / DICONDE objects to a remote AE

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Digital Intra – oral X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None

Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None

4.2.1.3.2.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 13 : DICOM Command response status handling behavior for sending DICONDE objects to a remote AE

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

The behavior of Storage AE running communication failure is summarized in the Table below

Table 14: DICOM command communication failure behavior for sending DICONDE objects to a remote AE

Exception	Behavior
Timeout	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Association Aborted	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

4.2.1.3.3 Activity - Sending DICOM/DICONDE Objects to a remote Application Entity in Response to retrieve requests

This Activity occurs when efX Software application (efX AE) sends Image(s) to another remote Application Entity because that remote Application Entity has requested that object through a C-Move (retrieve) request (C-Move request addressed in section 4.2.1.4.4 below).

4.2.1.3.3.1 Description and Sequencing of activities

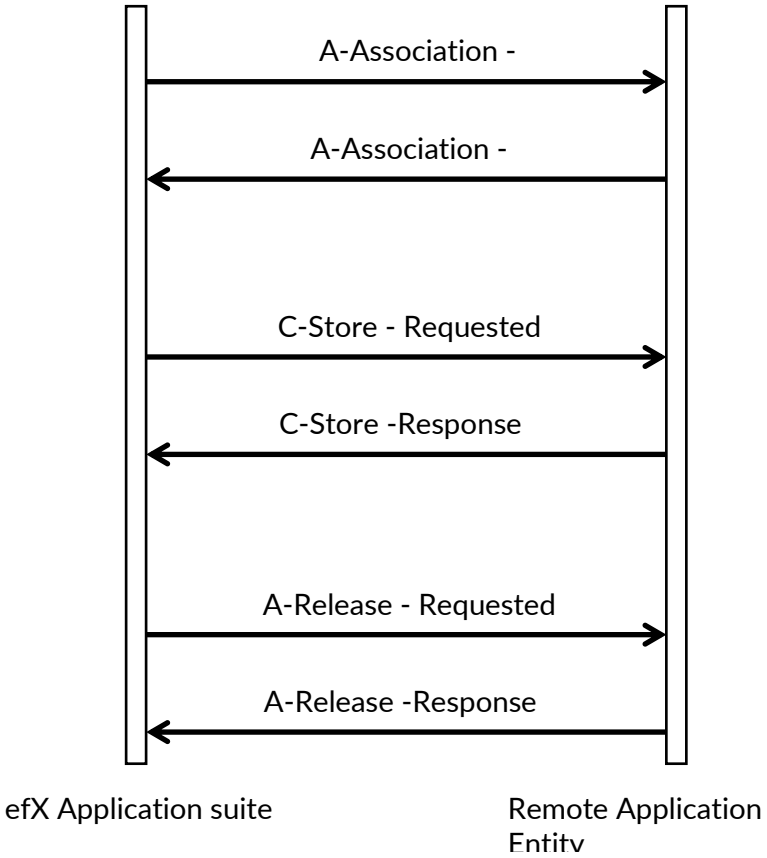

Figure 4: Sequence of events when sending DICONDE object(s) to remote AE in response to retrieve request

- efX Software would receive a retrieve request from a remote Application Entity, once the association is accepted and the presentation contexts is negotiated, then the efX Software will start sending the DICOM objects selected in a different association as a sub-operation as specified below (please see section 4.2.1.4.4 below for more details).
- If efX Software successfully establishes an association to the remote Application Entity, it will transfer each marked image one after the other to through an association.
- The Status of the transfer will be available and reported back to the user.
- In case of failure for any reason including unsuccessful status from the C-Store command to the remote Entity, the operation will terminate, and the user will be informed, and the issue will be logged.

4.2.1.3.3.2 Proposed Presentation context

- efX Software is capable of proposing the presentation contexts shown in the following table based on the DICOM/DICONDE objects being transmitted:

Table 15: Proposed Presentation context for sending objects to a remote AE in response to retrieve request

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Intra – oral X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

4.2.1.3.3.3 SOP Specific Conformance for SOP Classes

- The table below shows the response behavior for the association initiation policies.
- Please see Table 13 : DICOM Command response status handling behavior

The behavior of Storage AE running communication failure is summarized in the Table below

- Please see Table 14: DICOM command communication failure behavior

4.2.1.3.4 Activity - Searching a remote Application Entity

This Activity occurs when efX Software application (efX AE) searches DICOM/DIOCNDE objects on another remote Application Entity.

4.2.1.3.4.1 Description and Sequencing of activities

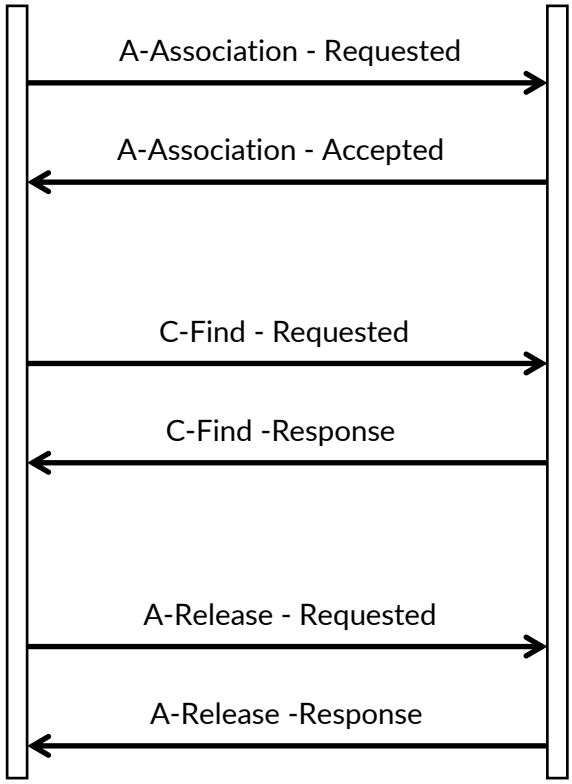

Figure 5: Sequence of events when sending a C-Find Command to remote AE

- The user shall select the Application Entity to search, the level of search (Patient, Study, Series, Image).
- The user shall construct the Query through the efX Software application.
- efX Software will initiate the association with the remote Application Entity.
- Once the Association is accepted, efX Software will construct the Query and sends it to the remote Application Entity.
- The remote Application Entity will responds with the Query Results and efX Software shall present the user with the Query Results.
- Once the Query Results are received, efX Software will Release the Association.

