

DICOM Conformance Statement

VARiS Vision™

VARiS Vision DICOM V 3.0 Conformance Statement

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1. Introduction

1.1 Purpose

This conformance statement specifies how the imaging related VARiS applications conform to the DICOM V 3.0 standard. VARiS Vision uses DICOM to receive and transmit images that are used in the radiation therapy process. Further more images and image related data can be printed on a hard copy medium using the DICOM Print Management Service Class.

1.2 Scope

The scope and format of this document are defined by the part 2 of the DICOM V3.0 standard. Some sections defined in the standard that are not applicable to the software described herein are left out for clarity.

The scope of this conformance statement is restricted to images and related objects only. It does not cover any DICOM RT (Radiotherapy) specific objects defined in DICOM 3 Supplement 11.

1.3 Definitions

AE :	Application Entity.
VDCM :	Name of the VARiS Vision DICOM program.
VDCMPrint :	Name of the VARiS Vision DICOM Print Management program.
DICOM :	Digital Imaging and Communications in Medicine, a standard on image communications in medical applications
PDU :	Protocol Data Unit, a chunk of data transmitted from one DICOM application to another.
SCU :	Service Class User
SCP :	Service Class Provider
SOP :	Service-Object-Pair, a definition of an information object (like an image) and of a service (like storage) that can be performed for the object.
TCP/IP :	Transmission Control Program / Internet Protocol, a widely used computer networking protocol.
VR :	Value Representation, a data encoding method in DICOM.

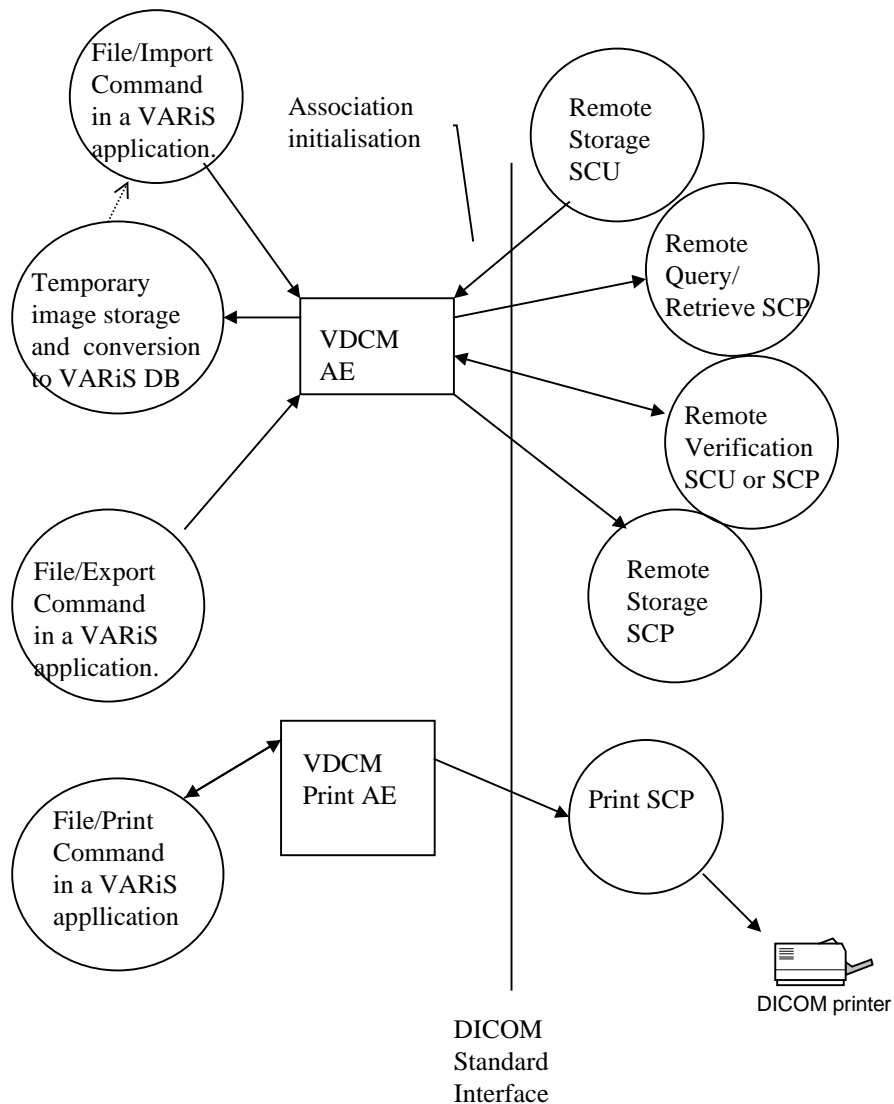
1.4 Related Documents

Digital Imaging and Communications in Medicine (DICOM), Parts 1-8, National Electrical Manufacturers Association, 2101 L Street, N.W., Washington D.C. 20037.

