DICOM Conformance Statement

Product Name: *syngo*™.Ultrasound
Breast Analysis
Release: VA30
Date: January 2016

www.siemens.com/DICOM

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CONFORMANCE STATEMENT OVERVIEW

The ***syngo*TM*.Ultrasound Breast Analysis*** system supports the following DICOM Application Entities:

- Verification:
  - Verification AE
- Transfer:
  - Storage AE
- Query / Retrieve:
  - Query AE
  - Retrieve AE

Table 1: Network Services

SOP Classes	Service Class User (SCU)	Service Class Provider (SCP)
VERIFICATION		
Verification AE		
Verification	Yes	Yes
TRANSFER		
Storage AE		
See Table 5 and Table 8	Yes	Yes
QUERY / RETRIEVE		
Query AE		
Patient Root Query/Retrieve Information Model - FIND	Yes	No
Study Root Query/Retrieve Information Model - FIND	Yes	No
Patient/Study Only Query/Retrieve Information Model - FIND	Yes	No
Retrieve AE		No
Patient Root Query/Retrieve Information Model - MOVE	Yes	No
Study Root Query/Retrieve Information Model - MOVE	Yes	No
Patient/Study Only Query/Retrieve Information Model - MOVE	Yes	No

Table 2: UID Values

SOP Class Name	SOP Class UID	Category
Verification AE		
Verification	1.2.840.10008.1.1	Verification
Storage AE		
See Table 5 and Table 8		
Query AE		
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Query / Retrieve
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Query / Retrieve
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Query / Retrieve
Retrieve AE		
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Query / Retrieve
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Query / Retrieve

SOP Class Name	SOP Class UID	Category
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Query / Retrieve
Patient Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.1.3	Query / Retrieve
Study Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.2.3	Query / Retrieve
Patient/Study Only Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.3.3	Query / Retrieve

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1.0 Purpose

This document describes the conformance to the ACR-NEMA DICOM 3.0 Standard by the syngo.Ultrasound Breast Analysis VA30 System from Siemens Heathcare. It shall establish the conformance specifications for the systems listed in the Conformance Statement Overview sectionand does not apply to other products offered by Siemens Healthcare or its affiliates.

1.1 Scope

The DICOM standard provides a well-defined set of structures and protocols that allow inter-operability of a wide variety of medical imaging devices. The syngo.Ultrasound Breast Analysis system provides support for essential services related to reading images and connectivity to DICOM compliant devices. The syngo.Ultrasound Breast Analysis systems will not support all features supported by the DICOM standard. This document clearly states the DICOM services and data classes that are supported by the applications included with the syngo.Ultrasound Breast Analysis system. The intent of this document is to allow users and other vendors who also conform to the DICOM standard to exchange information within the specific context of those elements of the DICOM standard that syngo.Ultrasound Breast Analysis system supports.

This document is written with respect to the adopted portions of the DICOM standard, Version 3. The following sections of this document follow the outline specified in the DICOM Standard NEMA publication PS3.3 [1].

2.0 References

Specifications of the DICOM 3.0 standard may be obtained from ACR-NEMA for customers who require detailed information.

Table 3: References

Document Title	Location
[1] Part 2 of the DICOM Standard: NEMA Standards Publication PS 3.2-2008, Digital Imaging and Communications in Medicine (DICOM), Part 2: Conformance	http://dicom.nema.org [1]
[2] Part 4 of the DICOM Standard: NEMA Standards Publication PS 3.4-2008, Digital Imaging and Communications in Medicine (DICOM), Part 4: Service Class Specifications	
[3] Part 16 of the DICOM Standard, NEMA Standards Publication PS 3.16-2008, Digital Imaging and Communication in Medicine (DICOM), Part 16: Content Mapping Resource	

3.0 Definitions

Table 4: Acronyms and Abbreviations

Acronym/Abbreviation	Definitions
Conformance Statement	A formal statement associated with a specific implementation of the DICOM Standard. It specifies the Service Classes, Information Objects, Communications Protocols and Media Storage Application Profiles supported by the implementation.
DICOM 3.0	Digital Imaging and Communications in Medicine, Version 3.0.

[1] Source: DICOM® Standards Publication, © NEMA. The DICOM Standard is under continuous maintenance. The current official version is available at http://dicom.nema.org.