4.2.1.3.4.2 Proposed Presentation context

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 16 : Proposed Presentation context for searching a remote AE

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Component Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Study Root QR Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None

4.2.1.3.4.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 17 : DICOM Command response status handling behavior for searching a remote AE

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

The behavior of Storage AE running communication failure is summarized in the Table below

Table 18 : DICOM command communication failure behavior for searching a remote AE

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.3.5 Activity - Retrieving from remote Application Entity

This Activity occurs when efX Software application (efX AE) retrieves DICOM/DICONDE objects from a remote Application entity

4.2.1.3.5.1 Description and Sequencing of activities

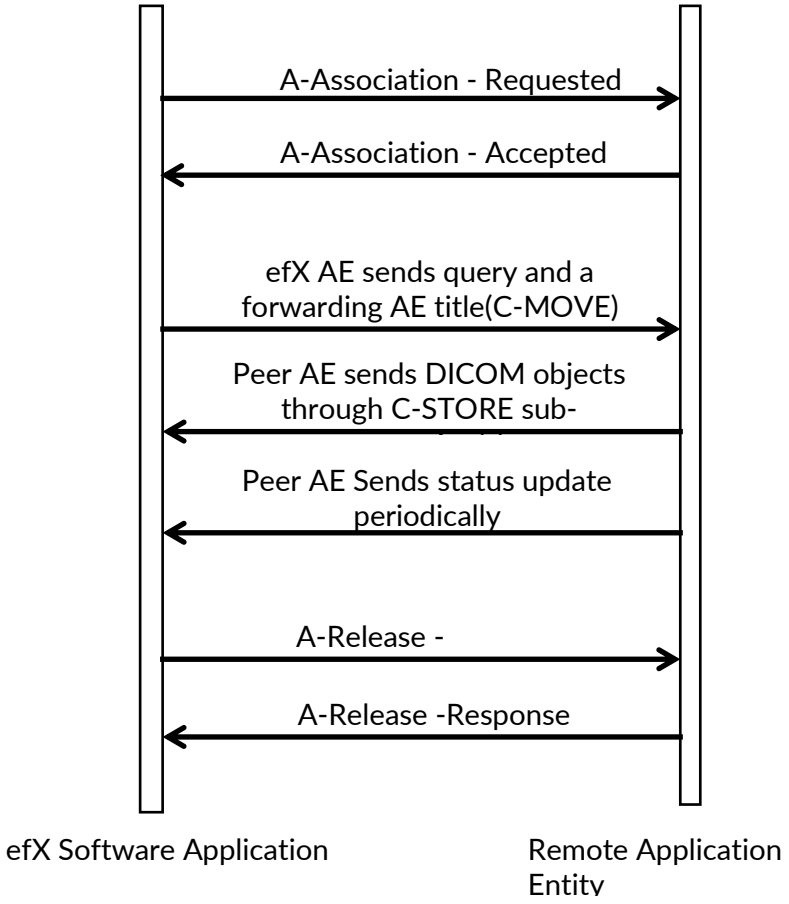

Figure 6: Sequence of events when sending C-MOVE Command to remote AE

- The user shall select a DICOM object(s) on a remote Application Entity in the efX Software graphical user interface.
- The user would request to retrieve selected DICOM objects
- efX Software will initiate the association with the remote Application Entity.
- Once the Association is accepted, efX Software will construct the C-MOVE command and sends it to the remote Application Entity.
- The remote Application Entity will responds with forwarding the DICOM object(s) selected to the efX AE.
- Once the DICOM object(s) selected have been retrieved, efX Software will Release the Association.

4.2.1.3.5.2 Proposed Presentation context

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 19 : Proposed Presentation context for retrieving from remote AE

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Component Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCU	None

4.2.1.3.5.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 20 : DICOM Command response status handling behavior for retrieving from remote AE

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

The behavior of Storage AE running communication failure is summarized in the Table below

Table 21 : DICOM command communication failure behavior for retrieving from remote AE

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity - Receiving C-Echo from a remote Application Entity

This Activity occurs when efX Software application (efX AE) receives a C-Echo command from another remote Application Entity

4.2.1.4.1.1 Description and Sequencing of activities

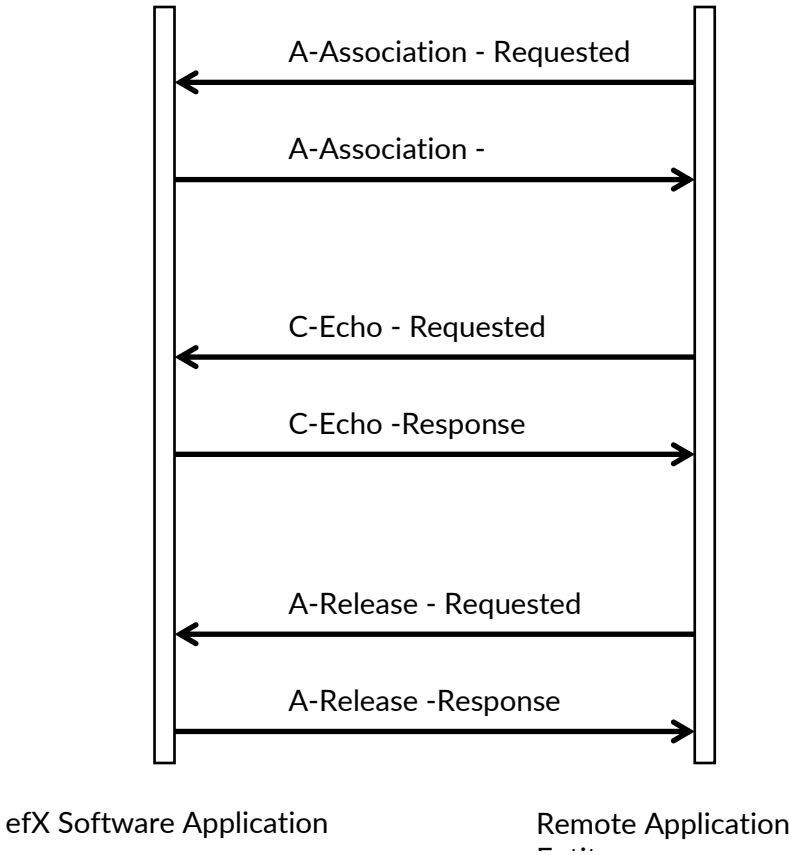

Figure 7: Sequence of events when recieving C-Echo command from remote AE

- Remote Application Entity requests an association with efX Software.
- efX Software look up the IP and the Application Entity (AE) title from the list of approved IP and Application Entity (AE) titles, if a match is found, efX Software sends an Association acceptance PDU to the remote Application Entity; If a match was not found, efX Software will send an Association Rejection PDU to the remote Application Entity.
- Remote Application Entity sends C-Echo command to efX Software.
- efX Software responds to the C-Echo command to the remote Application Entity,
- Peer Application Entity releases the association.

efX Software may reject an Association attempt from a peer Application Entity for the reason presented below:

- The Called AE Title not recognized – The Association Request contained an unrecognized called AE Title.
- The association request could not be parsed.

4.2.1.4.1.2 Proposed Presentation context

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 22 : Proposed Presentation context for receiving C-Echo from a remote AE

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

4.2.1.4.1.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 23 : DICOM Command response status handling behavior for receiving C-Echo from a remote AE

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The Echo is successfully completed
Any	Any other than Success	Any	The Association is aborted using A-Abort and the request fails.

