
Gendex

VixWin DICOM

DICOM Conformance Statement

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1 Introduction

1.1 Purpose of this Document

This document is the DICOM Conformance Statement for the VixWin™ dental imaging application program. It is drafted in accordance with NEMA PS3.2. 2007.

1.2 Abbreviations and Acronyms:

ASCII	American Standard Code for Information Interchange
AE	Application Entity
ANSI	American National Standards Institute
DICOM	Digital Imaging and Communications in Medicine
DX	Digital X-ray Image
IE	Information Entity
IO	Intra-oral
IOD	Information Object Definition
ISO	International Standards Organization
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
VL	Visible Light
VR	Value Representation

1.3 References and Resources:

- “Digital Imaging and Communications in Medicine (DICOM) standard”, NEMA PS 3.1-3.18, 2007, <http://medical.nema.org>

2 Implementation Model

2.1 Application Data Flow

VixWin™ is a software application program for general dental and maxillo-facial diagnostic imaging. VixWin manages and controls X-ray digital images from Denoptix®, Denoptix® QST, Visualix®/GX-S™ USB/HDI, Visualix® eHD, KaVo Dig eXam®, Orthoralix® DPI and Orthoralix® DDE systems. It can also handle other types of images acquired by digitizing film with a flat bed scanner or color images from an intraoral or extraoral dental cameras such as AcuCam® Concept IV FWT and eZ1 series.

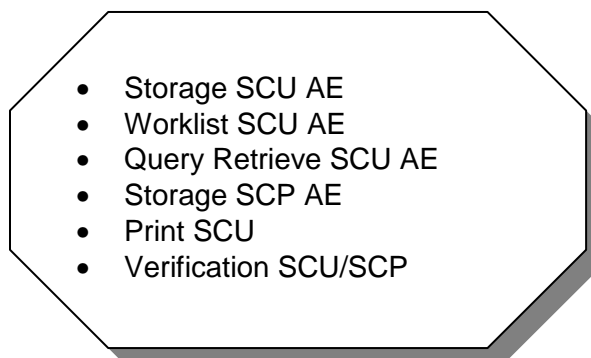
The application program has the capability to associate acquired images with patient demographics, send images to a DICOM storage class service provider, query another database and pull images back and Print.

The most important DICOM characteristics of the application program are the supported SOP Classes and the respective roles (Service Class User or Provider, SCU/SCP), listed below:

- **Storage SCU** is supported so that images can be sent to DICOM storage archives.
- **Modality Worklist SCU** allows requests for scheduled examinations with relevant patient and study data from the Information System. The user can select an examination by simply clicking on the entry in the list.
- **Q/R SCU** means that VixWin can query the remote archive for DICOM information objects and retrieve them.
- **Storage SCP** is supported so that images can be retrieved from the DICOM storage archive
- **Print SCU** means that VixWin can print images on a DICOM printer.
- **Verification** both as a User and Provider of the DICOM network as required by the DICOM Standard.

2.2 Functional Definition of Network Application Entities

VixWin has six distinct DICOM software modules for the purpose of networking:



VixWin's DICOM Modules

Storage SCU AE

- Establishes an association with a configured Storage Service Class Provider Application Entity.
- Transmits images to the remote DICOM device.

Worklist SCU AE

- Establishes an association with a configured Worklist Management Service Class Provider Application Entity.
- Provides matching keys for a worklist query.
- Receives the worklist information.

Query Retrieve SCU AE

- Establishes an association with a configured Query Retrieve Service Class Provider Application Entity
- Performs query for IOD situated on remote DICOM device.
- Performs retrieve of DICOM IOD from remote DICOM device.

Storage SCP AE

- Receives images from the remote DICOM device.

Print SCU AE

- Establishes an association with a configured Print Service Class Provider Application Entity
- Print selected images on a remote DICOM Printer

Verification SCU/SCP AE

- Establishes and Accepts an association with a Verification Provider or User.

