cvi42 | report®

v.3.10

DICOM Conformance Statement

circle CARDIOVASCULAR IMAGING

1 CONFORMANCE STATEMENT OVERVIEW

cvi42|Report is a vendor-independent workstation solution for comprehensive reporting of Cardiovascular MR and CT cases. It is designed to be used in clinical settings as well as for experimental and clinical research.

cvi42|Report supports two DICOM Service Classes, using the OFFIS DICOM Toolkit (DCMTK), to provide the following capabilities:

- Send DICOM images generated by the local system to a remote system.
- Send DICOM Storage Commitment requests to a remote system

Table 1-1 provides an overview of the network services supported by **cvi42|Report**. Table 1-2 lists all supported media services.

Table 1-1
NETWORK SERVICES

Networking SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	No	No
CT Image Storage	No	No
Digital X-Ray Image Storage For Presentation	No	No
Digital X-Ray Image Storage For Processing	No	No
Enhanced CT Image Storage	No	No
Enhanced MR Image Storage	No	No
MR Image Storage	No	No
Multi-frame Single Bit SC Image Storage	No	No
Multi-frame Grayscale Byte SC Image Storage	No	No
Multi-frame Grayscale Word SC Image Storage	No	No
Multi-frame True Color SC Image Storage	Yes	No
Nuclear Medicine Image Storage	No	No
Positron Emission Tomography Image Storage	No	No
Secondary Capture Image Storage	No	No
Ultrasound Image Storage	No	No
Ultrasound Multi-frame Image Storage	No	No
X-Ray Angiographic Image Storage	No	No
Query/Retrieve		
Study Root Query/Retrieve Information Model – FIND	No	No
Study Root Query/Retrieve Information Model – MOVE	No	No
Study Root Query/Retrieve Information Model – GET	No	No
Encapsulated PDF Storage	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No

Table 1-2
MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disc – Recordable		
Basic Cardiac X-Ray Angiographic Studies on CD-R Media	No	No
1024 X-Ray Angiographic Studies on CD-R Media	No	No
Ultrasound Single Frame for Image Display on CD-R	No	No
Ultrasound Multi-Frame for Image Display on CD-R	No	No
General Purpose CD-R Interchange	No	No
CT/MR Studies on CD-R	No	No
Digital Versatile Disc		
1024 X-Ray Angiographic Studies on DVD Media	No	No
CT/MR Studies on DVD Media	No	No
CT/MR Studies on DVD-RAM Media	No	No

2 TABLE OF CONTENTS

3 INTRODUCTION

This DICOM Conformance Statement specifies the behavior and functionality of the **cvi42|Report** system, with regard to supported DICOM networking SOP Classes and Media Storage Application Profiles. **cvi42|Report** is an intranet web application for comprehensive evaluation of Cardiovascular MR and CT data.

Contact address:

CIRCLE Cardiovascular Imaging Inc.
Suite 1100, 800 5th Avenue SW
Calgary, Alberta, Canada T2P 3T6
http://www.circlecvi.com/

3.1 Revision History

Document Version	Date of Issue	Author	Description
Version **report42** 3.3.0	2017-02-01	Glen van de Mosselaer	Initial release of this document
Version **report42** 3.5.0	2018-03-29	Ben Park	Version update, Added STORAGE COMMITMENT-SCU service
Version **report42** 3.6.0	2018-11-28	Billy Wu	Version update
Version **report42** 3.7.0	2019-07-24	Billy Wu	Version update. Updated Implementation Class UID and Implementation Version Name.
Version **report42** 3.8.0	2020-04-01	Geoff Michalak	Version update.
Version **cvi42|Report** 3.9.0	2020-07-21	Ben Park	Version update.
Version **cvi42|Report** 3.9.0	2021-03-12	Ben Park	Updated Implementation Class UID and Version Name.
Version **cvi42|Report** 3.10.0	2022-03-22	Estee Lee	Version update.

