

Philips Medical Systems
DICOM Conformance Statement

EasyVision 5.2
DICOM Store, Query/Retrieve, Print, Media

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1 Introduction

This chapter provides general information about the purpose, scope and contents of this Conformance Statement.

1.1 Scope and field of application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices.

This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM]. The conformance to the DICOM standard is a key element of the Inturis Program (see [INTURIS]).

1.2 Intended audience

This Conformance Statement is intended for:

- (potential) customers,
- system integrators of medical equipment,
- marketing staff interested in system functionality,
- software designers implementing DICOM interfaces.

It is assumed that the reader is familiar with the DICOM standard.

1.3 Contents and structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2.

1.4 Used definitions, terms and abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4.

The word Philips in this document refers to Philips Medical Systems.

1.5 References

- [DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard:
NEMA PS 3.X
National Electrical Manufacturers Association (NEMA) Publication Sales
1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

[INTURIS] Inturis for Cardiology
On-Line Image Access
Doc. nr. 4522 982 69681
Philips medical Systems Ned. BV

[EV REL BUL] EasyVision Release Bulletin
Easy Vision Modules (EVM)
Philips Medical Systems Nederland B.V. (see address at page ii)

1.6 Important note to the reader

This Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment, also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

Introduction

1.7 General Acronyms and Abbreviations.

The following acronyms and abbreviations are used in the document.

- ACC American College of Cardiology
- AE Application Entity
- ACR American College of Radiology
- ANSI American National Standard Institute
- BOT Basic Offset Table
- CD-R CD Recordable
- CD-M CD Medical
- DCI Digital Cardio Imaging
- DCR Dynamic Cardio Review
- DICOM Digital Imaging and Communication in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element-Composite
- DIMSE-N DICOM Message Service Element-Normalized
- ELE Explicit VR Little Endian
- EBE Explicit VR Big Endian
- FSC File Set Creator
- GUI Graphic User Interface
- HIS Hospital Information System
- HL7 Health Level Seven
- ILE Implicit VR Little Endian
- ELE Explicit VR Little Endian
- IOD Information Object Definition
- ISIS Information System - Imaging System
- NEMA National Electrical Manufacturers Association
- PDU Protocol Data Unit
- RIS Radiology Information System
- RWA Real World Activity
- SC Secondary Capture
- SCM Study Component Management
- SCP Service Class Provider
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet protocol
- UID Unique Identifier
- WLM Worklist Management

2 Implementation model

The EasyVision Release 5.2 system of Philips Medical Systems is a comprehensive range of hardware and software modules that allow for tailored clinical solutions. The software applications are categorised in packages, for instance the Stack View package for CT/MR images. The hardware consists out of a range of different SUN stations allowing for flexibility in price-performance. The range is from simple user box workstation till complex client-server configurations.

EasyVision provides the following DICOM data exchange features:

- It receives images sent to it by local applications (e.g. workstations or imaging modalities) and stores them in a database.
- It allows the operator to copy images from the database to remote databases and vice versa. For this purpose the operator is able to query remote databases.
- It allows a remote system to query the EasyVision database and to retrieve images from it.
- It allows the operator to print images stored in the database on a DICOM printer.
- It is able to read and write DICOM CD-R disks.

EasyVision allows the operator also to view, to analyse and process the images stored in the database. Some advanced analysis and processing applications are primarily designed for images generated by Philips equipment and that are sent to the EasyVision by means of a private protocol (like Gyrocom or PMSNet, the Philips Medical Systems proprietary communication protocol). Some of these advanced applications may not perform optimally when applied to images that are sent to EasyVision by means of DICOM because additionally required data may be lacking, see EasyVision application profiles documentation.

2.1 Application Data Flow Diagram

The EasyVision system behaves as a single Application Entity. Its related Implementation Model is shown in Figure 2-1 on page 6.

The EasyVision operator can request to query a selected remote system, request to copy images from EasyVision to a selected remote system, request to retrieve selected images from remote systems and can request to print images. This results in Associations initiated by EasyVision.

EasyVision is able to reply on verification requests, to execute a requested query, to store received images into EasyVision and retrieve requested images from EasyVision. These requests from remote systems are done via Associations initiated by the remote systems.

EasyVision is also able to display the contents (i.e. directory listing) of DICOM CD-Recordable disks and to write, read and update images on/from a DICOM CD-Recordable disk.

2.2 Functional definition of Application Entities

The EasyVision Application Entity acts as a Service Class User (SCU) of Query/Retrieve and Store service classes. The application acts as a Service Class Provider (SCP) of Verification, Query/Retrieve and Store service classes.

The EV-Print Application Entity acts as Service Class User (SCU) for the Print Service Class.