2. Implementation Model

2.1 Application data flow diagram

A diagram illustrating the application model is shown in fig. 1



2.2 VDCM and VDCMPrint AE Functional Definition

The VDCM application entity is responsible for all DICOM communications. Depending on the specific installation this application is running either all the time, or only when started by the user. It accepts storage requests of the service classes specified below. The C-echo messages

to the Verification SCP are automatically responded to with a C-echo response.

The VDCMPrint application entity contains the DICOM Print Management. VDCMPrint is responsible for acquiring all the information which is required to print a film session. The film session contains one or more films related in an user defined way (e.g. belonging to the same patient or to the same folder). Each film consists of one or more images.

3. AE Specifications

3.1 VDCM AE Specification

The VDCM Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes:

SOP Class Name	SCU/SCP Role	SOP Class UID
CT Image Storage	Both	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	Both	1.2.840.10008.5.1.4.1.1.4
CR Image Storage	Both	1.2.840.10008.5.1.4.1.1.1
Secondary Capture Image Storage	Both	1.2.840.10008.5.1.4.1.1.7
Verification (Echo)	SCP only	1.2.840.10008.1.1
Study Root Query/Retrieve information model- FIND	SCU only	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve information model- MOVE	SCU only	1.2.840.10008.5.1.4.1.2.2.2

Note: Query/Retrieve will be supported as a SCP in future releases of the software.

3.1.1 Association Establishment Policies

3.1.1.1 General

The maximum PDU length of the AE is 32768 bytes.

The AE does not support any SOP class extended negotiations. The user information item sent by this AE only contains the maximum PDU length and the Implementation UID.

3.1.1.2 Number of associations

The VDCM AE accepts any number of simultaneous associations. Note however, that multiple associations at a time affect the response time of the system, and may thus cause time-outs on the association initiator side.

3.1.1.3 Asynchronous nature

Asynchronous operation is not supported.

3.1.1.4 Implementation Identifying information

The Implementation Class UID of the application entity is:

1.2.246.352.43077212.2

No implementation version information is given.

3.1.1.5 Association Initiation by Real-World Activity

The VDCM application entity initiates associations in two different cases:

1. The user selects the File/Export command in a Visual VARiS application and then selects an export destination that is configured to use DICOM. The service class used depends on the type of the image that the user has selected before the File/Export command.
2. The user selects the File/Import command and an import source that has been configured to use the DICOM Query/Retrieve service class.

3.1.1.6 Association Acceptance Policy

The VDCM accepts all association requests that request one of the supported service classes. It does not place any limits on the number of concurrent associations or on who may connect to it.

Associated real world activity

When images are sent to VDCM, it stores them to temporary files. The user may then use the File/Import command to read the images into the VARiS database.

In case of Query/Retrieve, the images that are received by VDCM are read into the VARiS database as they are received.

Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU/SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU/SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU/SCP	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR	1.2.840.10008.1.2	SCU/SCP	None

Storage		Little Endian			
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve information model- FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve information model- MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific conformance

SOP Specific conformance to the verification service class

VDCM provides standard conformance to the DICOM Verification Service Class.

SOP Specific conformance to the supported storage service classes

SCP role

VDCM conforms to the image storage service classes at level 0 (local). This means that only the attributes of the images that can be saved in VARiS database are stored by VDCM and all others are discarded. However, is guaranteed that at least all type 1 attributes are stored.

A successful C-STORE operation means that the image has been received, and saved to a temporary file, which can then be read in to the VARiS database by the user. The successful termination of the association does not imply that the image data is either syntactically or semantically correct.

SCU Role

In a case of successful C-STORE operation, the program does not display the user any information but returns to its normal state. All C-STORE-responses with a warning or unsuccessful status cause the program to display warning messages to the user.

SOP Specific conformance to the Query/Retrieve service class

Priority processing is not used.

Only unique and required keys are supported.

No relational queries are generated.

Presentation context and acceptance criterion

VDCM will accept the presentation contexts mentioned in the Presentation Context Table above.