Table 24 : DICOM command communication failure behavior for receiving C-Echo from a remote AE

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.4.2 Activity - Receiving DICOM/DICONDE objects and storage commitment requests

This Activity occurs when efX Software application (efX AE), acting as an SCP, receives images and storage commitment requests.

4.2.1.4.2.1 Description and Sequencing of activities

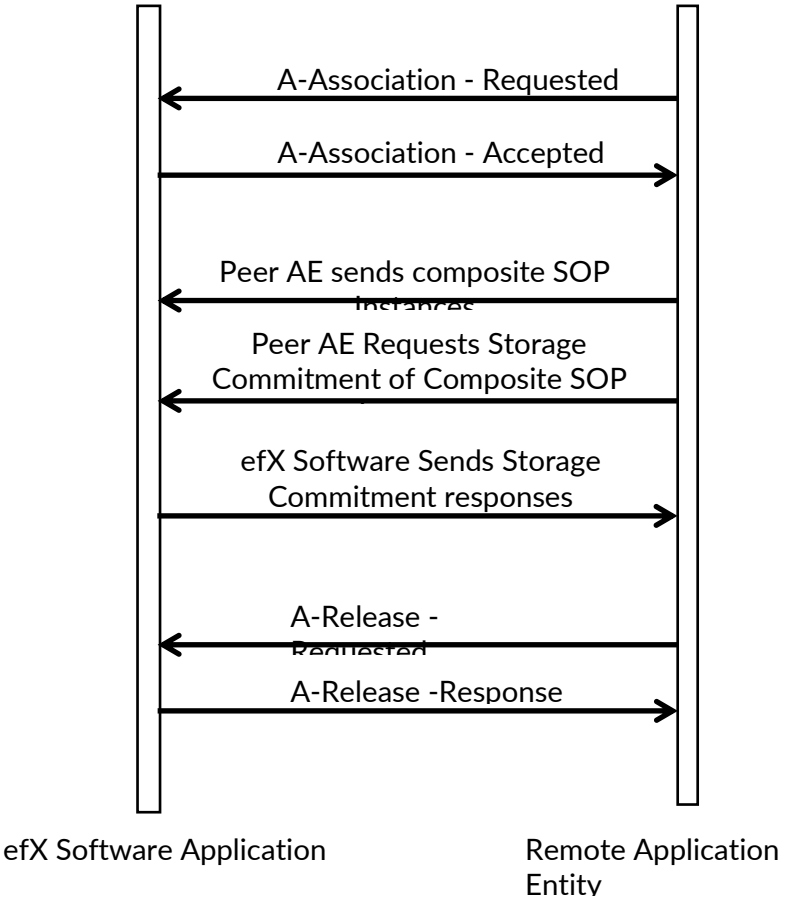

Figure 8: Sequence of events when recieving DICONDE object(s) from remote AE

The following sequence constraints illustrated above, apply to the STORAGE-SCP AE for handling Storage Commitment Push Model Requests over the original Association:

- Peer AE opens an Association with the STORAGE-SCP AE.
- Peer AE sends zero or more Composite SOP Instances.
- Peer AE requests Storage Commitment of Composite SOP Instance(s).
- STORAGE-SCP AE sends Storage Commitment Push Model Notification request from peer AE.
- Peer AE closes the association.

efX Software may reject an Association attempt from a peer Application Entity for the reason presented below:

- The Called AE Title not recognized – The Association Request contained an unrecognized called AE Title.
- The association request could not be parsed.

4.2.1.4.2.2 Accepted Presentation contexts

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 25 : Proposed Presentation context for receiving DICOM/DICONDE objects

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Digital Intra – oral X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

4.2.1.4.2.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 26 : DICOM Command response status handling behavior for receiving DICOM/DICONDE objects

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
Error	Unable to create new object for this SOP class	AA01	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Time-based request received for a non-time based original SOP-Class	AA03	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Invalid Request	AA04	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

Table 27: DICOM command communication failure behavior for receiving DICOM/DICONDE objects

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.4.3 Activity - Receiving Search requests

- This Activity occurs when efX Software application (efX AE), acting as an SCP, receives a C-FIND PDU (Search request) including a Query, a search root type.
- efX Software will respond with a list of Datasets that match the query submitted by the remote Application Entity.

4.2.1.4.3.1 Description and Sequencing of activities

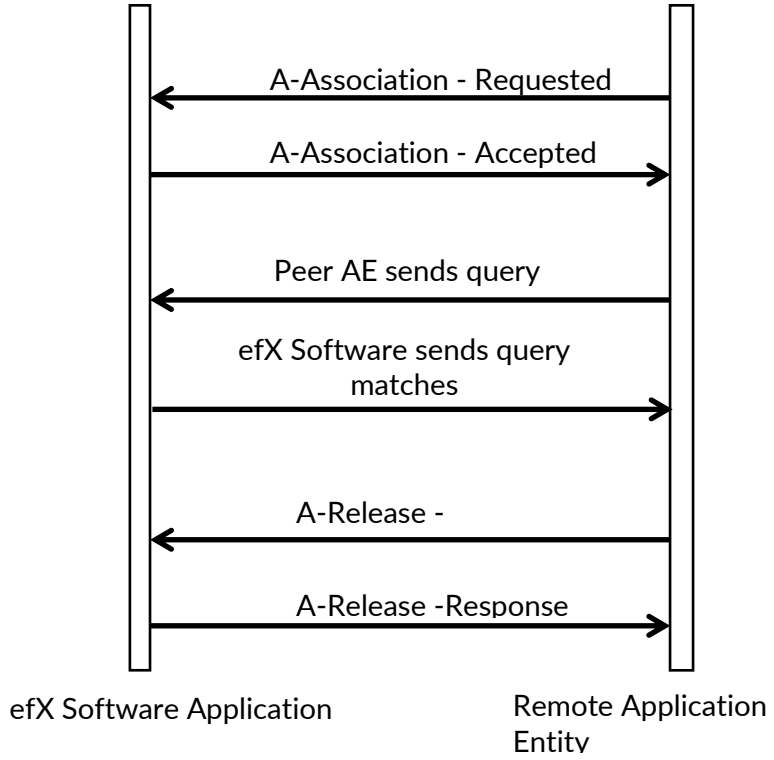

Figure 9: Sequence of events when when recieving C-FIND command from remote AE

The following sequence constraints illustrated above, describes how the efX AE handles responding to search requests from remote Application Entities:

- Peer AE requests an Association with the efX AE.
- If the association is accepted, the Peer AE sends the query to the efX AE.
- The efX AE will search its local database, and responds back with a collection of PDU that contains the matching responses to the submitted queries.
- efX AE will release the association.

efX Software may reject an Association attempt from a peer Application Entity for the following reason:

- The Called AE Title not recognized – The Association Request contained an unrecognized called AE Title.
- The association request could not be parsed.