2.3 Sequencing of Real World Activities

The DICOM features in VixWin follow the logical sequence of real world activities listed below:

- The user selects DICOM Worklist from the VixWin File menu.
- A worklist query can be performed at any time by simply clicking on the relevant toolbar button.
- The user can then select an entry from the list of exams to start the examination phase for the selected patient
- Images are acquired for the selected patient.
- Images are selected by the user.
- User selects the DICOM Storage command from the VixWin File menu.
- The image is sent to a remote archive node over the DICOM network.
- The user may request to query patients-studies-series/images and to retrieve the queried patients-studies-series/images from a list.

3 AE Specifications

3.1 Storage SCU AE

3.1.1 SOP Classes

The VixWin Storage SCU AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 4.1.1 - 1
SOP Classes supported by VixWin as an SCU

SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4

3.1.2 Association establishment policies

3.1.2.1 General

The maximum PDU (Protocol Data Unit) size which can be transmitted by VixWin is fixed at 16KB.

3.1.2.2 Number of Associations

VixWin Storage SCU will initiate at most one simultaneous association.

3.1.2.3 Asynchronous Nature

VixWin does not support asynchronous operations.

3.1.2.4 Implementation Identifying Information

<i>Implementation Class UID</i>	1.2.840.10008.114368.120408.1.1
<i>Implementation Version Name</i>	VXDICOM_1_3

3.1.3 Association Initiation Policy

The VixWin will attempt to initiate association after selected images are sent to a remote image archive.

The storage association is closed when all images have been sent to the remote DICOM image archive.

VixWin terminates the association if a configurable time out or an error occurs.

3.1.3.1 Real-World Activity – Storage SCU

3.1.3.1.1 Associated Real World Activity– Storage SCU

VixWin issues Storage C-STORE when the user sends the selected image to the DICOM Storage archive.

3.1.3.1.2 Proposed Presentation Context– Storage SCU

VixWin supports the presentation contexts listed in the following table:

Table 4.1.3.1.2-1
Proposed Presentation Contexts for Storage SCU AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.1.1 - 1	See Table 4.1.1 -1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.3.1.3 SOP Specific Conformance Statement – Storage SCU

The user will be notified if the image is not correctly stored. The error will be logged to the VixWin application software.

3.2 Worklist SCU AE

3.2.1 SOP Classes

The VixWin Worklist SCU provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 4.1.1 - 1
SOP Classes supported by VixWin as an SCU

SOP Class Name	SOP Class UID
Modality Worklist Information Model FIND	1.2.840.10008.5.1.4.31

3.2.2 Association establishment policies

3.2.2.1 General

The maximum PDU (Protocol Data Unit) size which can be transmitted by VixWin is fixed at 16KB.

3.2.2.2 Number of Associations

VixWin Worklist SCU will initiate at most one simultaneous association.

3.2.2.3 Asynchronous Nature

VixWin does not support asynchronous operations.

3.2.2.4 Implementation Identifying Information

<i>Implementation Class UID</i>	1.2.840.10008.114368.120408.1.1
<i>Implementation Version Name</i>	VXDICOM_1_3

3.2.3 Association Initiation Policy

The VixWin Worklist AE will attempt to initiate association when the user selects to retrieve the worklist;

VixWin terminates the association if a time out or an error occurs.

3.2.3.1 Real-World Activity – Modality Worklist

3.2.3.1.1 Associated Real World Activity – Modality Worklist

The Modality Worklist AE will initiate an association to a device in response to the following real-world activities:

- The user initiates a manual Update Worklist (Broad Query).
- The user initiates a specific Worklist Query (Patient Based Query).

In all cases a C-FIND command is issued to the Modality Worklist server. After the requested data is returned, the association is closed.

3.2.3.1.2 Proposed Presentation Context – Modality Worklist

VixWin supports the presentation contexts listed in the following table:

Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

3.2.3.1.2.1 SOP Specific Conformance Statement - Modality Worklist

VixWin provides support for Patient and Date Worklist Queries.

The Patient Query queries with one or more of the following keys.

QUERY BY PATIENT

Attribute Name	Tag	Type	Notes
Patient's Name	(0010,0010)	R	Entered on Patient Query user interface. A wild card is appended to Last and First name component.
Patient ID	(0010,0020)	R	Entered on Patient Query screen. Single value matching only.
Accession Number	(0008,0050)	O	Entered on Patient Query screen.
Scheduled Station Name	(0040,0010)	O	Entered in VixWin Preferences

The Date Query queries with the following key.