Acronym/Abbreviation	Definitions
DIMSE	DICOM Message Service Element
C-STORE	Composite Store
Ethernet	Network topology devised in 1976 by DIX (DEC/Intel/Xerox) which is the most common in practice today.
IOD	Information Object Definition
MWL	Modality Worklist
OB-GYN	Obstetric or Obstetrical and Gynaecological
OOG	Object Oriented Graphics
PACS	Picture Archiving and Communications Systems
PDU	Protocol Data Unit
RWA	Real-World Activity
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SR	Structured Reporting
Syngo	Siemens DICOM Application Framework - Common User SW
UID	Unique identifier
ASCII	American Standard Code for Information Interchange
AE	Application Entity
ANSI	American National Standards Institute
CR	Computed Radiography
CT	Computed Tomography
DCMTK	OFFIS DICOM Toolkit
ECR	European Congress of Radiology
GSPS	Grayscale Softcopy Presentation State
HIMSS	Healthcare Information and Management Systems Society
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
ISO	International Standards Organization
NEMA	National Electrical Manufacturers Association
OSI	Open Systems Interconnection
RSNA	Radiological Society of North America
TCP/IP	Transmission Control Protocol / Internet Protocol
TLS	Transport Layer Security
VM	Value Multiplicity
VR	Value Representation

4.0 Implementation Model

4.1 Application Data Flow Diagram

syngo.Ultrasound Breast Analysis System system consists of a set of parallel, communicating but independent processes that deal with the DICOM communication. There is a process that takes care of receiving the images (C-STORE SCP) and storing them in the database, and one that sends images out on request (C-STORE SCU). From a functional perspective, the processes that implement syngo.Ultrasound Breast Analysis System system's DICOM network interface can be separated into the application entities: Store SCP, Store SCU, Find SCU, Move SCU and Echo SCU. The application entity titles attached to the different application entities are freely configurable.

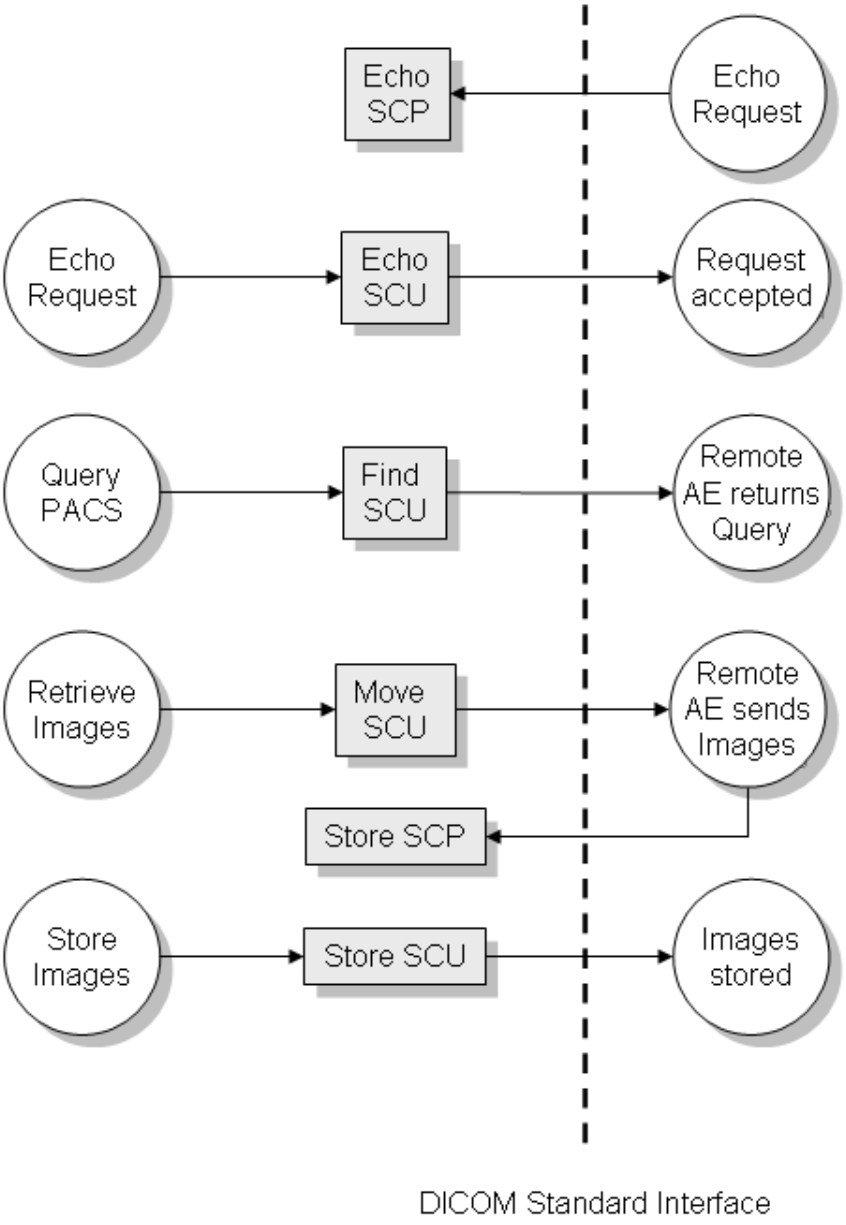

Figure 1: Implementation Model

4.2 Functional Definitions of AEs

4.2.1 Store SCP

Store SCP is an application that implements the DICOM Storage Service Class and the Verification Service Class as SCP (Echo SCP). Store SCP is automatically started together with the operating system. Store SCP spawns a new process for each incoming DICOM association request. The association remains open until the remote application entity closes the association or until an error condition occurs that leads to an association abort.