3.2 Audience

This document is written for the people that need to understand how **cvi42|Report** will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between **cvi42|Report** and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance

Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.4 Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard [DICOM] is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed 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 – 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. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

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: MR Image IOD, CT Image IOD, Print Job 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). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (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: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (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) [Patient 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 Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of 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 devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, 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 queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. 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, but it may not be the most efficient for some use cases. 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.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies “pre-negotiated” exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 Abbreviations

The following list illustrates all abbreviations that are used in this document.

ACSE	Association Control Service Element
AE	Application Entity
CD-R	Compact Disc – Recordable
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DVD	Digital Versatile Disc
FSC	File-Set Creator
FSR	File-Set Reader
FSU	File-Set Updater
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Standards Organization
JPEG	Joint Photographic Experts Group
MPR	Multiplanar Reconstruction
PACS	Picture Archiving and Communication System
PDF	Portable Document Format
PDU	Protocol Data Unit
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
US	Ultrasound
VM	Value Multiplicity
VR	Value Representation
XA	X-Ray Angiography

3.7 References

[DICOM] NEMA Standards Publication PS 3.1-18, Digital Imaging and Communications in Medicine (DICOM), 2009, available at http://medical.nema.org/

4 NETWORKING

4.1 Implementation Model

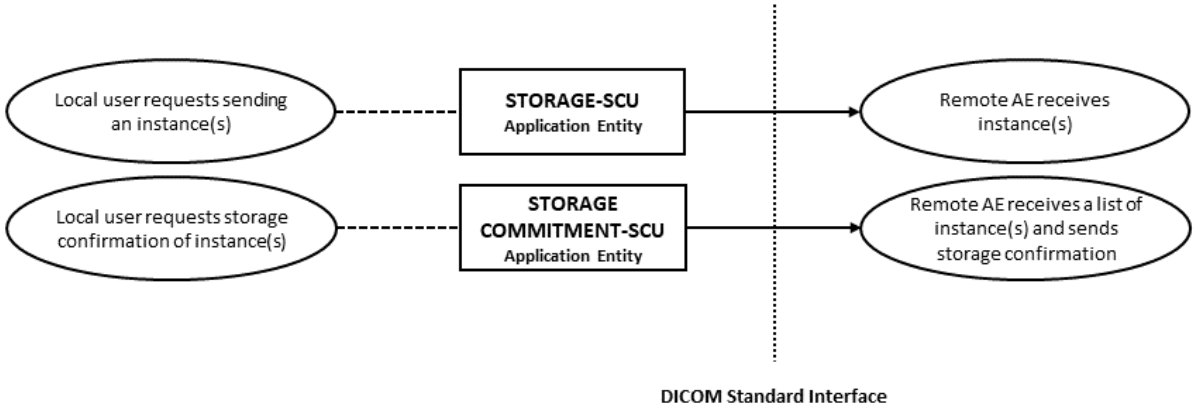

Figure 4-1. Application Data Flow Diagram

Conceptually, the networking services which are implemented in the **cvi42|Report** system may be modeled as the following separate AEs.

4.1.1 Functional Definitions of AEs

4.1.1.1 STORAGE-SCU

STORAGE-SCU is activated through the user interface when a user selects one or more instances from the local system and requests that they be sent to a remote AE. The remote AE is selected from a pre-configured list of communication partners.

4.1.1.2 STORAGE COMMITMENT-SCU

STORAGE COMMITMENT-SCU ensures that previously sent images are properly stored in the remote AE. In **cvi42|Report**, STORAGE COMMITMENT-SCU is triggered automatically after STORAGE-SCU finishes sending all images to the remote AE.

4.1.2 Sequencing of Real-World Activities

All SCU activities are initiated in the user interface. For each remote AE, a new background is started which allows for multiple associations at the same time.

4.2 AE Specifications

4.2.1 STORAGE-SCU

4.2.1.1 SOP Classes

STORAGE-SCU provides standard conformance to the following DICOM SOP classes.

Table 4.2-9
SOP CLASSES FOR AE STORAGE-SCU

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	No
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1.1	No	No
Digital X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1	No	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	No
Multi-frame Single Bit SC Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	No
Multi-frame Grayscale Byte SC Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	No
Multi-frame Grayscale Word SC Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	No
Multi-frame True Color SC Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	No
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

4.2.1.2 Association Policies

4.2.1.2.1 General

STORAGE-SCU initiates but never accepts associations. The DICOM standard application context name, which is always proposed, is:

Table 4.2-10
DICOM APPLICATION CONTEXT

Application context name	1.2.840.10008.3.1.1.1

The PDU size is in the range 4096 to 131072 bytes. The default is 16384 bytes.