QUERY BY DATE

Attribute Name	Tag	Type	Notes
Scheduled Procedure Step Start Date	(0040,0002)	R	Selectable as: <ul style="list-style-type: none"> • Today's date • User specified date range • Universal Matching
Scheduled Station Name	(0040,0010)	O	Entered in VixWin Preferences

The following table specifies the Return Key attributes that are included in all Worklist C-FIND requests.

RETURN KEY ATTRIBUTES

Description / Module	Tag	Type	Notes
Scheduled Procedure Step			
Scheduled Procedure Step Sequence	(0040,0100)	1	
>Scheduled Station AE Title	(0040,0001)	1	
>Scheduled Procedure Step Start Date	(0040,0002)	1	
>Scheduled Procedure Step Start Time	(0040,0003)	1	
>Modality	(0008,0060)	1	
>Scheduled Performing Physician's Name	(0040,0006)	2	
>Scheduled Procedure Step Description	(0040,0007)	1C	
>Scheduled Station Name	(0040,0010)	2	Used in query, if entered in VixWin Preferences
>Scheduled Procedure Step Location	(0040,0011)	2	
Requested Procedure			
Requested Procedure ID	(0040,1001)	1	Displayed on Patient Selected user interface.
Requested Procedure Description	(0032,1060)	1C	Displayed on Patient Selected user interface.
Requested Procedure Code Sequence	(0032,1064)	1C	
>Code Value	(0008,0100)	1	
>Coding Scheme Designator	(0008,0102)	1	
>Coding Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Study Instance UID	(0020,000D)	1	
Study Date	(0008,0020)	3	
Study Time	(0008,0030)	3	
Referenced Study Sequence	(0008,1110)	2	

Description / Module	Tag	Type	Notes
>Referenced SOP Class UID	(0008,1150)	1	
>Referenced SOP Instance UID	(0008,1155)	1	
Requested Procedure Priority	(0040,1003)	2	
Intended Recipients of Results	(0040,1010)	3	
Imaging Service Request			
Accession Number	(0008,0050)	2	Displayed on Patient Selected user interface.
Requesting Physician	(0032,1032)	2	Displayed on Patient Selected user interface.
Referring Physician's Name	(0008,0090)	2	Displayed on Patient Selected user interface.
Patient Identification			
Patient's Name	(0010,0010)	1	Only Last and First name components are displayed on Patient selected user interface. All 5 name components are preserved internally by VixWin.
Patient ID	(0010,0020)	1	Displayed on Patient Selected user interface.
Other Patient ID	(0010,1000)	3	Displayed on Patient Selected user interface.
Patient Demographic			
Patients Birth Date	(0010,0030)	2	Displayed on Patient Selected user interface.
Patient's Sex	(0010,0040)	2	Displayed on Patient Query and Patient Selected user interface.
Patient Medical			
Patient State	(0038,0500)	2	
Pregnancy Status	(0010,21C0)	2	
Medical Alerts	(0010,2000)	2	
Contrast Allergies	(0010,2110)	2	

3.3 Query/Retrieve SCU AE

3.3.1 SOP Classes

The VixWin Storage SCU AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 4.3.1 - 1
SOP Classes supported by VixWin as an SCU

SOP Class Name	SOP Class UID
Patient Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2

3.3.2 Association establishment policies

3.3.2.1 General

The maximum PDU (Protocol Data Unit) size which can be transmitted by VixWin is fixed at 16KB.

3.3.2.2 Number of Associations

VixWin Q/R SCU will initiate at most one simultaneous Association.

3.3.2.3 Asynchronous Nature

VixWin Q/R does not support asynchronous operations.

3.3.2.4 Implementation Identifying Information

<i>Implementation Class UID</i>	1.2.840.10008.114368.120408.1.1
<i>Implementation Version Name</i>	VXDICOM_1_3

3.3.3 Association Initiation Policy

The VixWin Q/R will attempt to initiate association:

1. When the user queries information from a remote DICOM device.
2. When images are retrieved from a remote DICOM device.

VixWin terminates the association if a time out or an error occurs.