4.2.2 Store SCU

Store SCU is an application that implements the DICOM Storage Service Class as SCU. Store SCU is activated by syngo.Ultrasound Breast Analysis System whenever the user requests transmission of one or more objects from the local database to a remote node. When syngo.Ultrasound Breast Analysis System is terminated, Store SCU continues to transmit until the transmission is completed or aborted because of a fatal error. For each transmission request a separate Store SCU is spawned. A transmission request may consist of the transmission of a single image, a complete series or study or several studies. All objects comprising one transmission request are transmitted over one association. When transmission is finished, the association is released and Store SCU terminates. If the transmission of an object fails because the peer Store SCP sends back an error code or no valid presentation context for the transmission of the object is available, the association is aborted and Store SCU also terminates.

4.2.3 Find SCU

syngo.Ultrasound Breast Analysis System application implements the Query/Retrieve Service Class. It only supports query functionality using the C-FIND message. It sends query keys to an SCP and awaits responses. The application can be used to test SCPs of the Query/Retrieve Service Classes. The functionality is activated by syngo.Ultrasound Breast Analysis System whenever the user queries for objects at a remote node. A query request starts on patient or patient/study level (depending on the configured query information model) and then can be refined down to the image level (first get patient and study information, then series, and finally image information). For patient root information model, a separate query on study level will be performed for each patient Query requests on series and image level will trigger separate queries for each study/series.

4.2.4 Move SCU

Move SCU is an application which implements both an SCU for the Query/Retrieve Service Class and an SCP for the Storage Service Class. Move SCU supports retrieve functionality using the C-MOVE message. It sends query keys to an SCP and awaits responses. It will accept associations for the purpose of receiving images sent as a result of the C-MOVE request. The application can be used to test SCPs of the Query/Retrieve Service Class. The Move SCU application can initiate the transfer of images to a third party or can retrieve images to itself. Note that the use of the term "move" is a misnomer. The C-MOVE operation actually performs an image copy (no images will be deleted from the SCP). Move SCU is activated by syngo.Ultrasound Breast Analysis System when retrieving data from a remote node or when choosing to send data from one remote node to another remote node. When syngo.Ultrasound Breast Analysis System terminates, Move SCU continues to transmit until the transmission is completed or aborted because of a fatal error.

4.2.5 Echo SCU

Echo SCU is an application that implements the Verification Service Class as an SCU. It allows to check the availability of remote AEs from the network configuration tool.

5.0 Application Entity Specifications

5.1 Store SCP

The Store SCP application supports the following SOP Classes as an SCP:

Table 5: Store SOP Classes

SOP Class Name	SOP Class ID
BreastTomosynthesisImageStorage	1.2.840.10008.5.1.4.1.1.13.1.3
CTImageStorage	1.2.840.10008.5.1.4.1.1.2
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1
EnhancedMRColorImageStorage	1.2.840.10008.5.1.4.1.1.4.3
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1
EnhancedUSVolumeStorage	1.2.840.10008.5.1.4.1.1.6.2
MRImageStorage	1.2.840.10008.5.1.4.1.1.4
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3
*MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1
VerificationSOPClass	1.2.840.10008.1.1
RETIRED_UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6

This application entity does not provide standard conformance to any SOP class as Store SCU. Objects of the service classes marked with an asterisk (*) may not be handled as expected by the syngo.Ultrasound Breast Analysis System Application itself, though the handling of the DICOM objects will be successful. See 5.1.3.1.2.1

5.1.1 Association Policies

5.1.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16384 bytes.

SOP Class extended negotiation is not supported.

5.1.1.2 Number of Associations

The number of parallel associations is only limited by the resources of the underlying operating system.

5.1.1.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

5.1.1.4 Implementation Identifying Information

The implementation Class and Version of this application are:

Implementation Class UID	1.2.276.0.7230010.3.0.3.6.0
Implementation Version Name	OFFIS_DCMTK_360

5.1.2 Association Initiation Policy

This application entity never initiates associations.

5.1.3 Association Acceptance Policy

When Store SCP accepts an association, it will respond to storage requests. It places no limitations on who may connect to it, nor on the number of simultaneous connects it will support.

5.1.3.1 Real-World Activity "Receive Storage Request"

The Store SCP application entity accepts an association when it receives an association request from a remote DICOM Storage. The application accepts incoming association requests on the port number defined in the DICOM configurator, if the called AET matches the respective entry in its DICOM configuration. It accepts any association for which at least one presentation context is accepted. The calling application entity title is ignored. The responding application entity name can be configured in the DICOM configurator.

5.1.3.1.1 Associated Real-World Activity

The associated Real-World Activity associated with the C-STORE operation is the storage of the image on the disk of the system upon which Store SCU is running. The data received is then added to a database and analyzed for proper viewing by processed out of the scope of this document.