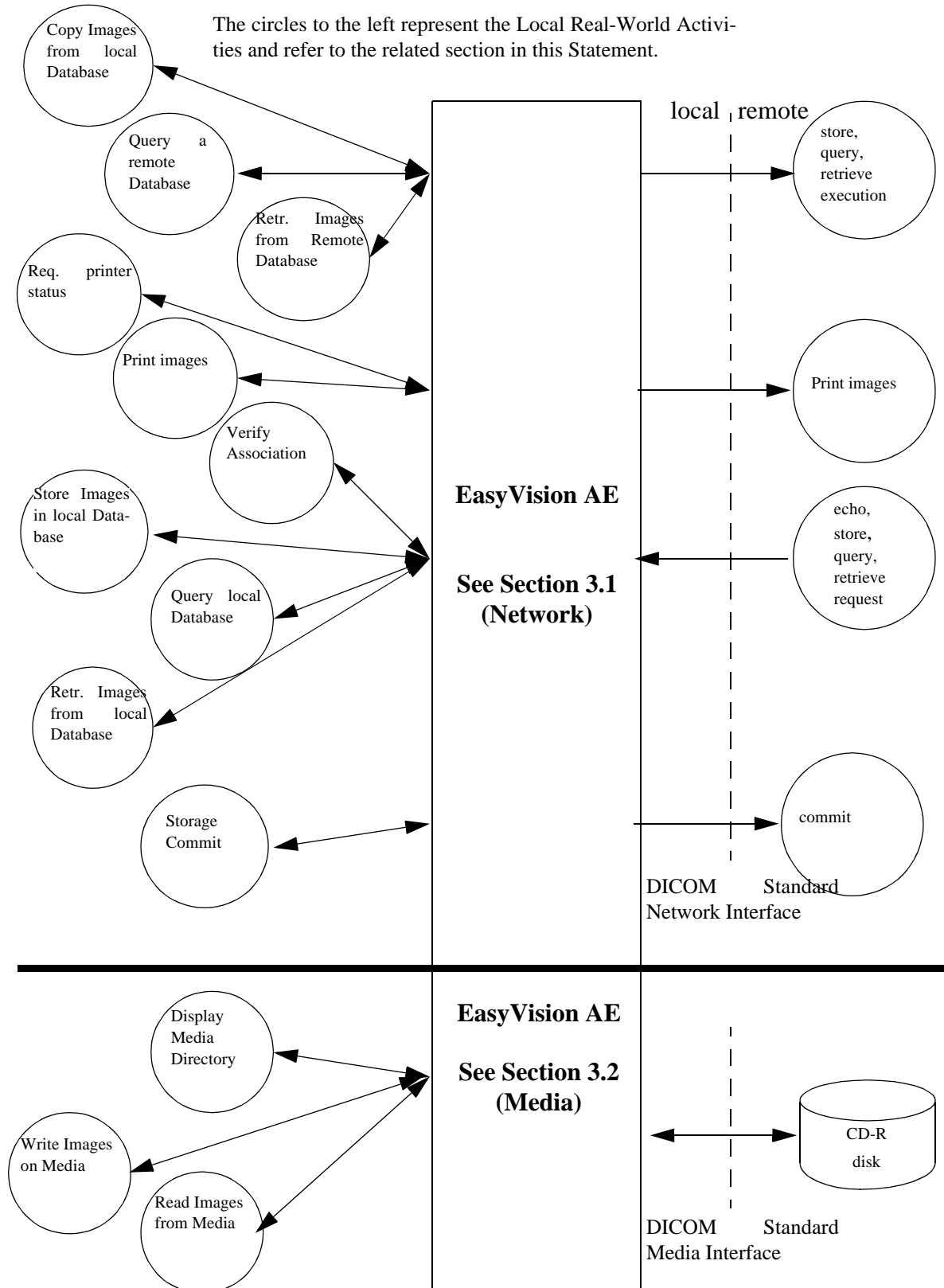
EasyVision acts also as a File Set Creator (FSC), File Set Reader (FSR) and File Set Updater (FSU) of the Media Service Class.

2.3 Sequencing of Real World Activities

All Real-World Activities as specified in Figure 2-1 may occur independently from each other, except that the two local Print Real-World Activities are mutual exclusive: A request for the printer status is not done when a request for image printing is busy, vice versa.

Implementation model

Figure 2-1: EasyVision Implementation Model



AE Specifications

3 AE Specifications

The Network capabilities of the EasyVision DICOM Application Entity are specified in section 3.1 and the Media capabilities are specified in section 3.2.

3.1 EasyVision AE Network Specification

The EasyVision Application Entity provides Standard Extended Conformance to the DICOM V3.0 SOP classes as an SCU specified in Table 3-1. The following remarks are important:

- The list of available SOP Classes out of the full list in Table 3-1 can be configured per Easy-Vision system at installation time. The SOP Classes to be used as SCU can be configured per remote station.
- In case the remote system does not support the import of a specific Image Storage SOP Class, EasyVision will convert (if configured to do so) these images and sends them via the SC Image SOP Class.
- US Multi-frame images are not exported as such but as a set of single frame images.
- The Private SOP Classes may be stored in image archives but are to be used in EasyVision systems only.
- The EasyVision requests for a Storage Commitment.