3.3.3.1 Real-World Activity – Query Remote AE

3.3.3.1.1 Sequencing

VixWin performs the following sequence of steps for query operation:

Query:

- (1) Association establish (requestor only)

- (2) Transfer query request IOD (SCU only)
- (3) Wait for query result IOD
- (4) Receive query result IOD
- (5) Association release (requestor only)

VixWin assumes that the query succeeded when the result of (4) is 'success' even if the result of (5) 'Association release' is 'failure'.

3.3.3.1.2 Proposed Presentation Context – Query

VixWin supports the presentation contexts listed in following table:

Table 4.3.3.1.1 - 1
Proposed Presentation Contexts for FIND-SCU and Query Remote AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.3.1-1	See Table 4.3.1-1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.3.3.1.2.1 SOP Specific Conformance Statement – Query

The following attributes may be entered by the user and used in the query request.

Description	Tag	Type	Notes
Study Date	(0008,0020)	R	Selectable as: <ul style="list-style-type: none"> • Today's date • User specified date range • Universal Matching
Patient's Name	(0010,0010)	R	Entered on the Query user interface. A wild card is appended to Last and First name component.
Patient ID	(0010,0020)	U	Entered on the Query user interface. Single value matching only.
Study ID	(0020,0010)	R	Entered on the Query user interface. Single value matching only.
Study Instance UID	(0020,000D)	U	Entered on the Query user interface. Single value matching only.
Series Number	(0020,0022)	R	Entered on the Query user interface. Single value matching only.
Instance Number	(0020,0013)	R	Entered on the Query user interface. Single value matching only.

3.3.3.2 Real-World Activity – Retrieve Remote AE

3.3.3.2.1 Sequencing

VixWin performs the following sequence of steps for retrieve operation:

Retrieve:

- (1) Establish Association (requestor only)
- (2) Issues C-MOVE for patient
- (3) Association release (requestor only)

VixWin assumes that the retrieve succeeded when the result of (2) is 'success' even if the result of (3) 'Association release' is 'failure'.

3.3.3.2.2 Proposed Presentation Context – Retrieve

VixWin supports the presentation contexts listed in following table:

Table 4.3.3.1.1 - 1
Proposed Presentation Contexts for FIND-SCU and Query Remote AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.3.1-1	See Table 4.3.1-1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.3.3.2.3 Sub-operation dependent behavior

Upon sending a C-MOVE request to the Query/Retrieve SCP, VixWin waits for associations with C-STORE request messages from the SCP. It accepts the associations and sends back C-STORE response messages.

3.4 Storage SCP AE

3.4.1 SOP Classes

The VixWin Storage SCP AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 4.4.1 - 1
SOP Classes supported by VixWin as a SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4

3.4.2 Association establishment policies

3.4.2.1 General

The maximum PDU (Protocol Data Unit) size which can be transmitted by VixWin is fixed at 16KB.

3.4.2.2 Number of Associations

VixWin Storage SCP will accept one simultaneous association.

3.4.2.3 Asynchronous Nature

VixWin does not support asynchronous operations.

3.4.3 Association Acceptance Policy

The VixWin will accept associations from any SCU unless SCU's are restricted via VixWin's configuration settings.

VixWin terminates the association if a time out or an error occurs.

3.4.3.1 Real-World Activity – Storage SCP

3.4.3.1.1 Accepted Presentation Context– Storage SCP

VixWin supports the presentation contexts listed in the following table:

Table 4.1.3.1.2-1
Proposed Presentation Contexts for Storage SCP AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.1.1 - 1	See Table 4.1.1 -1	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

3.4.3.1.2 SOP Specific Conformance Statement – Storage SCP

3.4.3.1.2.1 Transfer Syntax Selection Policies

VixWin's default transfer syntax is Implicit VR Little Endian.

3.4.3.1.2.2 Response Status

STORAGE-SCP will send back the status in the Table below in response to a C-STORE.