5.1.3.1.2 Accepted Presentation Contexts

Table 6: Store SCP Presentation Context

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Image SOP Classes (See table above)		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70	SCP	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
		JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCP	None
Non-Image SOP Classes (see table above)		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

The default behavior can be changed in the configuration file such that some transfer syntaxes are not accepted.

5.1.3.1.2.1 SOP Specific Conformance for all Storage SOP Classes

The Store SCP will receive any DICOM objects (images and non-image objects) transmitted in the open association provided that the correct presentation context is used. If the objects are received successfully, they are stored and registered in the local database, from where they can be loaded into syngo.Ultrasound Breast Analysis System. No integrity checks of the received objects are performed beyond tests of a very basic structural integrity. In particular, the sending system is not prevented from transmitting incomplete or incorrect IODs or objects that are correct but cannot be displayed. Such objects will be visible in the PACS browser, but they cannot be viewed.

Objects are stored in the local database as files in DICOM part 10 format with Explicit VR Little Endian Transfer Syntax. When objects received in Implicit VR contain attributes unknown to this application, they are stored as “Unknown VR” (UN) elements. Certain element values may be changed during storage, i. e. group length values and sequence lengths are re-computed.

The following error/warning status codes can be sent by the Store SCP in the context of a CSTORE- RSP message:

Table 7: Store SCP Error Codes

Code	Name	Severity	Description
a700	refused: out of resources	failure	Application out of memory, file system or database write error (e. g. file system full)
a800	refused: SOP class not supported	failure	Received C-STORE-RQ for non-storage SOP class
a900	error: data set does not match SOP class	failure	SOP class or instance UID in C-STORE-RQ does not match UIDs in the received dataset
c000	error: cannot understand	failure	Received dataset without SOP class or instance UID; received Presentation State that failed syntax check; internal application error

Store SCP never removes, coerces or changes attribute values, except for the special case of group length attributes mentioned above. The duration of storage depends on the user, who can delete objects from the local database at any time and on the configuration of the storage database, that can be configured to auto-delete studies after a given time.

Store SCP implements Level 2 (Full) conformance to the Storage Service Class. Store SCP implements Signature Level 3 conformance since the integrity of incoming Digital Signatures is preserved even if “bit preserving mode” is not activated. However, extended negotiation is not supported.

5.1.3.1.3 Transfer Syntax Selection Policies

The default behavior of the Store SCP is to select for each presentation context containing a supported SOP class the explicit VR transfer syntax with the byte order matching the local machine byte order (i. e. little endian on PC, big endian on Mac OS). If this transfer syntax is not available, the explicit VR transfer syntax with opposite byte order is selected. If this is also unavailable, Implicit VR little endian is selected if available, otherwise the presentation context is rejected.

5.2 Store SCU

The Store SCU application supports the following Storage SOP Classes as an SCU:

Table 8: Store SCU SOP Classes

SOP Class Name	SOP Class ID
BreastTomosynthesisImageStorage	1.2.840.10008.5.1.4.1.1.13.1.3
CTImageStorage	1.2.840.10008.5.1.4.1.1.2
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1
EnhancedMRColorImageStorage	1.2.840.10008.5.1.4.1.1.4.3
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1
EnhancedUSVolumeStorage	1.2.840.10008.5.1.4.1.1.6.2
MRImageStorage	1.2.840.10008.5.1.4.1.1.4
MultiframeGrayscaleByteSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.2
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3
MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1

This application entity does not provide standard conformance to any SOP class as SCP.

Note: Results generated by the *syngo.*Ultrasound Breast analysis system are stored and sent out as Secondary Capture Images.

5.2.1 Association Establishment Policies

5.2.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16384 bytes.

SOP Class extended negotiation is not supported.

5.2.1.2 Number of Associations

Store SCU will only propose a single association. However, multiple instances of Store SCU may be running at the same time. The number of parallel instances is only limited by the resources of the underlying operating system.

5.2.1.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

5.2.1.4 Implementation Identifying Information

The implementation Class and Version of this application are:

Implementation Class UID	1.2.276.0.7230010.3.0.3.6.0
Implementation Version Name	OFFIS_DCMTK_360

5.2.2 Association Initiation by Real-World Activity

5.2.2.1 Real-World Activity "Image transmission"

An instance of the Store SCU application entity is started in order to execute a transmission request. The application initiates an association with the selected remote Storage SCP. The calling application entity name can be configured. The called application entity name must be configured together with the related host name or address in the DICOM configurator.

5.2.2.1.1 Associated Real-World Activity

There are two ways to start a file transfer:

- syngo.Ultrasound Breast Analysis System Browser: The user selects an object, series or study in syngo.Ultrasound Breast Analysis System browser. He selects the "send" function, chooses a send target and selects "OK".
- Result Storage: The result images or presentation contexts generated within the viewing application can be sent to an arbitrary known C-STORE SCP by the user or are sent to the C-STORE SCP, that is marked as "Default PACS" in the DICOM configuration.