SOP Class extended negotiation is not supported.

4.2.1.2.2 Number of Associations

Table 4.2-11
NUMBER OF ASSOCIATIONS AS AN ASSOCIATION INITIATOR FOR AE STORAGE-SCU

Maximum number of simultaneous associations	Dependent on system specifications

4.2.1.2.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

4.2.1.2.4 Implementation Identifying Information

Table 4.2-12
DICOM IMPLEMENTATION CLASS AND VERSION FOR AE STORAGE-SCU

Implementation Class UID	1.3.6.1.4.1.53684.1.0.3.6.5
Implementation Version Name	CVI42_DCMTK_365

4.2.1.3 Association Initiation Policy

STORAGE-SCU attempts to initiate a new association each time the user requests to send a group of instances. In case a large number of instances are to be sent, multiple subsequent associations are initiated each used to send only a part of the instances.

4.2.1.3.1 Activity – Local user requests sending instance(s)

4.2.1.3.1.1 Description and Sequencing of Activities

For each group of instances selected from the user interface to be transferred, a single attempt will be made to transmit it to the selected remote AE. If the send fails, no retry will be performed but an error message will be reported to the user.

4.2.1.3.1.2 Proposed Presentation Contexts

Table 4.2-13
PROPOSED PRESENTATION CONTEXTS FOR AE STORAGE-SCU AND
REAL-WORLD ACTIVITY 'LOCAL USER REQUESTS SENDING INSTANCE(S)'

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Multi-frame True Color SC Image Storage	1.2.840.10008.5.1.4.1.1.7.4	JPEG Baseline (P1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless (P14SV1)	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
		Implicit VR Little Endian, Explicit VR Little Endian, Explicit VR Big Endian	1.2.840.10008.1.2, 1.2.840.10008.1.2.1, 1.2.840.10008.1.2.2	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian, Explicit VR Little Endian, Explicit VR Big Endian	1.2.840.10008.1.2, 1.2.840.10008.1.2.1, 1.2.840.10008.1.2.2	SCU	None

STORAGE-SCU will always propose all Presentation Contexts, independently of the instances that are to be sent.

4.2.1.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.1.3.1.3 SOP Specific Conformance

4.2.1.3.1.3.1 SOP Specific Conformance to Storage SOP Classes

STORAGE-SCU provides standard conformance to the Storage Service Class.

4.2.1.3.1.3.2 Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations.

4.2.1.3.1.3.3 Transfer Syntax Selection Policies

If offered a choice of transfer syntaxes in the accepted presentation contexts, the default behavior of STORAGE-SCU is to prefer the transfer syntax that is used for the DICOM file stored on the local system. If this transfer syntax is not available, an explicit VR uncompressed transfer syntax is selected. If this is also unavailable, implicit VR little endian is selected. Finally, any matching presentation context is accepted independent of the transfer syntax.

The default behavior may be modified by changing the configuration of STORAGE-SCU.

4.2.1.3.1.3.4 Response Status

STORAGE-SCU will behave as described in the Table below when receiving the C-STORE response command message.

Table 4.2-14

RESPONSE STATUS HANDLING BEHAVIOR FOR AE STORAGE-SCU AND REAL-WORLD ACTIVITY 'LOCAL USER REQUESTS SENDING INSTANCE(S)'

Service Status	Further Meaning	Error Code	Behavior
Refused	Out of resources	A7xx	This is treated as a permanent failure. An error message is reported to the user interface.
Error	Data set does not match SOP class	A9xx	This is treated as a permanent failure. An error message is reported tom the user interface.
	Cannot understand	Cxxx	This is treated as a permanent failure. An error message is reported to the user interface.
Warning		Bxxx	Transmission of the DICOM instance is considered successful. No message is posted to the user interface.
Success		0000	The DICOM instance was successfully received by the remote AE. No message is reported to the service logs or posted to the user interface.