4.2.1.4.3.2 Accepted Presentation contexts

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 28 : Proposed Presentation context for Receiving search requests

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Component Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Study Root QR Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

4.2.1.4.3.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 29 : DICOM Command response status handling behavior for receiving search requests

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
Refused	Out of Resources Unable to Calculate number of matches	A701	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Time-based request received for a non-time based original SOP-Class	AA03	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Invalid Request	AA04	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

Table 30: DICOM command communication failure behavior for receiving search requests

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.2.1.4.4 Activity - Receiving retrieval requests

This Activity occurs when efX Software application (efX AE), acting as an SCP, receives requests to send DICOM/DIOCNDE objects to another remote Application entity.

4.2.1.4.4.1 Description and sequencing of activities

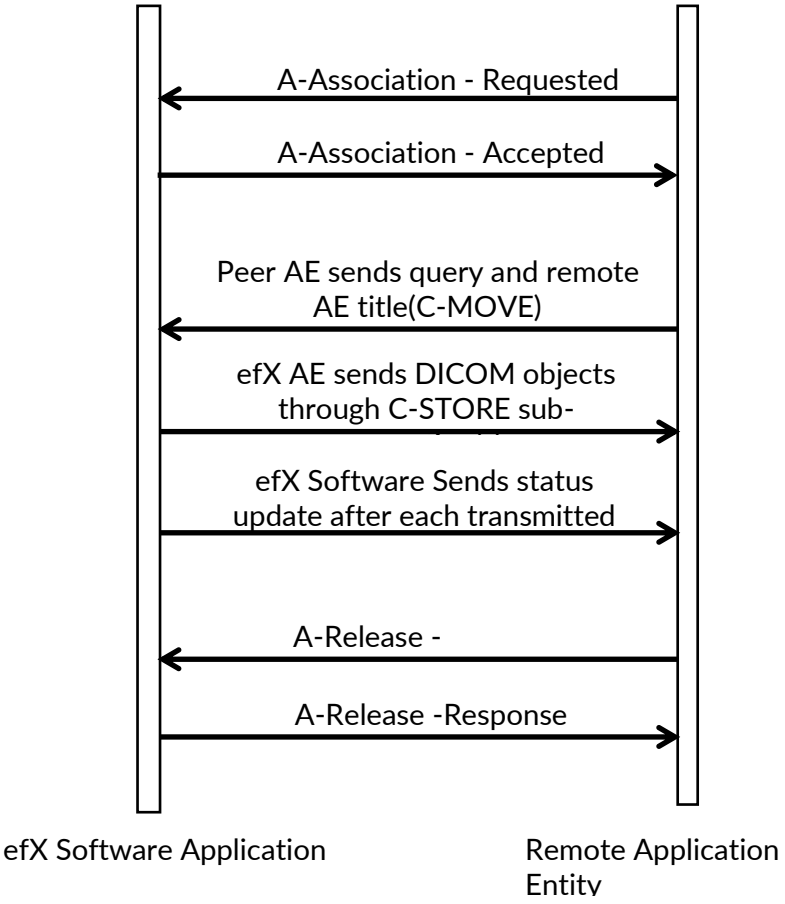

Figure 10: Sequence of events when recieving retreive requests

The following sequence constraints illustrated above, apply to the efX AE for handling the receiving of retrieval requests from other Application Entity (C-MOVE requests)

- Peer AE requests an Association with the efX AE.
- If the association is accepted, the Peer AE sends the query and the retrieve request to the efX AE.
- The efX AE will search its local database to find matching objects, and will send them on a separate association(s) to the forwarding Application Entity described in the retrieve request (see Activity - Sending DICOM/DICONDE Objects to a remote Application Entity in Response to retrieve requests)
- efX AE will send storage commitments update after each DICOM/DICONDE object has been processed over the initial opened association according to the standard communication for C-MOVE operation.
- Peer remote Application Entity will release the Association when done.

efX Software may reject an Association attempt from a peer Application Entity for the following reason:

- The Called AE Title not recognized – The Association Request contained an unrecognized called AE Title.
- The association request could not be parsed.

4.2.1.4.4.2 Accepted Presentation contexts

efX Software is capable of proposing the presentation contexts shown in the following table:

Table 31 : Proposed Presentation context for receiving retrieval requests

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Component Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.1008.1.2	SCP	None

4.2.1.4.4.3 SOP Specific Conformance for SOP Classes

The table below shows the response behavior for the association initiation policies.

Table 32 : DICOM Command response status handling behavior for receiving retrieval requests

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The operation was performed successfully
Refused	Out of Resources Unable to Calculate number of matches	A701	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Refused	Out Of Resources Unable to perform sub-operations	A702	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Refused	Move Destination Unknown	A801	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Identifier does not match SOP Class	A900	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

Error	None of the frames requested were found in the SOP Instance	AA00	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Time-based request received for a non-time based original SOP-Class	AA03	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Invalid Request	AA04	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Sub-operations terminated due to Cancel Indication	FE00	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
Error	Sub-operations Complete one or more failures or warnings	B000	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.
*	Unable to Process	Any other status code	The Association is aborted using A-Abort and the send job is marked as failed. The status meaning is logged, and the job failure is reported to the user.

Table 33: DICOM command communication failure behavior for receiving retrieval requests

Exception	Behavior
Timeout	The association is aborted using A-Abort and the command marked as failure.
Association Aborted	The command is marked as failed and the issue is logged and reported to the user.

4.3 Network Interfaces

efX Software uses DICOM V3.0 TCP/IP Network Communication standard as defined in PS 3.8 section of the DICOM Standard.

4.3.1 Physical Network Interface

Table 34 : Supported Physical Network Interfaces

Ethernet 1000baseT

Ethernet 100baseT

Ethernet 10baseT

- efX Software depends on the operating system ability to communicate over the physical Network interface.
- Windows 10 and 11 are the only operating systems supported by the efX Software product family.

4.3.2 Additional Protocols

Not Applicable

4.4 Configuration

Any implementation's DICOM conformance may be dependent upon configuration, which takes place at the time of installation. Issues concerning shall be addressed in this section.

4.4.1 AE Title / Presentation Address Mapping

An important installation issue is the translation from AE Title to Presentation Address. How this is to be performed shall be described in this section

4.4.1.1 Local AE Titles

The table below shows the default preconfigured AE Title Configuration. It is advised that the user customize those settings per installation.

Table 35 : AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP port
efX Software Application Entity Title	My_AE_Title	104

4.4.1.2 Remote AE Title / Presentation Address Mapping

Configuration of the remote AET port number, IP addresses and capabilities is specified here.