5.2.2.1.2 Proposed Presentation Contexts

Table 9: Store SCU Presentation Context

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Image SOP Classes (See table above)		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70	SCU	None
UltraSound Image Storage		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
		JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70	SCU	None
Non-Image SOP Classes (see table above)		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

The explicit VR transfer syntax with local byte order (i. e. little endian on PC) will always be the first in the list of the proposed transfer syntaxes, followed by the explicit VR transfer syntax with opposite byte order, followed by the DICOM default transfer syntax.

5.2.2.1.2.1 SOP Specific Conformance for all Storage SOP Classes

Store SCU transmits the selected objects from the local syngo.Ultrasound Breast Analysis System data storage and creates a log entry for each C-STORE operation. The log entry shows whether or not the transmission was successful. If the SCP returns a DIMSE error or warning status code for one C-STORE operation, this information is logged, and transmission continues with the next object. Store SCU never attempts to automatically repeat failed transmissions. If transmission of one selected object fails because no appropriate presentation context could be negotiated, Store SCU aborts the association and creates a log entry indicating the unsuccessful termination. Store SCU always transmits all elements contained in an object, independent from their type within the IOD of the corresponding SOP Class.

5.2.3 Association Policies

This application does not accept associations.

5.3 Find SCU

The Find SCU application supports the following SOP Classes as an SCU:

Table 10: Find SCU SOP Classes

SOP Class Name	SOP Class UID
Patient Root Query Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1

5.3.1 Association Establishment Policies

5.3.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16384 bytes.

SOP Class extended negotiation is not supported.

5.3.1.2 Number of Associations

Find SCU will only propose a single association. However, multiple instances of Find SCU may be running at the same time. The number of parallel instances is limited by the resources of the underlying operating system and by the resources of the remote node.

5.3.1.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

5.3.1.4 Implementation Identifying Information

The implementation Class and Version of this application are:

Implementation Class UID	1.2.276.0.7230010.3.0.3.6.0
Implementation Version Name	OFFIS_DCMTK_360

5.3.2 Association Initiation by Real-World Activity

5.3.2.1 Real-World Activity "Query remote AE"

An instance of the Find SCU application entity is started in order to execute a query request. The application initiates an association with the selected remote Storage SCP. The calling application entity name can be configured. The called application entity name must be configured together with the related host name or address in the DICOM configurator.

5.3.2.1.1 Associated Real-World Activity

A query request is started within syngo.Ultrasound Breast Analysis System Browser by querying for certain keys. These keys can be set in the Browser.

5.3.2.1.2 Proposed Presentation Contexts

The default behavior of the Find SCU is to propose for each of the supported SOP classes a single presentation context containing the following transfer syntaxes:

Table 11: Find SCU Presentation Context

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name List**	**UID List**		**Negotiation**
See table above		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

The explicit VR transfer syntax with local byte order (i. e. little endian on PC) will always be the first in the list of the proposed transfer syntaxes, followed by the explicit VR transfer syntax with opposite byte order, followed by the DICOM default transfer syntax.

No extended negotiation is performed. In particular, relational queries are not supported.

5.3.2.1.3 SOP Specific Conformance to C-FIND SOP Classes

FIND-SCU provides standard conformance to the supported C-FIND SOP Classes.

All queries are initiated at the highest level of the information model (the STUDY or PATIENT level, depending of the Query Retrieve Information Model configured for the respective SCP), and then for each response received, recursively repeated at the next lower levels (the SERIES and then IMAGE levels), in

order to completely elucidate the “tree” of instances available on the remote AE (from which the user may subsequently request a retrieval at any level).

No CANCEL requests are ever issued.

5.3.2.1.4 Specific Character Set used in queries

For all query expressions containing only the ASCII character subset no Specific Character Set attribute (0008,0005) is sent.

In case the query expression cannot be expressed in the ASCII character subset, but can be expressed in the ISO 8859-1 (Latin-1) character set, a Specific Character Set attribute with the value “ISO_IR 100” (Latin-1) is sent in the query.

In all other cases, a Specific Character Set attribute with the value set to “ISO_IR 192” (UTF-8) is sent in the query.

If the FIND SCP application entity is not configured to support the sent encoding, a warning is shown to the user stating that the query result may be incomplete. The setting does not change the issued queries.

Note: For the query result, all character sets stated in chapter 6 of this conformance statement are supported.

5.3.3 Association Acceptance Policy

This application does not accept associations.

5.4 Move SCU

This application entity provides standard conformance to the following DICOM SOP classes as an SCU:

Table 12: Move SCU SOP Classes

SOP Class Name	SOP Class ID	SCU	SCP
Patient Root Query Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

5.4.1 Association Policies

5.4.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16384 bytes.

SOP Class extended negotiation is not supported.