Table 4.2-15

COMMUNICATION FAILURE BEHAVIOR FOR AE STORAGE-SCU AND REAL-WORLD ACTIVITY 'LOCAL USER REQUESTS SENDING INSTANCE(S)'

Exception	Behavior
TCP/IP connection could not be established within the specified time range (configurable parameter).	An error message is reported to the user interface.
ASCE response message could not be received within the specified time range (configurable parameter).	An error message is reported to the user interface.
DIMSE response message could not be received within the specified time range (configurable parameter).	An error message is reported to the user interface.
Association aborted by the SCP using A-ABORT or the network layers indicate communication loss (i. e. low-level TCP/IP socket closure)	An error message is reported to the user interface.

4.2.1.4 Association Acceptance Policy

STORAGE-SCU does not accept associations.

4.2.2 STORAGE COMMITMENT-SCU

4.2.2.1 SOP Classes

STORAGE COMMITMENT-SCU provides standard conformance to the following DICOM SOP classes.

Table 4.2-16

SOP CLASSES FOR AE STORAGE COMMITMENT-SCU

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No

4.2.2.2 Association Policies

4.2.2.2.1 General

STORAGE COMMITMENT-SCU initiates but never accepts associations. The DICOM standard application context name, which is always proposed, is:

Table 4.2-17

DICOM APPLICATION CONTEXT

Application context name	1.2.840.10008.3.1.1.1

The PDU size is in the range 4096 to 131072 bytes. The default is 16384 bytes.

SOP Class extended negotiation is not supported.

4.2.2.2.2 Number of Associations

Table 4.2-18

NUMBER OF ASSOCIATIONS AS AN ASSOCIATION INITIATOR FOR AE STORAGE COMMITMENT-SCU

Maximum number of simultaneous associations	Dependent on system specifications

4.2.2.2.3 Asynchronous Nature

Asynchronous mode of operation is not supported.

4.2.2.2.4 Implementation Identifying Information

Table 4.2-19

DICOM IMPLEMENTATION CLASS AND VERSION FOR AE STORAGE COMMITMENT-SCU

Implementation Class UID	1.3.6.1.4.1.53684.1.0.3.6.5
Implementation Version Name	CVI42_DCMTK_365

4.2.2.3 Association Initiation Policy

STORAGE COMMITMENT-SCU attempts to initiate a new association after each time the user has sent a group of instances using STORAGE-SCU application entity.

4.2.2.3.1 Activity –Local user requests storage confirmation of instance(s)

4.2.2.3.1.1 Description and Sequencing of Activities

After the user successfully sends a group of instances to a remote AE, STORAGE COMMITMENT-SCU will be invoked by transmitting a list that contains the group of instances previously sent. Retries will be performed based on the configuration parameters. User will be reported with a list of unsuccessful transmissions.

4.2.2.3.1.2 Proposed Presentation Contexts

Table 4.2-20

PROPOSED PRESENTATION CONTEXTS FOR AE STORAGE COMMITMENT-SCU AND REAL-WORLD ACTIVITY 'LOCAL USER REQUESTS STORAGE CONFIRMATION OF INSTANCES'

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model SOP Class	1.2.840.10008 .1.20.1	Implicit VR Little Endian, Explicit VR Little Endian, Explicit VR Big Endian	1.2.840.10008.1.2, 1.2.840.10008.1.2.1, 1.2.840.10008.1.2.2	SCU	None

STORAGE COMMITMENT-SCU will always propose all Presentation Contexts, independently of the instances that are to be sent.

4.2.2.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.2.3.1.3 SOP Specific Conformance

4.2.2.3.1.3.1 SOP Specific Conformance to Storage Commitment Push Model SOP Classes

STORAGE COMMITMENT-SCU provides standard conformance to the Storage Commitment Service Class.

4.2.2.3.1.3.2 Presentation Context Acceptance Criterion

STORAGE COMMITMENT-SCU does not accept associations.

4.2.2.3.1.3.3 Transfer Syntax Selection Policies

The default preferred transfer syntax is either explicit VR little endian or explicit VR big endian depending on the byte order of the local system. If this is unavailable, implicit VR little endian is selected.