Table 3-1: Supported SOP classes by the EasyVision AE as SCU

SOP class Name	UID
Storage Commitment Push Model	1.2.840.10008.1.20.1
CR Image Storage	1.2.840.10008.5.1.4.1.1.1
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
NM Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.5
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
US Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.6
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
SC Image Storage	1.2.840.10008.5.1.4.1.1.7
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Patient Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient/Study Only Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

AE Specifications

Table 3-1: Supported SOP classes by the EasyVision AE as SCU (Continued)

SOP class Name	UID
Patient/Study Only Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
> ^a 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 Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
> Printer SOP Class	1.2.840.10008.5.1.1.16
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
> ^b 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
3D Volume Storage (Private class)	1.3.46.670589.5.0.1
3D Volume Object Storage (Private class)	1.3.46.670589.5.0.2
Surface Storage (Private class)	1.3.46.670589.5.0.3
Composite Object Storage (Private class)	1.3.46.670589.5.0.4
MR Cardio Profile Storage (Private class)	1.3.46.670589.5.0.7
MR Cardio Storage (Private class)	1.3.46.670589.5.0.8
CT Synthetic Image Storage (Private class)	1.3.46.670589.5.0.9
MR Synthetic Image Storage (Private class)	1.3.46.670589.5.0.10
MR Cardio Analysis Storage (Private class)	1.3.46.670589.5.0.11
CX Synthetic Image Storage (Private class)	1.3.46.670589.5.0.12
Reconstructed X-ray (Private class)	1.3.46.670589.2.4.1.1

a. The '>' sign indicates that the SOP Class is part of the above mentioned Meta SOP Class.

b. The '>' sign indicates that the SOP Class is part of the above mentioned Meta SOP Class.

The EasyVision Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes as an SCP specified in Table 3-2. The following remarks are important:

- The list of available SOP Classes out of the full list in Table 3-2 can be configured per Easy-Vision system at installation time. The SOP Classes to be supported as SCP can be configured per remote station.
- US Multi-frame images can be imported but are stored as a set of single frame images.
- The Private SOP Classes may be stored in image archives but are to be used in EasyVision

systems only.

Table 3-2: Supported SOP classes by the EasyVision AE as SCP

SOP class Name	UID
Verification	1.2.840.10008.1.1
CR Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US Multi Frame Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.3
US Multi Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
NM Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.5
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
US Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.6
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
SC Image Storage	1.2.840.10008.5.1.4.1.1.7
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2
XA Bi-Plane Image Storage (retired standard class)	1.2.840.10008.5.1.4.1.1.12.3
Patient Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient/Study Only Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient/Study Only Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2
3D Volume Storage (Private class)	1.3.46.670589.5.0.1
3D Volume Object Storage (Private class)	1.3.46.670589.5.0.2
Surface Storage (Private class)	1.3.46.670589.5.0.3
Composite Object Storage (Private class)	1.3.46.670589.5.0.4
MR Cardio Profile Storage (Private class)	1.3.46.670589.5.0.7
MR Cardio Storage (Private class)	1.3.46.670589.5.0.8
CT Synthetic Image Storage (Private class)	1.3.46.670589.5.0.9
MR Synthetic Image Storage (Private class)	1.3.46.670589.5.0.10

Table 3-2: Supported SOP classes by the EasyVision AE as SCP (Continued)

SOP class Name	UID
MR Cardio Analysis Storage (Private class)	1.3.46.670589.5.0.11
CX Synthetic Image Storage (Private class)	1.3.46.670589.5.0.12
Reconstructed X-ray (Private class)	1.3.46.670589.2.4.1.1

3.1.1 Association Establishment Policies

3.1.1.1 General

EasyVision as SCU will offer unrestricted maximum PDU size on Associations initiated by EasyVision itself. This is also configurable per remote station. EasyVision as SCP will offer the same PDU size as offered on Associations initiated by remote applications (SCU), this is not configurable, and will then use that same value as its own maximum PDU size.

3.1.1.2 Number of Associations

The number of simultaneous Associations supported by EasyVision as a Service Class Provider is in principle not limited. The practical maximum number of supported Associations is determined by the amount of resources (CPU, memory, hard disk size).

As a result of local activities, EasyVision will initiate at most 3 simultaneous Associations. One Association is used to issue query requests. The other Association is used to issue store or retrieve and one for print requests. EasyVision will further initiate an Association for each remote retrieve request executed by EasyVision as a MOVE Service Class Provider. These Associations are used to issue the store sub-operations implied by the retrieve requests. The number of simultaneous store Associations for this retrieve purpose is in principle not limited. Storage Commitment can keep open a configurable number of associations.

3.1.1.3 Asynchronous Nature

EasyVision does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.5.2.14

The implementation version name is: EV52

3.1.2 Association Initiation Policy

EasyVision initiates Associations as a result of the following events:

- The EasyVision operator or a remote application copies selected images from the EasyVision database to another database (i.e. image export), see section 3.1.2.1 on page 11;
- The EasyVision operator queries a remote database, see section 3.1.2.2 on page 15;
- The EasyVision operator copies selected images from a remote database to another database, see section 3.1.2.3 on page 16.
- The EasyVision operator requests to print selected images in the EasyVision database, see section 3.1.2.4 on page 17.