5.4.1.2 Number of Associations

Move SCU will only propose a single association. However, multiple instances of Move SCU may be running at the same time. The number of parallel instances is limited by the resources of the underlying operating system.

5.4.1.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

5.4.1.4 Implementation Identifying Information

The implementation Class and Version of this application are:

Implementation Class UID	OFFIS_DCMTK_360
Implementation Version Name	1.2.276.0.7230010.3.0.3.6.0

5.4.2 Association Initiation by Real-World Activity

5.4.2.1 Real-World Activity "Image transmission"

An instance of the Move SCU application entity is started in order to execute a transfer request from a remote host to another host, which can either be another remote host or the local host. The application initiates an association with the selected remote Storage SCP. The calling application entity name can be configured. The called application entity name must be configured together with the related host name or address in the DICOM configurator.

5.4.2.1.1 Associated Real-World Activity

There are two ways to start a file transfer from syngo.Ultrasound Breast Analysis System Browser:

- The user selects an object, series, or study from a remote host in syngo.Ultrasound Breast Analysis System browser. He selects the "retrieve" function and selects "OK".
- The user selects an object, series, or study from a remote host in syngo.Ultrasound Breast Analysis System browser. He selects the "send" function, chooses a send target and selects "OK".

5.4.2.1.2 Proposed Presentation Contexts

The default behavior of the Move SCU is to propose for each of the supported SOP classes a single presentation context containing the following transfer syntaxes:

Table 13: Move SCU Presentation Context

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name List**	**UID List**		**Negotiation**
See table above		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

The explicit VR transfer syntax with local byte order (i. e. little endian on PC) will always be the first in the list of the proposed transfer syntaxes, followed by the explicit VR transfer syntax with opposite byte order, followed by the DICOM default transfer syntax.

5.4.2.1.3 SOP Specific Conformance to C-MOVE SOP Classes

Move SCU provides standard conformance to the supported C-MOVE SOP Classes.

A retrieval will be performed at the PATIENT, STUDY, SERIES or IMAGE level depending on what level has been selected by the user in the browser.

No CANCEL requests are ever issued.

The retrieval is performed from the AE that was specified in the Retrieve AE attribute returned from the query performed by Find SCU.

The instances can be retrieved either to the current application's local database or to another AE by specifying the AE Title of the destination Store SCP. This implies that the remote C-MOVE SCP must be preconfigured to determine the presentation address corresponding to the Store SCP AE. The local Store

SCP AE will accept storage requests addressed to it from anywhere, so no pre-configuration of the local application to accept from the remote AE is necessary (except in so far as it was necessary to configure Find SCU).

5.4.3 Association Acceptance Policy

This application entity does not accept associations.

5.5 Echo SCU/Echo SCP

5.5.1 SOP Classes

This application entity provides standard conformance to the following DICOM SOP classes:

Table 14: Verification SOP Class

SOP Class Name	SOP Class ID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes

5.5.2 Association Policies

5.5.2.1 General

Echo SCU initiates associations. Echo SCP accepts, but never initiates, associations.

The maximum PDU length can be configured at installation time in the range 4096..131072 bytes. The default is 16384 bytes.

SOP Class extended negotiation is not supported.

5.5.2.2 Number of Associations

Echo SCU will only propose a single association.

5.5.2.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

5.5.2.4 Implementation Identifying Information

The implementation UID of this application is:

Implementation Class UID	OFFIS_DCMTK_360
Implementation Version Name	1.2.276.0.7230010.3.0.3.6.0

5.5.3 Association Initiation Policy

5.5.3.1 Real-World Activity “Send Echo Request”

An instance of the Echo SCU application is started when the user initiates a connection test from the DICOM configuration tool. The application initiates an association with a selected remote Echo SCP.

5.5.3.1.1 Proposed Presentation Contexts

Table 15: Echo SCU Presentation Context

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name List**	**UID List**		**Negotiation**
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

No Extended negotiation is performed.

5.5.3.1.2 SOP Specific Conformance

Echo SCU provides standard conformance to the Verification Service Class.

5.5.4 Association Acceptance Policy

The Echo SCP application is part of the Store SCP AE. The Store SCP application will respond to echo requests when it accepts associations.

6.0 COMMUNICATION PROFILES

6.1 Supported Communication Stacks

DICOM Upper Layer over TCP/IP is supported.

6.2 OSI Stack

Not supported.

6.3 TCP/IP Stack

The TCP/IP stack is inherited from the underlying operating system.

6.3.1 API

The application makes use of the WinSock interface.

6.3.2 Physical Media Support

DICOM is indifferent to the physical medium over which TCP/IP executes.

6.4 Point-to-Point Stack

Not supported.

7.0 Configuration

7.1 AE Title / Presentation Address Mapping

The mapping of application entity titles to presentation addresses is configurable during runtime in the Network panel of the Preferences editor, see details below.

7.2 Configurable Parameters

7.2.1 Store SCP

For the Store SCP component, the following parameters are configurable:

- Listening IP port numbers
- Application entity title

The number of listening application entities is not restricted.