4.2.2.3.1.3.4 Response Status

STORAGE COMMITMENT-SCU will behave as described in the Table below when receiving the N-EVENT-REPORT response command message.

Table 4.2-21

RESPONSE STATUS HANDLING BEHAVIOR FOR AE STORAGE COMMITMENT-SCU AND REAL-WORLD ACTIVITY 'LOCAL USER REQUESTS STORAGE CONFIRMATION OF INSTANCES'

Service Status	Further Meaning	Error Code	Behavior
Refused	Syntax error	01	This is treated as a permanent failure. An error message is reported to both the service logs and to the user interface.
Error	Input file errors	2x	This is treated as a permanent failure. An error message is reported to both the service logs and to the user interface.
	Output file errors	4x	This is treated as a permanent failure. An error message is reported to both the service logs and to the user interface.
	Network errors	6x	This is treated as a permanent failure. An error message is reported to both the service logs and to the user interface.
Success		00	The list of DICOM Instance(s) was successfully stored or not stored at the remote AE

			If there are instances not properly stored, a message is reported to the service logs or posted to the user interface.

4.2.2.4 Association Acceptance Policy

In **cvi42|Report**, STORAGE COMMITMENT-SCU does not accept new associations and is expected to receive N-EVENT-REPORT request on the same association as N-ACTION.

4.3 Physical Network interfaces

4.3.1 Physical Network Interface

The DICOM applications of **cvi42|Report** are indifferent to the physical medium over which TCP/IP is used.

4.3.2 Additional Protocols

When host names rather than IP addresses are used in the configuration to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system.

4.3.3 IPv4 and IPv6 Support

cvi42|Report only supports IPv4 connections.

4.4 Configuration

The configuration can be changed by the user in the PACS Administration web page. Details are described in the user manual.

4.4.1 AE Title / Presentation Address Mapping

The Calling AE Title of the local AE is configurable in the PACS Administration web page. The mapping of the logical name by which remote AEs are described in the user interface to Called AE Titles as well as presentation address (hostname or IP address and port number) is configurable in the PACS Administration web page.

4.4.1.1 Local AE Title

Table 4.4-1

AE TITLE CONFIGURATION TABLE

Application Entity	Default AE Title	Default TCP/IP Port
STORAGE-SCU	REPORT42	–
STORAGE COMMITMENT-SCU	REPORT42	-

4.4.1.2 Remote AE Titles

The AE Title, host name or IP address and port number of remote AEs are configured in the PACS Administration web page.

4.4.2 Configurable Parameters

Concerning the STORAGE-SCU application entity, the following parameters are configurable at installation time.

Table 4.4-3
CONFIGURABLE PARAMETERS FOR AE STORAGE-SCU

Parameter	Configurable	Default Value
Time-out waiting for response to TCP/IP connect request	No	Unlimited
Time-out for ACSE messages	No	30 seconds
Time-out for DIMSE messages	No	Unlimited
Maximum number of instances sent in one association	No	20
Maximum PDU size the AE can receive	No	16384
Maximum PDU size the AE actually sends	Yes	As negotiated
Proposed network transfer syntaxes	Yes	See 4.2.2.3.1.2
Proposed networking SOP Classes	Yes	See 4.2.2.3.1.2

Concerning the STORAGE COMMITMENT-SCU application entity, the following parameters are configurable.

Table 4.4-4
CONFIGURABLE PARAMETERS FOR AE STORAGE COMMITMENT-SCU

Parameter	Configurable	Default Value
Enable or disable STORAGE COMMITMENT-SCU	Yes	Enabled

5 SUPPORT OF EXTENDED CHARACTER SETS

cvi42|Report does support extended character sets.