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- The EasyVision operator requests for the status of a selected printer, see section 3.1.2.5 on page 23.

3.1.2.1 Copy Images from EasyVision (i.e. Image Export)

3.1.2.1.1 Associated Real-World Activity

The operator is able to copy all/selected images in a patient folder from the local EasyVision database to a another database (i.e. image export) by means of the copy tool in the EasyVision data handling facility. EasyVision initiates for each selected patient an Association to the selected peer entity and uses it to send C-STORE requests (and receive the associated store replies). The Association is released when all selected images in the selected folder have been transmitted. EasyVision handles operator copy requests one after another.

A DICOM copy action can also be initiated indirectly on some Philips equipment by means of private protocols (like Gyrocom and PMSnet, the Philips proprietary communication protocol). This is the auto-forward function. EasyVision is able to simultaneously handle these auto-forward requests.

A remote application copies images from the local EasyVision database to a another database by sending a C-MOVE request to EasyVision. EasyVision initiates for each received retrieve request an Association to the requested move destination and uses it to send C-STORE requests (and receive the associated store replies). The Association is released when all images selected by the retrieve request identifier have been transmitted. EasyVision is able to simultaneously handle C-MOVE requests.

The EasyVision DICOM query as SCU for all possible levels all the required and the unique keys. No optional keys are queried.

3.1.2.1.2 Proposed Presentation Contexts

EasyVision will propose the following presentation contexts:

Table 3-3: Proposed Presentation Contexts for EasyVision to Other

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCU	None
See Note	See Note	ELE	1.2.840.10008.1.2.1	SCU	None
See Note	See Note	EBE	1.2.840.10008.1.2.2	SCU	None
See Note	See Note	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
See Note	See Note	JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCU	None

Table 3-3: Proposed Presentation Contexts for EasyVision to Other (Continued)

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCU	None
See Note	See Note	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None

Note: Any of the Standard Image Storage and Private SOP classes listed in Table 3-1, “Supported SOP classes by the EasyVision AE as SCU,” on page 7.
For performance reasons the EBE is preferred.

Extended negotiation is not supported.

3.1.2.1.3 C-STORE SCU Conformance

The store response status is saved in the log file, a user error will be displayed in the GUI. EasyVision will stop the transfer of the images and release the Association as soon as it receives an unsuccessful or warning store response status. In case a remote application requested the transfer (by means of a C-MOVE request), a move response with status unsuccessful is sent to the retrieve requester.

Some EasyVision applications are able to generate new derived images from a set of received (original) images. An example is a 3D reconstructed image from a CT or MR image set. The attributes in these generated images are not specified in this Conformance Statement but specified in detail in the EasyVision Release Bulletin [EV REL BUL] as they are private SOP Classes.

Important remarks about the exported images:

- The images are exported in the status “as last seen” in private attributes.
- EasyVision allows the operator to modify attributes of the stored images. EasyVision does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.
- In case the remote system does not support a modality specific Image Storage SOP Class, EasyVision will convert (if configured to do so) the images and sends them via the SC Image SOP Class. These Secondary Capture images and additional information (like graphics, text and important attribute information) are burnt-in (if configured). The original bit depth of the Secondary Capture image is kept.
- In case of color images, all color coding schemes are sent out just like they are received. However, the image handling is based on RGB color coding.
- EasyVision does support standard DICOM overlays and curves.
- Philips modality images imported into EasyVision via a protocol other than DICOM and

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then exported via DICOM by EasyVision, will conform as much as possible to the DICOM Conformance Statement of the Philips modality.

- Attributes e.g. Study Date and Study Time will be added to images to be exported (if not yet present). This is done because there are imaging systems relying on the existence of these attributes.
- The coding of Image Number in CT images imported via a non-DICOM interface and exported via DICOM is as follows:
 - Modality Image Number 1 => DICOM Image Number 1000
 - Modality Image Number 1a => DICOM Image Number 1001
 - Modality Image Number 1b => DICOM Image Number 1002 etc.
 - Modality Image Number 2 => DICOM Image Number 2000 etc.
- The exported EasyVision images do not contain Image Number if the original images received from modalities (possibly via a non-DICOM interface) do not contain this attribute or provide information in other attributes to EasyVision to generate it.
- Exported CT/MR images relate Scanogram and Slice images in the following way: Attribute 'Referenced Image Sequence' is present in the slice images and points to the related Scanogram image.
 - Note that Attribute 'Frame of Reference UID' in the Scanogram (Localiser image) and related image slices are not guaranteed to be equal; this depends on the source of the images.
- For SC images only one Window Width and Window Centre value is exported.

Use of optional, private and retired attributes:

The transmitted Storage SOP instances may include all optional elements specified in the DICOM standard, depending on the source of the images.