7.2.2 Store SCU

For the Store SCU component, the following parameters are configurable for each send target:

- Presentation address (DNS hostname or IP address)
- IP port number
- Called application entity title
- Calling application entity title
- “Default PACS” flag

The number of send targets is not restricted.

7.2.3 Find SCU

For the Find SCU component, the following parameters are configurable for each query target:

- Presentation address (DNS hostname or IP address)
- IP port number
- Called application entity title
- Calling application entity title
- Query/retrieve information model (patient or study root)

The number of send targets is not restricted.

7.2.4 Move SCU

For the Move SCU component, the following parameters are configurable for each target:

- Presentation address (DNS hostname or IP address)
- IP port number
- Called application entity title
- Calling application entity title
- Query/retrieve information model (patient or study root)

The number of send targets is not restricted.

8.0 SUPPORT OF EXTENDED CHARACTER SETS

This application supports the following extended character sets:

Table 16: Extended Character Support

ISO_IR 100	ISO 8859-1 (Latin 1)
ISO_IR 101 *	ISO 8859-2 (Latin 2)
ISO_IR 109 *	ISO 8859-3 (Latin 3)

ISO_IR 110 *	ISO 8859-4 (Latin 4)
ISO_IR 144 *	ISO-8859-5 (Cyrillic)
ISO_IR 127 *	ISO-8859-6 (Arabic)
ISO_IR 126 *	ISO-8859-7 (Greek)
ISO_IR 138 *	ISO-8859-8 (Hebrew)
ISO_IR 148 *	ISO-8859-9 (Latin 5)
ISO_IR 13 *	JIS_X0201 (Katakana/Romaji)
ISO_IR 166 *	ISO-8859-11 (Thai)
ISO_IR 192 *	UTF-8
GB18030 *	GB18030 (Chinese)

The proper display of character sets marked with "*" is only supported if the underlying operating system supports it.

9.0 INFORMATION OBJECT IMPLEMENTATION

This section specifies the subsets of DICOM Information Object Definitions (IOD) used to represent the information objects produced by this implementation.

9.1 Secondary Capture Module Table

Table 17: Secondary Capture IOD

Entity Name	Module	Reference
Patient	Patient	9.2.1
Study	General Study	9.2.2
	Patient Study	9.2.3
	Study Identification Module	9.2.4
	Study Classification Module	9.2.5
Series	General Series	9.2.6
Equipment	General Equipment	9.2.7
	SC Equipment	9.2.14
Image	General Image	9.2.8
	Image Pixel	9.2.9
	SC Image	9.2.15
	Overlay Plane	9.2.10
	Modality LUT	9.2.11
	VOI LUT	9.2.12
	SOP Common	9.2.13

9.2 Secondary Capture Module Descriptions

9.2.1 Patient Module

Table 18: Secondary Capture Patient Module

Attribute Name	Tag	Type	VR	VM	Comment
Patient's Name	(0010,0010)	2	PN	1	Copied from Original
Patient ID	(0010,0020)	2	LO	1	Copied from Original
Patient's Birth Date	(0010,0030)	2	DA	1	Copied from Original
Patient's Sex	(0010,0040)	2	CS	1	Copied from Original

9.2.2 General Study Module

Table 19: Secondary Capture General Study Module

Attribute Name	Tag	Type	VR	VM	Comment
Study Instance UID	(0020,000D)	1	UI	1	Copied from Original
Study Date	(0008,0020)	2	DA	1	Copied from Original
Study Time	(0008,0030)	2	TM	1	Copied from Original
Referring Physician's Name	(0008,0090)	2	PN	1	Copied from Original
Study ID	(0020,0010)	2	SH	1	Copied from Original
Accession Number	(0008,0050)	2	SH	1	Copied from Original
Study Description	(0008,1030)	3	LO	1	Copied from Original

9.2.3 Patient Study Module

Table 20: Secondary Capture Patient Study Module

Attribute Name	Tag	Type	VR	VM	Comment
Patient's Age	(0010,1010)	3	AS	1	Copied from Original
Patient's Size	(0010,1020)	3	DS	1	Copied from Original
Patient's Weight	(0010,1030)	3	DS	1	Copied from Original

9.2.4 Study Identification Module

Table 21: Secondary Capture Study Identification Module

Attribute Name	Tag	Type	VR	VM	Comment
Study ID Issuer	(0032,0012)		LO	1	Copied from Original
Other Study Numbers	(0020,1070)		IS	1-n	Copied from Original

9.2.5 Study Classification Module

Table 22: Secondary Capture Study Classification Module

Attribute Name	Tag	Type	VR	VM	Comment

Attribute Name	Tag	Type	VR	VM	Comment
Study Comments	(0032,4000)		LT	1	Copied from Original