4.4.1.2.1 Remote SCP 1

Remote AE Titles, TCP/IP Addressed and ports can be configured though the DICONDE configuration page in efX Software.

efX Software requires the following items for remote SCP / SCU configuration node :

- AE Title
- TCP/IP address
- Port number

4.4.2 Parameters

The table below shows important parameters of the system, as well as indicates which parameters are configurable by the user:

Table 36 : Configuration Parameters Table

Parameter	Configurable (Yes / NO)	Default Value
General Parameters		

Time-out waiting for acceptance or rejection response to an Association Open Request	NO	10 seconds
General DIMSE level time-out values	NO	No Time-out
Time-out waiting for response to TCP/IP connect request (Low-level time-out)	NO	No Time-out
Maximum number of simultaneous Associations	NO	Maximum number allowed by operating system
AE Specific Parameters		
Maximum PDU Size that AE can receive	NO	28,672
Maximum PDU Size that AE can Send	NO	28,672
Listening port	YES	104
Default AE Title	YES	My_AE_Title
Default Transfer syntax	NO	Implicit VR Little Endian

5 Media Interchange

5.1 Implementation Model

The implementation Model shall identify the DICOM Application Entities in a specific implementation and relate the Application Entities to Real-World activities.

5.1.1 Application Data Flow Diagram

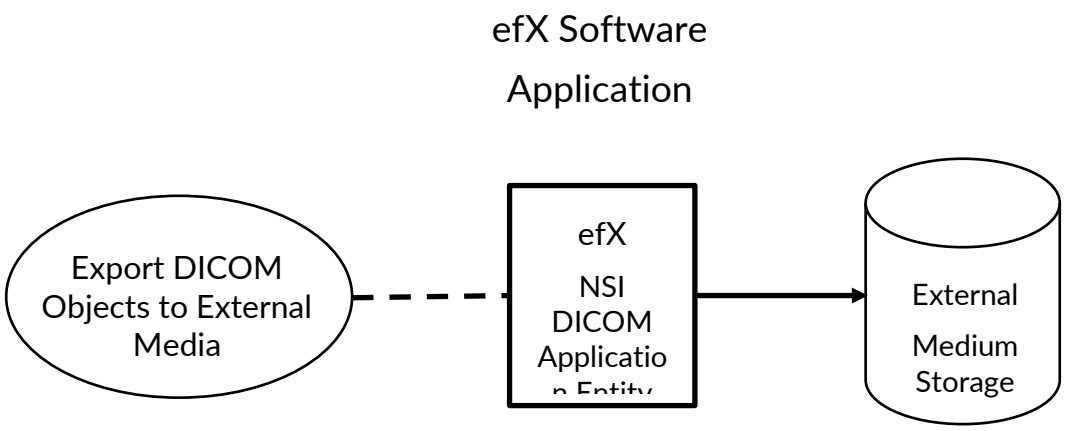

Figure 11: Implemented application data flow diagram

- The efX exports images and Presentation States to external media storage (e.g.: DVD, CD, Flash drives, network locations, etc....).
- It is associated with the local real-world activity "Export DICOM objects to external media."
- "Export DICOM objects to external media" is performed upon request for selected patients (components), studies, series, instances (images or presentation states).

5.1.2 Functional Definitions of AEs

5.1.2.1 Functional Definitions of efX Application Entity

- The user shall select the images, Presentation states, Volumes to be exported.
- The user shall click on the export Media Icon.
- The user shall chose the type of external media desired, and initiate export Job
- The contents of the DICOM/DICONDE objects will be written on the external Media.

5.1.3 Sequencing of Real-World Activities

At least one image or presentation state must exist and be selected before export job can be invoked. The operator can insert / mount / make available external media at any time before or after invocation of the export job.

The efX Application Entity will wait indefinitely for a media to be inserted, made available or mounted before starting the write process.

5.1.4 File Meta Information for Implementation Class and Version

The implementation information written to the File Meta Header in each file is:

Table 37 : Implementation information written to the File Meta Header

Implementation Class UID	1.2.840.800.635.8392.78.83.73
Implementation Version Name	efX Software 2.4.0

5.2 AE Specifications

5.2.1 efX Application Entity Specifications

efX provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class.

The application profiles and roles are listed below:

Table 38 : Application profiles and roles

Application Profiles Supported	Real-World Activity	Role	SC option
STD-GEN-CD	Export to CD-R / DVD R	FSC	Interchange
STD-GEN-DVD	Export to CD-R / DVD R	FSC	Interchange
STD-GEN-CD	Load Directory of File	FSU	
STD-GEN-DVD-RAM	Load Directory of File	FSU	

5.2.1.1 Real-World Activities

5.2.1.1.1 Activity – Export to CD-R

- The efX acts as an FSC using the interchange option when requested to export SOP instances form the local database to a CD-R or a DVD-R medium.
- A Dialog will be presented allowing the user to modify the suggested media label and provides control over the available media capacity.
- If the contents of the current selection do not fit on a single media, the user will be alerted to modify content and try again.
- The contents of the export job will be written together with a corresponding DICOMDIR to a single-session CD / DVD.

5.2.1.1.1.1 Media Storage Application Profile

The efX supports STD-GEN-CD and STD-GEN-DVD Application Profiles.

5.2.1.1.1.2 Options

The efX supports the SOP Classes and Transfer Syntaxes listed in the Table below:

Table 39 : SOP Classes and Transfer Syntaxes for Activity

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2

Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.1008.1.2
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian	1.2.840.1008.1.2
Digital Intra – oral X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian	1.2.840.1008.1.2
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian	1.2.840.1008.1.2
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.1008.1.2
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.1008.1.2
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.1008.1.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.1008.1.2
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian	1.2.840.1008.1.2
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.1008.1.2
Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian	1.2.840.1008.1.2
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.1008.1.2

5.2.1.1.2 Activity – Load File or Directory

When a DICOMDIR is loaded, it will be imported to the local database, and it may be navigated through the local database.

5.3 Augmented and Private Application Profiles

There are no augmented or private profiles implemented.

6 Support of Character Sets

efX Software DICOM Application supports the following character set:

Table 40 : Character sets supported

Character Set	Description	ISO Registration Number
ISO_IR 100	Latin Alphabet No. 1 supplementary set	ISO_IR 100

7 Security

efX Software does not support any specific security measures.

It is assumed that efX Software is used within a secured environment. It is assumed that a secured environment includes at minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to efX Software.
- Firewall or router protections to ensure that efX Software only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g., such as a Virtual Private Network (VPN))

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

This Section specifies each IOD created. It also specifies the Attribute Name tag, VR and Value. The Value should specify the range and source.