Table 4.4.3.1.2.2 -1
RESPONSE STATUS FOR STORAGE-SCP AND RECEIVE STORAGE REQUEST

Service Status	Further Meaning	Status Codes	Condition
Refused	Out of Resources	A700	Out of resources (unable to create local file)

Error	Data Set does not match SOP Class	A900	Data set does not match SOP class
	Cannot understand	C000	Cannot understand
Success		0000	Image successfully stored

3.5 Print AE

3.5.1 SOP Classes

The VixWin Print SCU AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 4.5.1 - 1
SOP Classes supported by VixWin as an SCU

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9

3.5.2 Association establishment policies

3.5.2.1 General

The maximum PDU (Protocol Data Unit) size which can be transmitted by VixWin is fixed at 16KB.

3.5.2.2 Number of Associations

VixWin Storage SCU will initiate at most one simultaneous association.

3.5.2.3 Asynchronous Nature

VixWin does not support asynchronous operations.

3.5.2.4 Implementation Identifying Information

<i>Implementation Class UID</i>	1.2.840.10008.114368.120408.1.1
<i>Implementation Version Name</i>	VXDICOM_1_3

3.5.3 Association Initiation Policy

The VixWin will attempt to initiate association after selected images are selected to be printed.

The storage association is closed when all images belonging to the same SOP Class have been sent to the remote DICOM printer.

VixWin terminates the association if a time out or an error occurs.

3.5.3.1 Real-World Activity – Print SCU

3.5.3.1.1 Associated Real World Activity– Print SCU

A user selects images and requests them to be sent to a specific hardcopy device. The user can select the desired film format and number of copies. Each print-job is forwarded to the job queue and processed individually.

3.5.3.1.2 Proposed Presentation Context– Print SCU

VixWin supports the presentation contexts listed in the following table:

Proposed Presentation Contexts

Presentation Context Table	
Abstract Syntax	
Name	UID
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
> Basic Film Session	1.2.840.10008.5.1.1.1
> Basic Film Box	1.2.840.10008.5.1.1.2
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
> Basic Annotation Box	1.2.840.10008.5.1.1.15
> Printer	1.2.840.10008.5.1.1.16

Transfer Syntax: DICOM Implicit VR Little Endian

UID List: 1.2.840.10008.1.2

Role: SCU

Extended Negotiation: None

3.5.3.1.2.1 SOP Specific CS for SOP Basic Grayscale Print Management Meta Classes

VixWin supports the following mandatory SOP classes as defined by the Basic Grayscale Print Management class:

- Basic Film Session: 1.2.840.10008.5.1.1.1
- Basic Film Box: 1.2.840.10008.5.1.1.2

- Basic Grayscale Image Box: 1.2.840.10008.5.1.1.4.
- Printer: 1.2.840.10008.5.1.1.16

VixWin also supports also the following optional SOP classes:

- Basic Annotation Box: 1.2.840.10008.5.1.1.15

3.5.3.1.2.2 SOP Specific CS for SOP Basic Film Session Class

VixWin includes the following attributes in the N-CREATE for the Basic Film Session SOP class:

Description	Tag	Usage
▪ Number of Copies	(2000,0010)	M
▪ Print Priority	(2000,0020)	M
▪ Medium Type	(2000,0030)	M
▪ Film Destination	(2000,0040)	M
▪ Film Session Label	(2000,0050)	C

In “Usage” column “M” means that the attribute is always sent and “C” means that the attribute is sent only when it is not empty on VixWin GUI.

The N-SET, N-ACTION, N-DELETE are currently unused.

3.5.3.1.2.3 SOP Specific CS for SOP Basic Film Box Class

VixWin includes the following attributes in the N-CREATE for the Basic Film Box SOP class:

Description	Tag	Usage
▪ Image Display Format	(2010,0010)	M
▪ Referenced Film Session Sequence	(2010,0500)	M
▪ Referenced SOP Class UID	(0008,1150)	M
▪ Referenced SOP Instance UID	(0008,1155)	M
▪ Film Orientation	(2010,0040)	M
▪ Film Size ID	(2010,0050)	M
▪ Magnification Type	(2010,0060)	M
▪ Border Density	(2010,0100)	M
▪ Max Density	(2010,0130)	C
▪ Configuration Information	(2010,0150)	C
▪ Smoothing Type	(2010,0080)	C
▪ Empty Image Density	(2010,0110)	C
▪ Min Density	(2010,0120)	C
▪ Trim	(2010,0140)	C

In “Usage” column “M” means that the attribute is always sent and “C” means that the attribute is sent only when it is not empty in VixWin.