The transmitted Storage SOP instances may contain Retired and Private data elements, depending on the source of the images and of the EasyVision configuration.

Private elements are not described except for the following elements that facilitate the correct interpretation of the pixel data of images exported by EasyVision:

- odd group number, 00YY Owner Data Elements (VR=LO, VM=1)
 - The value of this text element are the Recognition Codes and it declares that all elements YYxx in the odd numbered group are Private Philips elements. The EasyVision Recognition Codes are:
 - Group 9 'SPI-P Release 1'
 - Group 11 'SPI-P Release 1'
 - Group 21 'SPI-P-Private_CDS Release 1'
 - Group 29 'SPI-P-Private_ICS Release 1'
 - 'SPI-P-Private_ICS Release 1;1'
 - 'SPI-P-Private_ICS Release 1;5'
- 0009, YY04 Image Data Consistence (VR=LO, VM=1-n)
 - This element indicates the consistency of the data elements because of incorporated processing, windowing or burnt-in graphics. A data element becomes inconsistent if its value incorporates a value (or reference to a value) which has been changed while the data element itself has not been changed or deleted. Updating or deleting such data elements cannot be done if the data element is a free formatted data element or other than a standard

data element.

The generic format of the multiple values of this text element is: <free text> | '\$'<enumerated text>. The first value is a global indication of the consistency and the following enumeration are defined for it:

- '\$unknown': This is the default value.
- '\$normal': Normal consistency.
- '\$limited': Possibly limited consistency.

The other (second etc.) values of this element give detailed consistency information and are not specified in this Statement.

- *0019, YY25 Original Pixel Data Quality (VR=LO, VM=1-n)*
This element indicates that the quality of the original pixel data is limited because of one reason or another. The generic format and enumerated values are the same as for private element 0009, YY04 Image Data Consistence.
- *0029, YY25 Processed Pixel Data Quality (VR=LO, VM=1-n)*
This element indicates that the quality of the processed pixel data is limited because of incorporated processing, windowing or burnt in graphics. The first value summarizes the quality. Each subsequent value identifies one aspects which contributes to the quality, in order of occurrence. The generic format and enumerated values are the same as for private element 0009, YY04 Image Data Consistence.
- A private group with group number 7FE1 can be available to store non standard pixel data behind the 7FE0 group which contains the standard pixel data.

3.1.2.2 Query a Remote Database

3.1.2.2.1 Associated Real-World Activity

The operator queries a remote database by means of the query tool in the EasyVision data handling facility. EasyVision initiates an Association to the selected peer entity and uses it to send C-FIND requests (and receive the associated find replies). The Association is released when the find execution completes.

3.1.2.2.2 Proposed Presentation Contexts

EasyVision will propose the presentation contexts as given in the next table.

Table 3-4: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

Note: Any of the Standard Query Retrieve SOP classes listed in Table 3-1, “Supported SOP classes by the EasyVision AE as SCU,” on page 7.

For performance reasons the EBE is preferred.

3.1.2.2.3 C-FIND SCU Conformance

EasyVision will not generate queries containing optional keys. EasyVision will not generate relational queries.

3.1.2.3 Retrieve Images from a Remote Database

3.1.2.3.1 Associated Real-World Activity

The operator is able to copy all/selected images in a patient folder from a remote database to another, local or remote, database by means of the copy tool in the EasyVision data handling facility. EasyVision initiates for each selected study an Association to the selected peer entity and uses it to send C-MOVE requests (and receive the associated move replies). The Association is released when all selected images have been transmitted.

3.1.2.3.2 Proposed Presentation Contexts

EasyVision will propose the presentation contexts as given in the next table.

Table 3-5: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU SCU SCU	None None None

Note: Any of the Standard Query Retrieve SOP classes listed in Table 3-1, "Supported SOP classes by the EasyVision AE as SCU," on page 7.

For performance reasons the EBE is preferred.

3.1.2.3.3 C-MOVE SCU Conformance

The AE provides standard conformance.

3.1.2.4 Print images

3.1.2.4.1 Associated Real-World Activity

There are two ways to request for image printing:

- **Print Compose**
The operator is able to select one or more images from the internal database (via the Data Handling facility) and perform the Print operation on them.
- **Print Protocol**
The operator is also able to print images via the various clinical applications of EasyVision.
- **Quick Print**

The operator will select the print destination (out of choice list of configured printers) and some print parameters (depending on the configuration and the selected printer), these values can also be configured.

As a result, EasyVision will initiate an association to the selected printer and uses it to send the Print Service Elements of the Print SOP Classes.

EasyVision allows to have a print preview first.

3.1.2.4.2 Proposed Presentation Contexts

EasyVision will propose the presentation contexts as given in the next table.

Table 3-6: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

Note: Any of the Print SOP classes listed in Table 3-1, “Supported SOP classes by the EasyVision AE as SCU,” on page 7.

For performance reasons the EBE is preferred.