Abbreviations used for the tables are:

VNAP – Value Not Always Present (attribute sent zero length if no value is present)

ANAP – Attribute Not Always Present

ALWAYS – Always present with a value

EMPTY – Attribute is sent without a value

Abbreviations used for the source of the data values in the tables are:

USER – the attribute value source is from User input

AUTO – the attribute value is generated automatically

CONFIG – the attribute value source is a configurable parameter

8.1.1.1 Computed Radiography IOD

Table 41 : Computed Radiography IOD

DICOM Module	DICONDE Module	Reference	Presence of Module
Patient	Component	Table 45 : Patient / Component Module Of Created SOP Instances	ALWAYS
General Study	Component Study	Table 46 : Component Study Module	ALWAYS
General Series	Component Series	Table 47 : Component Series Module	ALWAYS
CR Series	NDE CR Series	Table 43 : CT Image Storage IOD**Table 50 : NDE CR Series Module Attributes**	ALWAYS
General Equipment	NDE Equipment	Table 48 : NDE Equipment Module	ALWAYS
Image Pixel	Image Pixel	Table 49 : Image Pixel Module	ALWAYS
Presentation State	Presentation State	Table 54 : Presentation State Module	ANAP
	Display Area	Table 55 : Displayed Area Module	ANAP

	Graphic Annotation	Table 56 : Graphic Annotation Module	ANAP
	Graphic Layer	Table 57 : Graphic Layer Module	ANAP
	Softcopy Presentation LUT	Table 58 : SoftCopy Presentation LUT Module	ANAP
SOP Common	SOP Common	Table 59 : SOP Common Module	ALWAYS

8.1.1.2 Digital X-Ray Image Storage

Table 42 : Digital X-Ray Image Storage

DICOM Module	DICONDE Module	Reference	Presence of Module
Patient	Component	Table 45 : Patient / Component Module Of Created SOP Instances	ALWAYS
General Study	Component Study	Table 46 : Component Study Module	ALWAYS
General Series	Component Series	Table 47 : Component Series Module	ALWAYS
General Equipment	NDE Equipment	Table 48 : NDE Equipment Module	ALWAYS
DX Detector	NDE DX Detector	Table 51 : NDE DX Detector Module Attributes	ANAP
Image Pixel	Image Pixel	Table 49 : Image Pixel Module	ALWAYS
Presentation State	Presentation State	Table 54 : Presentation State Module	ANAP
	Display Area	Table 55 : Displayed Area Module	ANAP
	Graphic Annotation	Table 56 : Graphic Annotation Module	ANAP
	Graphic Layer	Table 57 : Graphic Layer Module	ANAP
	Softcopy Presentation LUT	Table 58 : SoftCopy Presentation LUT Module	ALWAYS
SOP Common	SOP Common	Table 59 : SOP Common Module	ALWAYS

8.1.1.3 CT Image Storage IOD

Table 43 : CT Image Storage IOD

DICOM Module	DICONDE Module	Reference	Presence of Module
Patient	Component	Table 45 : Patient / Component Module Of Created SOP Instances	ALWAYS

General Study	Component Study	Table 46 : Component Study Module	ALWAYS
General Series	Component Series	Table 47 : Component Series Module	ALWAYS
General Equipment	NDE Equipment	Table 48 : NDE Equipment Module	ALWAYS
CT Image	NDE CT Image	Table 52 : NDE CT Image Module Attributes	ALWAYS
Image Pixel	Image Pixel	Table 49 : Image Pixel Module	ALWAYS
Presentation State	Presentation State	Table 54 : Presentation State Module	ANAP
	Display Area	Table 55 : Displayed Area Module	ANAP
	Graphic Annotation	Table 56 : Graphic Annotation Module	ANAP
	Graphic Layer	Table 57 : Graphic Layer Module	ANAP
	Softcopy Presentation LUT	Table 58 : SoftCopy Presentation LUT Module	ANAP
SOP Common	SOP Common	Table 59 : SOP Common Module	ALWAYS

8.1.1.4 Grayscale Softcopy Presentation State IOD

Table 44 : Grayscale Softcopy Presenation State IOD

IE	Module	Reference	Presence of Module
Patient	Patient	Table 45 : Patient / Component Module Of Created SOP Instances	ALWAYS
Study	General Study	Table 46 : Component Study Module	ALWAYS
Series	General Series	Table 47 : Component Series Module	ALWAYS
	Presentation Series	Table 53 : Presentation Series Module	ALWAYS
General Equipment	NDE Equipment	Table 48 : NDE Equipment Module	ALWAYS
Presentation State	Presentation State	Table 54 : Presentation State Module	ALWAYS
	Display Area	Table 55 : Displayed Area Module	ALWAYS
	Graphic Annotation	Table 56 : Graphic Annotation Module	Only if Graphic Annotation are Present
	Graphic Layer	Table 57 : Graphic Layer Module	Only if Graphic Annotation are present

Softcopy Presentation LUT	Table 58 : SoftCopy Presentation LUT Module	ALWAYS
SOP Common	Table 59 : SOP Common Module	ALWAYS

8.1.1.5 Common Modules

Table 45 : Patient / Component Module Of Created SOP Instances

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	Component Name	0010,0010	PN	User Input	ALWAYS	User
Patient ID	Component ID Number	0010,0020	LO	User Input	ALWAYS	User
Other Patient IDs	Other Component IDs	0010,1000	LO	Auto Generated	ANAP	Auto
Other Patient Names	Other Component Names	0010,1001	PN	Auto Generated	ANAP	Auto
Patient's Birth Date	Component Manufacturing Date	0010,0030	DA	Auto Generated	ALWAYS	Auto
Patient's Sex		0010,0040	CS	Auto Generated	ALWAYS	Auto
Patient Comments	Components Notes	0010,4000	LT	Auto Generated	ANAP	Auto

Table 46 : Component Study Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	Study Instance UID	0020,000D	UI	Auto Generated	ALWAYS	Auto
Study Date	Study Date	0008,0020	DA	Auto Generated	ALWAYS	Auto
Study Time	Study Time	0008,0030	TM	Auto Generated	ALWAYS	Auto
Referring Physician's Name	Component Owner Name	0008,0090	PN	User Defined	ALWAYS	User
Study ID	Study ID	0020,0010	SH	User Input	ALWAYS	User
Physicians of Record	Inspecting Company Name	0008,1048	PN	User Input	ANAP	User
Name of Physician's Reading Study	Certifying Inspector Name	0008,1060	PN	User Input	ANAP	User
Accession Number	Accession Number	0087,0050	SH	Auto Generated	ALWAYS	Auto
Study Description	Study Description	0008,1030	LO	User Input	ANAP	User

Examination Notes	Examination Notes	0032,4000	LT	User Input	ANAP	User
	Expiry Date	0009,xx20	DA	User Input	ANAP	User

Table 47 : Component Series Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	Modality	0008,0060	CS	Auto Generated	ALWAYS	Auto
Series Instance UID	Series Instance UID	0020,000E	UI	Auto Generated	ALWAYS	Auto
Series Number	Series Number	0020,0011	IS	Auto Generated	ALWAYS	Auto
Series Date	Series Date	0008,0021	DA	Auto Generated	ANAP	Auto
Series Time	Series Time	0008,0031	TM	Auto Generated	ANAP	Auto
Series Description	Series Description	0008,103E	LO	User Input	ANAP	User
Inspector Name	Inspector Name	0008,1050	PN	User Input	ANAP	User
Operator Name	Operator Name	0008,1070	PN	User Input	ANAP	User
	Environmental Conditions	0009,xx40	ST	User Input	ANAP	User
	Actual Environmental Conditions	0009,xx10	ST	User Input	ANAP	User