The N-SET is currently unused. The N-ACTION is used to print a complete Basic Film Box SOP instance and the N-DELETE is used to delete it after printing.

3.5.3.1.2.4 SOP Specific CS for SOP Basic Annotation Box Class

VixWin Print Module includes the following attributes used in the N-SET for the Basic Annotation Box SOP class:

Description	Tag	Usage
▪ Annotation position	(2030,0010)	M
▪ Text string	(2030,0020)	M

In “Usage” column “M” means that the attribute is always sent.

The use of Annotation Box SOP Class may be enabled by VixWin's Print dialog through two dedicated edit boxes: ‘Display Format ID’ and ‘Position’. If the value of ‘Display Format ID’ is empty, then Annotation Box SOP Class is unsupported.

3.5.3.1.2.5 Conformance for SOP Class Basic Grayscale Image Box

VixWin Print Module includes the following attributes includes attributes used in the N-SET for the Basic Grayscale Image Box SOP class:

Description	Tag	Usage
▪ Image Position	(2020,0010)	M
▪ Sample Per pixel	(0028,0002)	M
▪ Photometric interpretation	(0028,0004)	M
▪ Rows	(0028,0010)	M
▪ Columns	(0028,0011)	M
▪ Bits Allocated	(0028,0100)	M
▪ Bits Stored	(0028,0101)	M
▪ High Bit	(0028,0102)	M
▪ Pixel Representation	(0028,0103)	M
▪ Pixel Data	(7FE0,0010)	M
▪ Magnification Type	(2010,0060)	M

In “Usage” column “M” means that the attribute is always sent and “C” means that the attribute is sent only when it is not empty in VixWin.

3.5.3.1.2.6 SOP Specific CS for SOP Printer Class

VixWin Print Module shall accept N-EVENT-REPORT and return confirmation accordingly. It uses N-GET for the Basic Printer SOP class to get information from the SCP.

The following table reports the list of DIMSE Service Elements used by Print SCU AE:

SOP Class	DIMSE Service Element
Basic Film Session SOP Class	N-CREATE, N-DELETE
Basic Film Box SOP Class	N-CREATE, N-DELETE, N-ACTION
Basic Grayscale Image Box SOP Class	N-SET
Printer SOP Class	N-GET
Basic Annotation Box SOP Class	N-SET

3.6 Verification AE

VixWin functions as a Service Class User (SCU) of the Verification Service Class. It requests verification to a remote DICOM AE. VixWin performs this request using the CECHO command.

VixWin functions as a Service Class Provider (SCP) of the Verification Service Class. After receiving a remote AE request for a connection, VixWin response to the AE's C-ECHO command. Upon receipt of the C-ECHO confirmation, it is expected that the SCU would determine that verification is complete.

4 Communication Profiles

4.1 TCP/IP Stack

VixWin provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.1.1 TCP/IP API

VixWin uses the TCP/IP stack from the Windows XP/Vista system upon which it executes.

4.1.2 Physical media support

VixWin is a software application that places no restrictions on the physical network for Windows environment. VixWin has been demonstrated using TCP/IP protocol over Ethernet (Thin wire and 10BaseT) and Fast-Ethernet (100BaseT).

5 Extensions/Specializations/Privatizations

Not applicable.

6 Configuration

VixWin has a user interface to configure the following:-

Configuration Parameter	Description
VixWin Application Entity Parameters	
Host Name/IP Address	TCP/IP host name or IP address of remote AE
Port Number	Port number
Calling AE Title	The calling Application Entity (AE) module title.
Called AE Title	The called Application Entity(AE) module title.

6.1 AE Title/Presentation Address mapping

Correspondence between IP addresses and Hostname should be established at Operating System level by configuring the proper TCP/IP configuration files.

6.2 Configurable Parameters

VixWin DICOM Modules can be configured using a dedicated dialog interface by selecting the menu item Options | DICOM Setup.

Configuration parameters are stored in the Windows Registry and/or INI files.

7 Support of Extended Character Sets

VixWin supports the extended character set ISO IR 101.