Table 8.1
Supported extended character sets

ISO_IR 100	Latin alphabet No. 1
ISO_IR 101	Latin alphabet No. 2
ISO_IR 109	Latin alphabet No. 3
ISO_IR 110	Latin alphabet No. 4
ISO_IR 144	Cyrillic
ISO_IR 127	Arabic
ISO_IR 126	Greek
ISO_IR 138	Hebrew
ISO_IR 148	Latin alphabet No. 5
ISO_IR 13	Japanese
ISO_IR 166	Thai
ISO 2022 IR 6	Default repertoire
ISO 2022 IR 100	Latin alphabet No. 1
ISO 2022 IR 101	Latin alphabet No. 2
ISO 2022 IR 109	Latin alphabet No. 3
ISO 2022 IR 110	Latin alphabet No. 4
ISO 2022 IR 144	Cyrillic
ISO 2022 IR 127	Arabic
ISO 2022 IR 126	Greek
ISO 2022 IR 138	Hebrew
ISO 2022 IR 148	Latin alphabet No. 5
ISO 2022 IR 13	Japanese
ISO 2022 IR 166	Thai
ISO 2022 IR 87	Japanese
ISO 2022 IR 159	Japanese
ISO 2022 IR 149	Korean
ISO_IR 192	Unicode in UTF-8
GB18030	GB18030

6 SECURITY

6.1 Security Profiles

cvi42|Report does not support any security profiles.

6.2 Association Level Security

cvi42|Report does not support any association level security.

6.3 Application Level Security

cvi42|Report does not support any application level security.

7 ANNEXES

7.1 IOD Contents

7.1.1 Created SOP Instances

7.1.1.1 Multi-frame True Color SC Image IOD

cvi42|Report creates Multi-frame True Color SC Image objects containing 150, 200, 300, or 600 dpi renderings of printable report pages.

The following tables describe the modules and attributes of the underlying IOD. Most attributes that are never present in a created SOP instance are omitted from the tables in order to increase the readability.

Table 10.1-4

MULTI-FRAME TRUE COLOR SC IMAGE IOD MODULES

IE	Module	Reference	Presence of Module
Patient	Patient	Table 10.1-6	Always
	Clinical Trial Subject	–	Never
Study	General Study	Table 10.1-7	Always
	Patient Study	–	Never
	Clinical Trial Study	–	Never
Series	General Series	Table 10.1-8	Always
	Clinical Trial Series	–	Never
Equipment	General Equipment	Table 10.1-9	Always
	SC Equipment	Table 10.1-10	Always
Frame of Reference	Frame of Reference	–	Never
	Synchronization	–	Never
Image	General Image	Table 10.1-11	Always
	Image Pixel	Table 10.1-20	Always
	Image Plane[1] *(selected attributes only)*	Table 10.1-13	Not always
	Cine	–	Never
	Multi-frame	Table 10.1-12	Always
	Frame Pointers	–	Never
	Device	–	Never
	Specimen	–	Never
	Multi-frame Functional Groups	–	Never
	Multi-frame Dimension	–	Never
	SC Image	–	Never
	SC Multi-frame Image	Table 10.1-21	Always
	SC Multi-frame Vector	–	Never
	SOP Common	Table 10.1-22	Always
	Frame Extraction	–	Never
	Private Data	–	Never

[1] According to the DICOM standard, this module is not required for this IOD (also see Section 8.5).

7.1.1.2 Common Secondary Capture Image Modules

Table 10.1-6
PATIENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Patient's Name	(0010,0010)	PN	From original DICOM image	Always
Patient ID	(0010,0020)	LO	From original DICOM image	Always, might be empty
Issuer of Patient ID	(0010,0021)	LO	From original DICOM image	Always, might be empty
Type of Patient ID	(0010,0022)	CS	From original DICOM image	Always, might be empty
Patient's Birth Date	(0010,0030)	DA	From original DICOM image	Always, might be empty
Patient's Sex	(0010,0040)	CS	From original DICOM image	Always, might be empty
Other Patient IDs	(0010,1000)	LO	From original DICOM image	Always, might be empty

Table 10.1-7
GENERAL STUDY MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Study Date	(0008,0020)	DA	From original DICOM image	Always, might be empty
Study Time	(0008,0030)	TM	From original DICOM image	Always, might be empty
Accession Number	(0008,0050)	SH	From original DICOM image	Always, might be empty
Referring Physician's Name	(0008,0090)	PN	From original DICOM image	Always, might be empty
Study Instance UID	(0020,000D)	UI	From original DICOM image	Always
Study ID	(0020,0010)	SH	From original DICOM image	Always, might be empty