Table 48 : NDE Equipment Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Software Versions	Software Versions	0018,1020	LO	Auto Generated	ALWAYS	Auto
Manufacturer	Manufacturer	0008,0070	LO	Auto Generated	ALWAYS	Auto
Company Name	Company Name	0008,0080	LO	User Input	ANAP	User
Company Address	Company Address	0008,0081	ST	User Input	ANAP	User
Station Name	Station Name	0008,1010	SH	User Input	ANAP	User
Department Name	Department Name	0008,1040	LO	User Input	ANAP	User
Manufacturer's Model Name	Manufacturer's Model Name	0008,1090	LO	User Input	ANAP	User
Device Serial Number	Device Serial Number	0018,1000	LO	User Input	ANAP	User

Scanner ID	Scanner ID	0018,1008	LO	Auto Generated	ANAP	Auto
Spatial Resolution	Spatial Resolution	0018,1050	ST	User Input	ANAP	User
Date Of Last Calibration	Date Of Last Calibration	0018,1200	DA	Auto Generated	ANAP	Auto
Time Of Last Calibration	Time Of Last Calibration	0018,1201	TM	Auto Generated	ANAP	Auto
Pixel Padding Value	Pixel Padding Value	0028,0120	US or SS	User Input	ANAP	User

Table 49 : Image Pixel Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Pixel Data	Pixel Data	7FE0,0010	OW	The pixel Data	ALWAYS	Auto

8.1.1.6 Computed Radiography Module

Table 50 : NDE CR Series Module Attributes

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Part Examined	Part Examined	0018,0015	CS	User Input	ALWAYS	User
View Position	View Position	0018,5101	CS	User Input	ALWAYS	User
Filter Type	Filter Type	0018,1160	SH	User Input	ANAP	User
Collimator / grid name	Collimator / grid name	0018,1180	SH	User Input	ANAP	User
Focal Spot	Focal Spot	0018,1190	DS	User Input	ANAP	User
Plate Type	Plate Type	0018,1260	SH	User Input	ANAP	User
Phosphor Type	Phosphor Type	0018,1261	LO	User Input	ANAP	User

8.1.1.7 Digital X-ray Image Storage Modules

Table 51 : NDE DX Detector Module Attributes

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Detector Type	Detector Type	0018,7004	CS	Auto Generated	ALWAYS	Auto
Detector Configuration	Detector Configuration	0018,7005	CS	Auto Generated	ANAP	Auto

Detector Description	Detector Description	0018,7006	LT	Auto Generated	ANAP	Auto
Detector Mode	Detector Mode	0018,700A	LT	Auto Generated	ANAP	Auto
Detector ID	Detector ID	0018,7008	SH	Auto Generated	ANAP	Auto
Detector Binning	Detector Binning	0018,701A	DS	Auto Generated	ANAP	Auto
Detector Manufacturer's Name	Detector Manufacturer's Name	0018,702A	LO	Auto Generated	ANAP	Auto
Detector Manufacturer Model Number	Detector Manufacturer Model Number	0018,702B	LO	Auto Generated	ANAP	Auto
Sensitivity	Sensitivity	0018,6000	DS	Auto Generated	ANAP	Auto
Field of View Shape	Field of View Shape	0018,1147	CS	Auto Generated	ANAP	Auto
Field of View Dimension(s)	Field of View Dimension(s)	0018,1149	IS	Auto Generated	ANAP	Auto
Field of View Origin	Field of View Origin	0018,7030	DS	Auto Generated	ANAP	Auto
Field of View Rotation	Field of View Rotation	0018,7032	DS	Auto Generated	ANAP	Auto
Field of View Horizontal Flip	Field of View Horizontal Flip	0018,7034	CS	Auto Generated	ANAP	Auto
Imager Pixel Spacing	Imager Pixel Spacing	0018,1164	DS	Auto Generated	ALWAYS	Auto
Detector Element Physical Size	Detector Element Physical Size	0018,7020	DS	Auto Generated	ANAP	Auto
Detector Element Spacing	Detector Element Spacing	0018,7022	DS	Auto Generated	ANAP	Auto
Detector Active Shape	Detector Active Shape	0018,7024	CS	Auto Generated	ANAP	Auto
Detector Active Dimension(s)	Detector Active Dimension(s)	0018,7026	DS	Auto Generated	ANAP	Auto
Detector Active Origin	Detector Active Origin	0018,7028	DS	Auto Generated	ANAP	Auto

8.1.1.8 CT Image Storage Module

Table 52 : NDE CT Image Module Attributes

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	Image Type	0008,0008	CS	Auto Generated	ALWAYS	Auto

Samples Per Pixels	Samples Per Pixels	0028,0002	US	Auto Generated	ALWAYS	Auto
Photometric Interpretation	Photometric Interpretation	0028,0004	CS	Auto Generated	ALWAYS	Auto
Bits Allocated	Bits Allocated	0028,0100	US	Auto Generated	ALWAYS	Auto
Bits Stored	Bits Stored	0028,0101	US	Auto Generated	ALWAYS	Auto
High Bit	High Bit	0028,0102	US	Auto Generated	ALWAYS	Auto
KVP	KVP	0018,0060	DS	Auto Generated	ALWAYS	Auto
Acquisition Number	Acquisition Number	0020,0012	IS	Auto Generated	ALWAYS	Auto
Distance Source To Detector	Distance Source to Detector	0018,1110	DS	Auto Generated	ANAP	Auto
Distance Source to Component	Distance Source to Component	0018,1111	DS	Auto Generated	ANAP	Auto
Exposure Time	Exposure Time	0018,1150	DS	Auto Generated	ANAP	Auto
X-Ray tube Current	X-Ray tube Current	0018,1151	DS	Auto Generated	ANAP	Auto
Exposure in mA	Exposure in mA	0018,1152	DS	Auto Generated	ANAP	Auto
Exposure in uA	Exposure in uA	0018,1153	DS	Auto Generated	ANAP	Auto
Filter Type	Filter Type	0018,1160	DS	Auto Generated	ANAP	Auto
Generator Power	Generator Power	0018,1170	DS	Auto Generated	ANAP	Auto
Focal Spot	Focal Spot	0018,1190	DS	Auto Generated	ANAP	Auto
Convolution Kernel	Convolution Kernel	0018,1210	DS	Auto Generated	ANAP	Auto
Single Collimation Width	Single Collimation Width	0018,9306	FD	Auto Generated	ANAP	Auto
Total Collimation Width	Total Collimation Width	0018,9307	FD	Auto Generated	ANAP	Auto
CT Pitch Factor	CT Pitch Factor	0018,9311	FD	Auto Generated	ANAP	Auto