3.1.2.4.3 Conformance to the Print SOP Classes

EasyVision provides standard conformance to the Basic Grayscale/color Print Management Meta SOP Class.

The applied order of Print Service Elements (DIMSE) is specified in Table 3-7. A description and the applied optional (i.e. non-mandatory attributes as Print SCU) attributes in these Service Elements are specified too. Note that the Service Elements order is not specified by the DICOM standard.

An explicit N-DELETE Request on the created instances is not done by EasyVision; these are deleted implicitly when releasing the association.

Overlay, Annotation (showing the values of some major identifying attributes) and Shutter information is processed in the images sent to the printer (i.e. burnt-in in the image).

Table 3-7: The applied order of Print Service Elements and its optional attributes

Service Element of SOP Class	Description and applied optional attributes
N-GET of the Printer SOP Class	Purpose is to retrieve printer information.
N-CREATE of the Basic Film Session SOP Class	EasyVision specifies the DICOM Printer about some general presentation parameters, applicable for all films in the Film Session. Applied optional attributes are: Number of Copies, Print Priority, Medium Type, Film Destination
N-CREATE of the Basic Film Box SOP Class	EasyVision specifies the DICOM Printer about some general presentation parameters, applicable for all images in the Film Box. Applied optional attributes are: Film Orientation, Film Size ID, Magnification Type, Max. Density, Configuration Information, Trim.
N-SET of the Basic Grayscale/Color Image Box SOP Class	EasyVision will send the images to be printed. Applied optional attributes are: Polarity
N-ACTION of the Basic Film Box SOP Class	EasyVision triggers the DICOM Printer to print, this actual print action is done at film box level. No (optional) attributes are present.

The table below specifies the supported Service Elements which may be generated by the Printer at any time during the association.

Table 3-8: The applied sequence of Print Service Elements and its optional attributes

Service Element of SOP Class	Note
N-EVENT-REPORT of the Printer SOP Class	May be sent at any moment by the Printer SCP (i.e. the DICOM Printer). EasyVision will ignore the contents of these events. However, the printer status is polled via a separate association, see section See 3.1.2.5.

The Status Codes of DIMSE Responses (Success, Warning, Failure) as returned by the printer will also be logged (for service purposes) and are mapped onto general print job status messages towards the operator. These User Interface messages indicate:

- “Job Completed” and has the meaning that the print job is accepted by the printer; the actual printing will be done afterwards.
- “General Print Error” indicating that a failure occurred during the DICOM Print. Also, most warning cases (like default printer values applied on optional print attributes) are interpreted as a print error because this will mostly result in a different print quality or print layout than expected.

AE Specifications

- The only warning code on which the Print Job is continued is 0x0107 (Attribute list error) in the N-GET-RSP.

The following implementation remarks are important to achieve successful printing:

- The number of Film Boxes per Film Session is **one**.
- The number of images per Film Box is **one**.
The images to be printed on one film are rendered by EasyVision into one logical image. This logical image is very large, depending on the pixel matrix size (pixels per line, lines per image), use of color or not. A rough indication is 20 MByte. One should take this into account when selecting the DICOM printer and the printer configuration (e.g. the amount of memory).
- EasyVision will release the association when the print command is given (i.e. the N-ACTION Request); the association is not kept open for receiving N-EVENT-REPORTs of the Printer SOP Class.
- On status-errors/warnings in a DIMSE response, the data transfer will be stopped and film will not be printed.
- The only warning code on which the Print Job is continued is 0x0107 (Attribute list error) in the N-GET-RSP.

This section gives an overview of the applied attributes in the applied Service Elements of the supported SOP Classes.

The list of possible attribute values are given. The situation that an attribute is present conditionally. The standard DICOM Conditions and Defined Terms and Enumerated Values are applicable

Table 3-9: Basic Film Session SOP Class - N-CREATE

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Number of Copies	2000,0010	Between 1 and 99.
Print Priority	2000,0020	Applied value(s): HIGH
Medium Type	2000,0030	Applied value(s): BLUE FILM, CLEAR FILM, PAPER
Film Destination	2000,0040	Applied value(s): MAGAZINE, PROCESSOR

Table 3-10: Basic Film Box SOP Class - N-CREATE

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Display Format	2010,0010	The applied value below is an EasyVision specific value indicating that one (large) image is contained in a Film Box. Applied value(s): CUSTOM\1, STANDARD\1,1 (1 is a vendor specific index, i.e. an integer) is applied if the Standard Image Display Format does not result in acceptable films. Purpose of this value is to use the film surface as much as possible for image printing (and avoid large margins). This should be agreed per printer vendor.
Film Orientation	2010,0040	Applied value(s): LANDSCAPE, PORTRAIT
Film Size ID	2010,0050	DICOM specifies a number of Defined Terms; more values are possible and is print configuration dependent.
Magnification Type	2010,0060	Normally sent out, however sometimes send out empty because some DICOM printers are not able to handle (value NONE for) this attribute. Applied value(s): NONE
Trim	2010,0140	
Configuration Information	2010,0150	Contains a vendor specific Lookup-table (LUT); should be applied by the DICOM printer if LUT data is present.
Max Density	2010,0130	Maximum density of the images on the film, expressed in hundredths of OD. If Max Density is higher than maximum printer density than Max Density is set to maximum printer density.