Table 10.1-8
GENERAL SERIES MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Series Instance UID	(0020,000E)	UI	Generated automatically	Always
Series Number	(0020,0011)	IS	Generated automatically	Always
Laterality	(0020,0060)	CS		Empty
Patient Position	(0018,5100)	CS		Never
Modality	(0008,0060)	CS	See Table 8.1-10	

Table 10.1-9
GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Manufacturer	(0008,0070)	LO	“CircleCVI”	Always
Institution Name	(0008,0080)	LO	From original DICOM image	Always, might be empty
Station Name	(0008,1010)	SH	From original DICOM image	Always, might be empty
Software Versions	(0018,1020)	LO	“report42 3.10.x(y)”	Always

Table 10.1-10
SC EQUIPMENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Conversion Type	(0008,0064)	CS	“SD”	Always
Modality	(0008,0060)	CS	“OT”	Always

Table 10.1-11
GENERAL IMAGE MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Image Type	(0008,0008)	CS		Never
Content Date	(0008,0023)	DA	Date of the content creation	Never
Content Time	(0008,0033)	TM	Time of the content creation	Always
Instance Number	(0020,0013)	IS	Sequential number increased for each instance within a series	Always
Patient Orientation	(0020,0020)	CS		Empty

Table 10.1-12
MULTI-FRAME MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Number of Frames	(0008,0008)	IS	“1”	Always
Frame Increment Pointer	(0028,0009)	AT	(0018,1063)	Always

Table 10.1-13
IMAGE PLANE MODULE OF CREATED SOP INSTANCES (SELECTED ATTRIBUTES)

Attribute Name	Tag	VR	Value	Presence of Value
Image Orientation (Patient)	(0020,0037)	DS		Never
Image Position (Patient)	(0020,0032)	DS		Never

7.1.1.3 Multi-frame True Color SC Image Modules

Table 10.1-20
IMAGE PIXEL MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Samples Per Pixel	(0028,0002)	US	3	Always
Photometric Interpretation	(0028,0004)	CS	“RGB” or “YBR_FULL_422”	Always
Planar Configuration	(0028,0006)	US	0	Always
Rows	(0028,0010)	US	Depends on the height of the image	Always
Columns	(0028,0011)	US	Depends on the width of the image	Always
Pixel Aspect Ratio	(0028,0034)	IS		Never
Bits Allocated	(0028,0100)	US	8	Always
Bits Stored	(0028,0101)	US	8	Always
High Bit	(0028,0102)	US	7	Always
Pixel Representation	(0028,0103)	US	0	Always
Pixel Data	(7FE0,0010)	OW	Depends on the content of the image	Always

Table 10.1-21
SC MULTI-FRAME IMAGE MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Frame Increment Pointer	(0028,0009)	AT	(0018,1063)	Always
Burned in Annotation	(0028,0301)	CS	“YES”	Always

Table 10.1-22
SOP COMMON MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Specific Character Set	(0008,0005)	CS	From original DICOM image	Always
SOP Class UID	(0008,0016)	UI	“1.2.840.10008.5.1.4.1.1.7.4“	Always
SOP Instance UID	(0008,0018)	UI	Generated automatically	Always

7.1.1.4 OT Image Modules

Table 10.1-24
PATIENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Patient’s Name	(0010,0010)	PN	From original DICOM image	Always
Patient ID	(0010,0020)	LO	From original DICOM image	Always, might be empty
Patient’s Birth Date	(0010,0030)	DA	From original DICOM image	Always, might be empty
Patient’s Sex	(0010,0040)	CS	From original DICOM image	Always, might be empty

Table 10.1-25

GENERAL STUDY MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Study Date	(0008,0020)	DA	From original DICOM image	Always, might be empty
Study Time	(0008,0030)	TM	From original DICOM image	Always, might be empty
Accession Number	(0008,0050)	SH		Empty
Referring Physician's Name	(0008,0090)	PN		Empty
Study Instance UID	(0020,000D)	UI	From original DICOM image	Always
Study ID	(0020,0010)	SH		Empty