8.1.1.9 Grayscale Softcopy Presentation State Module

Table 53 : Presentation Series Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	Modality	0008,0060	CS	PR	ALWAYS	Auto

Table 54 : Presentation State Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	Instance Number	0020,0013	IS	Auto Generated	ALWAYS	Auto
Presentation Label	Presentation Label	0070,0080	CS	User Input	ALWAYS	User
Presentation Description	Presentation Description	0070,0081	LO	User Input	ALWAYS	User
Presentation Creation Date	Presentation Creation Date	0070,0082	DA	Auto Generated	ALWAYS	Auto
Presentation Creation Time	Presentation Creation Time	0070,0083	TM	Auto Generated	ALWAYS	Auto
Presentation Creator's Name	Presentation Creator's Name	0008,1115	PN	Auto Generated	ALWAYS	Auto
Referenced Series Sequence	Referenced Series Sequence	0008,1116	SQ	Auto Generated	ALWAYS	Auto
>Series Instance UID	>Series Instance UID	0020,000E	UI	Auto Generated	ALWAYS	Auto
>Referenced Image Sequence	>Referenced Image Sequence	0008,1140	SQ	Auto Generated	ALWAYS	Auto
>>Referenced SOP Instance UID	>>Referenced SOP Instance UID	0008,1150	UI	Auto Generated	ALWAYS	Auto

Table 55 : Displayed Area Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Displayed Area Selection	Displayed Area Selection	0070,005A	SQ	Auto Generated	ALWAYS	Auto
>Displayed Area Top Left Hand Corner	>Displayed Area Top Left Hand Corner	0070,0052	SL	Auto Generated	ALWAYS	Auto
>Displayed Area Bottom Right Hand Corner	>Displayed Area Bottom Right Hand Corner	0070,0053	SL	Auto Generated	ALWAYS	Auto
>Presentation Size Mode	>Presentation Size Mode	0070,0100	CS	Auto Generated	ALWAYS	Auto
>Presentation Pixel Spacing	>Presentation Pixel Spacing	0070,0101	DS	Auto Generated	ANAP	Auto
>Presentation Pixel Aspect	>Presentation Pixel Aspect	0071,0102	IS	Auto Generated	ANAP	Auto

>Presentation Pixel Magnification Ratio	>Presentation Pixel Magnification Ratio	0070,0103	FL	Auto Generated	ANAP	Auto

Table 56 : Graphic Annotation Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Graphic Annotation Sequence	Graphic Annotation Sequence	0070,0001	SQ	Auto Generated	ANAP	AUTO
>Graphic Layer	>Graphic Layer	0070,0002	CS	Auto Generated	ALWAYS	AUTO
>Text Object Sequence	>Text Object Sequence	0070,0008	SQ	Auto Generated	ANAP	AUTO
>>Anchor Point Annotation Units	>>Anchor Point Annotation Units	0070,0004	CS	Auto Generated	ALWAYS	AUTO
>>Unformatted Text Value	>>Unformatted Text Value	0070,0006	ST	Auto Generated	ALWAYS	AUTO
>> Anchor Point	>> Anchor Point	0070,0014	FL	Auto Generated	ALWAYS	AUTO
>>Anchor Point Visibility	>>Anchor Point Visibility	0070,0015	CS	Auto Generated	ALWAYS	AUTO
>Graphic Object Sequence	>Graphic Object Sequence	0070,0009	SQ	Auto Generated	ANAP	AUTO
>>Graphic Annotation Units	>>Graphic Annotation Units	0070,0005	CS	Auto Generated	ALWAYS	AUTO
>>Graphic Dimensions	>>Graphic Dimensions	0070,0020	US	Auto Generated	ALWAYS	AUTO
>>Number of Graphic Points	>>Number of Graphic Points	0070,0021	US	Auto Generated	ALWAYS	AUTO
>>Graphic Data	>>Graphic Data	0070,0022	FL	Auto Generated	ALWAYS	AUTO
>>Graphic Type	>>Graphic Type	0070,0023	CS	Auto Generated	ALWAYS	AUTO
>>Graphic Filled	>>Graphic Filled	0070,0024	CS	Auto Generated	ALWAYS	AUTO

Table 57 : Graphic Layer Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Graphic Layer Sequence	Graphic Layer Sequence	0070,0060	SQ	One or more Items	ANAP	AUTO
>Graphic Layer	>Graphic Layer	0070,0002	CS	Layer Name...	ALWAYS	AUTO
>Graphic Layer Order	>Graphic Layer Order	0070,0062	IS	Layer Order	ALWAYS	AUTO

Table 58 : SoftCopy Presentation LUT Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Presentation LUT Shape	Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	Auto

Table 59 : SOP Common Module

DICOM Attribute Name	DICONDE Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	Specific Character Set	0008,0005	CS	ISO_IR_100	ALWAYS	AUTO
SOP Class UID	SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.11.1	ALWAYS	AUTO
SOP Instance UID	SOP Instance UID	0008,0018	UI	Auto Generated	ALWAYS	AUTO

8.1.2 Usage of Attributes from received IOD's

efX Software can display images from the Image SOPs Classes below:

Table 60 : Image SOPs that can be read

Name	SOP Class UID
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.12.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Grayscale Byte Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7.3
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1

Details to Grayscale Softcopy Presentation State SOP implementation on reading is stated below:

Table 61 : Viewing support for softcopy Presentaion State

Module	Implemented for Viewing
Patient	Fully
General Study	Fully
General Series	Fully

Presentation Series	Fully
NDE Equipment	Fully
Presentation State	Fully
Display Shutter	No
Display Area	Partial
Graphic Annotation	Fully
Spatial Transformation	partial
Graphic Layer	Fully
Softcopy Presentation LUT	Fully
SOP Common	Fully

8.1.3 Attribute Mapping

Not Applicable

8.1.4 Coerced / Modified fields

None

8.2 Data Dictionary of Private attributes

The Private Attributes added to create SOP Instances are listed in the Table below.

efX Software reserves a block of private attribute in groups 0009. Further Details on the usage of these private attributes are contained in Section 8.1.

Table 62 : Data Dictionary of Private Attributes

Tag	Attribute Name	VR	VM
0009,10xx	Private Creator for North Star Imaging, Inc.	LO	1
0009,xx00	View Property	UN	1
0009,xx0B	Thumbnail Width	US	1
0009,xx0C	Thumbnail Height	US	1
0009,xx0D	Image Thumbnail	OW	1

8.3 Coded Terminology and templates

Not Applicable

8.4 Grayscale Image consistency

The high-resolution display monitor attached to efX Software can be calibrated according to the Grayscale standard Display Function (GSDF). The Service/Installation tool is used together with a luminance meter to measure the Characteristic Curve of the display system and the current ambient light. The Result of the Calibration procedure is a Monitor Correction LUT that will be active within the display subsystem.

8.5 Standard Extended / Specialized / Private SOP Classes

No Specialized or Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.