9.2.6 General Series Module

Table 23: Secondary Capture General Series Module

Attribute Name	Tag	Type	VR	VM	Comment
Modality	(0008,0060)	1	CS	1	Copied from Original
Series Instance UID	(0020,000E)	1	UI	1	Copied from Original / Generated (for work area screenshots)
Series Number	(0020,0011)	2	IS	1	Copied from Original
Laterality	(0020,0060)	2C	CS	1	Copied from Original
Series Description	(0008,103E)	3	LO	1	Copied from Original
Operator's Name	(0008,1070)	3	PN	1-n	<full user name>
Body Part Examined	(0018,0015)	3	CS	1	Copied from Original
Patient Position	(0018,5100)	2C	CS	1	Copied from Original

9.2.7 General Equipment Module

Table 24: Secondary Capture General Equipment Module

Attribute Name	Tag	Type	VR	VM	Comment
Manufacturer	(0008,0070)	2	CS	1	'Siemens Corporation'
Institution Name	(0008,0080)	3	LO	1	<as configured>
Institution Address	(0008,0081)	3	ST	1	Copied from Original
Station Name	(0008,1010)	3	SH	1	<local hostname>
Institutional Department Name	(0008,1040)	3	LO	1	Copied from Original
Manufacturer's Model Name	(0008,1090)	3	LO	1	'syngo.Ultrasound Breast Analysis'
Device Serial Number	(0018,1000)	3	LO	1	Copied from Original
Software Versions	(0018,1020)	3	LO	1-n	'sUSBA VA30x <build number>' where x is a letter (e.g. A, B, C etc.)

The values of these attribute depend on the value of the configuration flag "Results_OverwriteManufacturer". For a value of '0', the original values are copied, for '1', the values mentioned above are used.

9.2.8 General Image Module

Table 25: Secondary Capture General Image Module

Attribute Name	Tag	Type	VR	VM	Comment
Instance Number	(0020,0013)	2	IS	1	Generated
Patient Orientation	(0020,0020)	2c	CS	2	Copied from Original
Content Date	(0008,0023)	2c	DA	1	Creation date of Secondary Capture object

Attribute Name	Tag	Type	VR	VM	Comment
Content Time	(0008,0033)	2c	TM	1	Creation time of Secondary Capture object
Image Type	(0008,0008)	3	CS	1-n	'DERIVED\SECONDARY\OTHER\SUSBA'

9.2.9 Image Pixel Module

Table 26: Secondary Capture Image Pixel Module

Attribute Name	Tag	Type	VR	VM	Comment
Samples per Pixel	(0028,0002)	1	US	1	'1' – for gray scale value images '3' – for color images
Photometric Interpretation	(0028,0004)	1	CS	1	'MONOCHROME2' – for gray scale value images 'RGB' – for color images
Rows	(0028,0010)	1	US	1	Depending on the size of the image on screen
Columns	(0028,0011)	1	US	1	Depending on the size of the image on screen
Bits Allocated	(0028,0100)	1	US	1	'8'
Bits Stored	(0028,0101)	1	US	1	'8'
High Bit	(0028,0102)	1	US	1	'7'
Pixel Representation	(0028,0103)	1	US	1	'0'
Pixel Data	(7FE0,0010)	1	OW/ OB	1	Always sent as OW
Planar Configuration	(0028,0006)	1c	US	1	'0' – for color images not present otherwise

9.2.10 Overlay Plane Module

This module is not implemented for this IOD.

9.2.11 Modality LUT Module

This module is not implemented for this IOD.

9.2.12 VOI LUT Module

This module is not implemented for this IOD.

9.2.13 SOP Common Module

Table 27: Secondary Capture SOP Common Module

Attribute Name	Tag	Type	VR	VM	Comment
SOP Class UID	(0008,0016)	1	UI	1	Secondary Capture Image Storage: '1.2.840.10008.5.1.4.1.1.7'
SOP Instance UID	(0008,0018)	1	UI	1	Generated
Specific Character Set	(0008,0005)	1c	CS	1-n	Never sent

9.2.14 SC Equipment Module

Table 28: Secondary Capture SC Equipment Module

Attribute Name	Tag	Type	VR	VM	Comment
Conversion Type	(0008,0064)	1	CS	1	'WSD'
Secondary Capture Device Manufacturer	(0018,1016)	3	LO	1	'Siemens Corporation'
Secondary Capture Device Manufacturers Model Name	(0018,1018)	3	LO	1	'syngo.Ultrasound Breast Analysis'
Secondary Capture Device Software Versions	(0018,1019)	3	LO	1	'sUSBA VA30x <build number>' where x is a letter (e.g. A, B, C etc.)

9.2.15 SC Image Module

Table 29: Secondary Capture SC Image Module

Attribute Name	Tag	Type	VR	VM	Comment
Date of Secondary Capture	(0008,1012)	3	DA	1	Creation date of Secondary Capture object
Time of Secondary Capture	(0018,1014)	3	TM	1	Creation time of Secondary Capture object