Table 3-11: Basic Film Box SOP Class - Basic Film Box Relationship Module

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Referenced Film Session Sequence	2010,0500	Parent Film Session.
> Referenced SOP Class UID	0008,1150	
> Referenced SOP Instance UID	0008,1155	

Table 3-12: Basic Film Box SOP Class - N-ACTION

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
No attributes present		

Table 3-13: Basic Grayscale Image Box SOP Class - N-SET

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Position	2020,0010	Applied value(s): 1
Polarity	2020,0020	Applied value(s): NORMAL
Preformatted Grayscale Image Sequence	2020,0110	
> Samples per Pixel	0028,0002	Applied value(s): 1
> Photometric Interpretation	0028,0004	Applied value(s): MONOCHROME2
> Rows	0028,0010	Depending on the selected printer type and film size.
> Columns	0028,0011	Depending on the selected printer type and film size.
> Bits Allocated	0028,0100	Applied value(s): 16, 8
> Bits Stored	0028,0101	Applied value(s): 12, 8
> High Bit	0028,0102	Applied value(s): 11, 7
> Pixel Representation	0028,0103	Applied value(s): 0x0000
> Pixel Data	7FE0,0010	

Table 3-14: Basic Color Image Box SOP Class - Image Box Pixel Presentation Module

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Position	2020,0010	Applied value(s): 1
Polarity	2020,0020	Applied value(s): NORMAL
Preformatted Color Image Sequence	2020,0111	
> Samples per Pixel	0028,0002	Applied value(s): 3
> Photometric Interpretation	0028,0004	Applied value(s): RGB
> Planar Configuration	0028,0006	Applied value(s): 0000, 0001 0000, is not interleaved, 0001, frame interleaved.
> Rows	0028,0010	
> Columns	0028,0011	Depending on the selected printer type and film size.

Table 3-14: Basic Color Image Box SOP Class - Image Box Pixel Presentation Module (Continued)

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
> Bits Allocated	0028,0100	Applied value(s): 8
> Bits Stored	0028,0101	Applied value(s): 8
> High Bit	0028,0102	Applied value(s): 7
> Pixel Representation	0028,0103	Applied value(s): 0000
> Pixel Data	7FE0,0010	

3.1.2.5 Request for the Printer Status

3.1.2.5.1 Associated Real-World Activity

EasyVision will periodically request for the printer status. This is only done when no association is set-up for a print job. In case of a print job association the printer status is requested in that association.

The received printer status is displayed in the Printer Status Tool.

3.1.2.5.2 Proposed Presentation Contexts

EasyVision will propose the presentation contexts as given in the next table.

Table 3-15: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Printer SOP Class	1.2.840.10008.5.1.1.16	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

For performance reasons the EBE is preferred.

3.1.2.5.3 Conformance to the Printer SOP Class

EasyVision provides standard conformance to this SOP Class.

The applied optional attributes in the N-GET Service Element are specified in Table 3-16..

Table 3-16: The applied optional attributes in the N-GET Service Element

Service Element of SOP Class	Note
N-GET of the Printer SOP Class	Purpose is to retrieve printer information. Applied optional attributes are: Printer Status, Printer Status Info, Printer Name, Manufacturer, Manufacturer Model Name

The Status Codes of Printer N-GET Responses (Success, Warning, Failure) as returned by the printer will also be logged (for service purposes) and are not indicated towards the operator.

This section gives an overview of the applied attributes in the applied Service Elements of the supported SOP Classes.

Table 3-17: Printer SOP Class - N-EVENT-REPORT^a

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Printer Status Info	2110,0020	Conditionally sent by the Printer. EasyVision will ignore this status information. However, polling this status via the N-GET Service Element is done.

- a. This Service Element is sent by the printer and interpreted by EasyVision.

Table 3-18: Printer SOP Class - N-GET

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Printer Status	2110,0010	
Printer Status Info	2110,0020	

The EasyVision does not send an attribute list to the printer, therefore the only attributes which are needed to be supported by the printer, are the mandatory attributes listed in Table 3-18, “Printer SOP Class - N-GET,” on page 24

3.1.2.6 Storage Commitment

3.1.2.6.1 Associated Real-World Activity

After every C-STORE a new association concerning Storage Commitment will be started. This association will be open till the remote archive sends a commit response or when the configured maximum time is passed. When this maximum configured period is passed it is the responsibility of the archive to setup a connection with EasyVision and send the commit response. It is also possible to configure the maximum number of parallel associations which will be kept open to receive commit responses.

3.1.2.6.2 Presentation Context Table

EasyVision will propose the presentation contexts as given in the next table.

Table 3-19: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

For performance reasons the EBE is preferred.