Table 10.1-26
GENERAL SERIES MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Series Instance UID	(0020,000E)	UI	Generated automatically	Always
Series Number	(0020,0011)	IS	Generated automatically	Always
Laterality	(0020,0060)	CS		Empty
Series Description	(0008,103E)	LO	"report42 report (STATUS)"	Always
Patient Position	(0018,5100)	CS	From original DICOM image	Never
Modality	(0008,0060)	CS	"OT"	Always

Table 10.1-27
GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Manufacturer	(0008,0070)	LO	"CircleCVI"	Always
Software Versions	(0018,1020)	LO	"report42 3.10.x(y)"	Always

Table 10.1-29
GENERAL IMAGE MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Image Type	(0008,0008)	CS		Never
Content Date	(0008,0023)	DA	Date of the content creation	Never
Content Time	(0008,0033)	TM	Time of the content creation	Always
Instance Number	(0020,0013)	IS	Sequential number increased for each instance within a series	Always

Table 10.1-30
IMAGE PIXEL MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Samples Per Pixel	(0028,0002)	US	3	Always
Photometric Interpretation	(0028,0004)	CS	"RGB" or "YBR_FULL_422"	Always

Planar Configuration	(0028,0006)	US		Never
Rows	(0028,0010)	US	Depends on the height of the image	Always
Columns	(0028,0011)	US	Depends on the width of the image	Always
Pixel Aspect Ratio	(0028,0034)	IS		Never
Bits Allocated	(0028,0100)	US	See Table 10.1-32	
Bits Stored	(0028,0101)	US	See Table 10.1-32	
High Bit	(0028,0102)	US	See Table 10.1-32	
Pixel Representation	(0028,0103)	US	0	Always
Pixel Data	(7FE0,0010)	OW	Depends on the content of the image	Always

Table 10.1-34
SOP COMMON MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Specific Character Set	(0008,0005)	CS	From original DICOM image	Always
SOP Class UID	(0008,0016)	UI	“1.2.840.10008.5.1.4.1.1.7.4“	Always
SOP Instance UID	(0008,0018)	UI	Generated automatically	Always

7.1.1.5 Encapsulated Document Modules

Table 10.1-35
ENCAPSULATED DOCUMENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value
Instance Number	(0020,0013)	IS	Sequential number increased for each instance within a series	Always
Content Date	(0008,0023)	DA		Empty
Content Time	(0008,0033)	TM		Empty
Acquisition DateTime	(0008,002A)	DT		Empty
Image Laterality	(0020,0062)	CS		Never
Burned In Annotation	(0028,0301)	CS	“YES”	Always
Recognizable Visual Features	(0028,0302)	CS		Never
Source Instance Sequence	(0042,0013)	SQ		Never
Document Title	(0042,0010)	ST	“report42 PDF”	Always
Concept Name Code Sequence	(0040,A043)	SQ		Empty
Document Class Code Sequence	(0040,E008)	SQ		Never
Verification Flag	(0040,A493)	CS		Never
HL7 Instance Identifier	(0040,E001)	ST		Never
MIME Type of Encapsulated Document	(0042,0012)	LO	“application/pdf”	Always

List of MIME Types	(0042,0014)	LO		Never
Encapsulated Document	(0042,0011)	OB	Encapsulated Document stream.	Always, might be empty

7.1.2 Attribute Mapping

cvi42|Report does not use any attribute mapping.

7.1.3 Coerced / Modified Fields

cvi42|Report does not modify any fields.

7.2 Data Dictionary of Private Attributes

cvi42|Report does not use any private attributes.

7.3 Coded Terminology and Templates

cvi42|Report does not use any coded terminology or templates.

7.4 Grayscale Image Consistency

cvi42|Report does not make use of the DICOM Grayscale Standard Display Function.

7.5 Standard Extended / Specialized / Private SOP Classes

cvi42|Report does not support any extended, specialized or private SOP classes.

7.6 Private Transfer Syntaxes

cvi42|Report does not use any private transfer syntaxes.

At the Heart of IMAGING
www.circlecvi.com
Circle Cardiovascular Imaging
@circlecvi