8 Annexes

8.1 IOD specifications

Table 10.1 - 1

ATTRIBUTE NAME	TAG	TYP	NOTES
Patient Module (SC DX IO ES GM XC)			
Patient's Name	(0010,0010)	2	From MWL, Dental SW or entered by user
Patient ID	(0010,0020)	2	From MWL, Dental SW or entered by user
Patient's Birth Date	(0010,0030)	2	From MWL or entered by user. (YYYYMMDD)
Patient's Sex	(0010,0040)	2	From MWL or entered by user (M,F,O)
Other Patient IDs	(0010,1000)	3	From MWL or empty
General Study Module (SC DX IO ES GM XC)			
Study Instance UID	(0020,000D)	1	From MWL, or auto generated
Study Date	(0008,0020)	2	Auto generated when study created.
Study Time	(0008,0030)	2	Auto generated when study created.
Referring Physician's Name	(0008,0090)	2	From MWL, or empty.
Study ID	(0020,0010)	2	Auto generated
Accession Number	(0008,0050)	2	From MWL, or empty.
Study Description	(0008,1030)	3	From MWL, mount description or empty.
General Series Module (SC DX IO ES GM XC)			
Modality	(0008,0060)	1	DX, IO, PX, ES, GM, XC
Series Instance UID	(0020,000E)	1	Auto generated
Series Number	(0020,0011)	2	Auto generated
Series Date	(0008,0021)	3	Image capture date (single image series)
Series Time	(0008,0031)	3	Image capture time (single image series)
Performing Physicians' Name	(0008,1050)	3	Entered by user
Series Description	(0008,103E)	3	Empty
General Equipment Module (SC DX IO ES GM XC)			
Manufacturer	(0008,0070)	2	Gendex,KaVo etc
Institution Name	(0008,0080)	3	Entered by user
Station Name	(0008,1010)	3	Entered by user
Manufacturer's Model Name	(0008,1090)	3	DenOptix, Visualix, etc.
Software Versions	(0018,1020)	3	VixWin Platinum vX.X
General Image Module (SC DX IO ES GM XC)			
Instance Number	(0020,0013)	2	0
Content Date (Image Date)	(0008,0023)	2C	Image capture date
Content Time (Image Time)	(0008,0033)	2C	Image capture time
Patient Orientation	(0020,0020)	2C	Entered by user : L\F P\F A\L A\F R\F F\A
Acquisition Date	(0008,0022)	3	Image capture date
Acquisition Time	(0008,0032)	3	Image capture time
Image Comments	(0020, 4000)	3	Image notes
Image Pixel Module (SC DX IO ES GM XC)			
Samples per Pixel	(0028,0002)	1	1 for grayscales, 3 for RGB
Photometric Interpretation	(0028,0004)	1	MONOCHROME 2 for grayscales, RGB for RGB
Rows	(0028,0010)	1	Image width in #pixels
Columns	(0028,0011)	1	Image height in #pixels
Bits Allocated	(0028,0100)	1	8 or 16
Bits Stored	(0028,0101)	1	8 or 16
High Bit	(0028,0102)	1	7 or 15
Pixel Representation	(0028,0103)	1	0 = unsigned integer
Pixel Data	(7FE0,0010)	1	Data stream
Planar Configuration	(0028,0006)	1C	Only for RGB images
Acquisition Context Module (DX IO ES GM XC)			
Acquisition Context Sequence	(0040,0555)	2	Empty
SC Image Equipment Module (SC)			
Conversion Type	(0008,0064)	1	DV=Camera, DF=TWAIN,else DI; digital still camera, imported (?)
Secondary Capture Device ID	(0018,1010)	3	Empty.
Secondary Capture Device Manufacturer	(0018,1016)	3	Gendex,KaVo etc
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	3	DenOptix, Visualix, etc.
SC Image Module (SC)			
Date of Secondary Capture	(0018,1012)	3	Date
DX Series Module (DX IO)			
Modality	(0008,0060)	1	DX
Presentation Intent Type	(0008,0068)	1	FOR PRESENTATION
DX Anatomy Imaged Module (DX IO)			
Image Laterality	(0020,0062)	1	Entered by user : R, L or B
Anatomic Region Sequence	(0008,2218)	2	
Anatomic Region Modifier Sequence	(0008,2220)	3	
Primary Anatomic Structure Sequence	(0008,2228)	3	
DX Image Module (DX IO)			