Transfer syntax selection policies

VDCM will only accept the DICOM default transfer syntax.

3.2 VDCMPrint AE Specifications

VDCMPrint AE provides standard conformance as a Print Management SCU to the following SOP classes:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
>Printer SOP Class	1.2.840.10008.5.1.1.16

3.2.1 Association Establishment Policies

3.2.1.1 General

The maximum PDU length of the AE is 32768 bytes. The user information item sent by this AE only contains the maximum PDU length and the Implementation UID.

3.2.1.2 Number of associations

The VDCMPrint AE acts as an Association-requester i.e. VDCMPrint establishes one single association to any remote AE at any time.

3.2.1.3 Asynchronous nature

Asynchronous operation is not supported.

3.2.1.4 Implementation Identifying information

The Implementation Class UID of the Print Management application entity (VDCMPrint) is:

1.2.246.352.43077212.3

No implementation version information is given.

3.2.1.5 Association Initiation by Real-World Activity

The VDCMPrint application entity initiates associations when the user selects the File/Print command in a Visual VARiS application and then selects a printer which is capable to use DICOM. The VDCMPrint AE allows the user to set print parameters and to transmit images for printing. Presentation Context Table

The VDCMPrint AE supports the listed Abstract Syntaxes and Transfer Syntaxes as a Print Management SCU.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Printer SOP Class	1.2.840.10008.5.1.1.16	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific conformance for Meta SOP Class: Basic Grayscale Print Management

The Meta SOP Class is defined by the following set of supported SOP Classes.

- Basic Film Session SOP Class
- Basic Film Box SOP Class
- Basic Grayscale Image Box SOP Class
- Printer SOP Class

SOP Specific conformance for SOP Class: Basic Film Session

VDCMPrint AE supports the following Attributes of the N-CREATE DIMSE Service:

Attribute Name	Tag
Number of Copies	(2000, 0010)
Medium Type	(2000, 0030)

Fim Session Label	(2000, 0050)
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SOP Specific conformance for SOP Class: Basic Film Box

VDCMPrint AE supports the following Attributes of the N-CREATE DIMSE Service:

Attribute Name	Tag
Image Display Format	(2010, 0010)
Referenced Film Session Sequence	(2010, 0500)
Film Orientation	(2010, 0040)
Film Size ID	(2010, 0050)
Magnification Type	(2010, 0060)

SOP Specific conformance for SOP Class: Basic Grayscale Image Box

VDCMPrint AE supports the following Attributes of the N-SET DIMSE Service:

Attribute Name	Tag
Image Position	(2020,0010)
Preformatted Grayscale Image Sequence	(2020,0110)
>Samples Per Pixel	(0028,0002)
>Photometric Interpretation	(0028,0004)
>Rows	(0028,0010)
>Columns	(0028,0011)
>Pixel Aspect Ratio	(0028,0034)
>Bits Allocated	(0028,0100)
>Bits Stored	(0028,0101)
>High Bit	(0028,0102)
>Pixel Representation	(0028,0103)
>Pixel Data	(7FE0,0010)
Magnification Type	(2010,0060)

SOP Specific conformance for SOP Class: Printer

VDCMPrint AE supports the mandatory service element N-EVENT-REPORT.

The N-GET DIMSE Service Attributes supported are:

Attribute name	Tag
Printer Status	(2110, 0010)
Printer Status Info	(2110,0020)

3.2.1.6 Association Acceptance Policy

The VDCMPrint AE does not accept any association from a remote AE.

4. Communication profiles

4.1 Supported communications stacks

VDCM and VDCMPrint provide DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 (part 8 of the DICOM V3.0 standard).

4.2 TCP/IP stack

VDCM and VDCMPrint uses the TCP/IP stack of Windows NT (Winsock) which is the operating system of the VARiS Vision system.

4.2.1 Physical media support

VDCM and VDCMPrint can run on any physical network media that is supported by the underlying hardware and operating system (i.e. standard PC's and Windows NT). These include, but are not limited to: thin, thick, and twisted-pair Ethernet, token ring network and FDDI.

5. Configuration

The configurable parameters of VDCM are:

- For the storage and Query/Retrieve service class SCUs the TCP/IP address, the AE title and port number of the destination are configurable. Multiple configurations can exist in the system at the same time.
- The TCP/IP port number.
The port number defaults to 104 (decimal), but it can be configured to be any number that is acceptable for TCP/IP.
- Whether or not a debug log is produced.