Image Type	(0008,0008)	1	ORIGINAL\PRIMARY
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Rows	(0028,0010)	1	Image width in #pixels
Columns	(0028,0011)	1	Image height in #pixels
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028,0103)	1	0=unsigned integer
Pixel Data	(7FE0,0010)	1	Data stream
Pixel Intensity Relationship	(0028,1040)	1	LIN (relationship between pixel sample values and x-ray beam intensity)
Pixel Intensity Relationship Sign	(0028,1041)	1	-1 (higher pixel values for less x-ray intensity)
Rescale Intercept	(0028,1052)	1	0
Rescale Slope	(0028,1053)	1	1
Rescale Type	(0028,1054)	1	US
Presentation LUT Shape	(2050,0020)	1	IDENTITY
Lossy Image Compression	(0028,2110)	1	00=no lossy compression
Patient Orientation	(0020,0020)	1	Entered by user : L\F P\F A\L A\F R\F F\A
Burned In Annotation	(0028,0301)	1	NO
Window Center	(0028,1050)	1C	128 (8 bit)
Window Width	(0028,1051)	1C	256 (8 bit)
DX Detector Module (DX IO)			
Detector Type	(0018,7004)	2	SCINTILLATOR or STORAGE
Detector ID	(0018,700A)		Empty
Imager Pixel Spacing	(0018,1164)	1	Physical distance between centers of each image pixel pair
Intra-oral Series Module (IO)			
Modality	(0008,0060)	1	IO or PX
Intra-oral Image Module (IO)			
Positioner Type	(0018,1508)	1	Entered by user: NONE, CEPHALOSTAT, RIGID
Image Laterality	(0020,0062)	1	Entered by user : R, L, B (both=midline)
Anatomic Region Sequence	(0008,2218)	1	
Primary Anatomic Structure Sequence	(0008,2228)	1C	
Anatomic Region Modifier Sequence	(0008,2220)	1C	
Primary Anatomic Structure Sequence	(0008,2228)	1C	
VL Image Module (ES GM XC)			
Image Type	(0008,0008)	1	ORIGINAL\PRIMARY
Photometric Interpretation	(0028,0004)	1	RGB
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028,0103)	1	0=unsigned integer
Samples per Pixel	(0028,0002)	1	3
Lossy Image Compression	(0028,2110)	2	00=no lossy compression
VOI LUT Module (SC DX IO)			
Window Center	(0028,1050)	3	128 (8 bit)
Window Width	(0028,1051)	1C	256 (8 bit)
SOP Common Module (SC DX IO ES GM XC)			
SOP Class UID	(0008,0016)	1	For IOD SC,IO,DX ...
SOP Instance UID	(0008,0018)	1	Auto generated
Specific Character Set	(0008,0005)		ISO_IR 100

8.2 Attribute mapping

The relationships between attributes received via Modality Work list, and stored in acquired images are summarized in the Table 10.2 - 1.

Table 10.2 - 1: Attribute Mapping Between Modality Worklist and Image IOD

Field	Tag	DICOM IOD	Interface	MWL
Patient's Name	(0010,0010)	Patient's Name	Name	Patient's Name
Patient ID	(0010,0020)	Patient ID	Patient ID	Patient ID
Other Patient ID	(0010,1000)	Other Patient ID	Not Displayed	Other Patient ID
Patient's Birth Date	(0010,0030)	Patient's Birth Date	Birth Date	Patient's Birth Date
Patient's Sex	(0010,0040)	Patient's Sex	Sex	Patient's Sex
Study Instance UID	(0020,000D)	Study Instance UID	Not Displayed	
Referring Physician's Name	(0008,0090)	Referring Physician's Name	Not Displayed	Referring Physician's Name
Accession Number	(0008,0050)	Accession Number	Accession No.	Accession Number
Modality	(0008,0060)	Modality	Modality	Modality
Study Description	(0008,1050)	Study Description	Study Description	Scheduled Procedure Step Description