3.1.2.6.3 Storage Commitment Push Conformance

The EasyVision provides standard conformance.

3.1.3 Association Acceptance Policy

EasyVision accepts Associations for the following purposes:

- To allow remote applications to verify application level communication with EasyVision, see section 3.1.3.1 on page 27;
- To allow remote applications to store images in the EasyVision database (i.e. image import), see section 3.1.3.2 on page 28;
- To allow remote applications to query the EasyVision database, see section 3.1.3.3 on page 30;
- To allow remote applications to retrieve images from the EasyVision database, see section 3.1.3.2 on page 28.

The EasyVision Application Entity rejects Association requests from unknown applications, i.e. applications that offer an unknown “calling AE title”. An application is known if and only if it is defined during configuration of the EasyVision system.

The EasyVision Application Entity rejects Association requests from applications that do not address the EasyVision AE, i.e. that offer a wrong “called AE title”. The EasyVision AE title is defined during configuration of the EasyVision system.

Any of the presentation contexts shown in Table 3-3 are acceptable.

3.1.3.1 Verify Application Level Communication

3.1.3.1.1 Associated Real-World Activity

EasyVision accepts Associations from systems that wish to verify application level communication using the C-ECHO command.

3.1.3.1.2 Presentation Context Table

EasyVision will accept the presentation contexts as given in the next table.

Table 3-20: Accepted Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

For performance reasons the EBE is preferred.

3.1.3.1.3 C-ECHO SCP Conformance

EasyVision provides standard conformance.

3.1.3.1.4 Presentation Context Acceptance Criterion

EasyVision accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes are accepted by EasyVision.

There is no check for duplicate contexts and are therefore accepted.

3.1.3.1.5 Transfer Syntax Selection Policies

Any of the presentation context show in Table 3-3, are acceptable.

3.1.3.2 Store Images in the EasyVision Database (i.e. Image Import)

3.1.3.2.1 Associated Real-World Activity

EasyVision accepts Associations from systems that wish to store images in the EasyVision database using the C-STORE command.

3.1.3.2.2 Presentation Context Table

EasyVision will propose the following presentation contexts:

Table 3-21: Proposed Presentation Contexts for EasyVision

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCP	None
See Note	See Note	ELE	1.2.840.10008.1.2.1	SCP	None
See Note	See Note	EBE	1.2.840.10008.1.2.2	SCP	None
See Note	See Note	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
See Note	See Note	JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
See Note	See Note	JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
See Note	See Note	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None

Note: Any of the Standard Image Storage and Private SOP classes listed in Table 3-2, “Supported SOP classes by the EasyVision AE as SCP,” on page 9.

For performance reasons the EBE is preferred.

3.1.3.2.3 C-STORE SCP Conformance

EasyVision provides conformance for the Storage Service Class. In the event of a successful C-STORE operation, the image has been stored in the EasyVision database. The duration of the storage of the image is determined by the operator of the EasyVision system.

The C-STORE is unsuccessful if EasyVision returns one of the following status codes:

- A700 - Indicates the database is full. Recovery from this condition is left to the Service Class User.
- A900 - Indicates that the SOP class of the image does not match the abstract syntax negotiated for the presentation context.
- C000 - Indicates that the image cannot be parsed.

If EV receives improper DICOM, EV tries as much as possible (if configured so), to make them proper DICOM. However, EasyVision also tries to remain as transparent on images as

possible. So, on export the images must be changed only as far as really necessary. Therefore, it is not guaranteed that all DICOM violations of incoming images are repaired (e.g. attributes as one with enumerated values, are not changed). So, improper DICOM input to the EasyVision can result in improper DICOM output.

Important implementation remarks and restrictions:

- EasyVision stores XA Bi-Plane as two Single Plane images.
- EasyVision stores US multi-frame images as a series of single frame images.
- EasyVision assumes that High Bit (0x0028, 0x0102) = Bits Stored (0x0028, 0x0101) - 1. If this is not the case in received images, the images are not accepted or the EasyVision applications cannot process/view them.
- EasyVision accepts all color coding schemes in color image (however the image handling is based on RGB).
- Acquisition number can be changed on import with a value related to the image number.
- EasyVision allows the operator to modify attributes of the stored images. EasyVision does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.
- The DICOM standard does not guarantee that the advanced EasyVision applications can process the received images. This depends on the presence and consistency of a set of attributes in these images. The conditions for running the EasyVision applications are specified in detail in the EasyVision Release Bulletin [EV REL BUL].

Support for additional Standard, Private and Retired attributes:

EasyVision stores all additional Standard, Private and Retired attributes in received images. Retrieval of these attributes is only possible (by means of a C-MOVE request) if the following conditions are satisfied:

- The image was encoded (when EasyVision was C-STORE SCP) using one of the explicit value representations or
- The image was encoded (when EasyVision was C-STORE SCP) using implicit value representation and the move destination (i.e. a C-STORE Service Class Provider) has accepted implicit value representation as the only transfer syntax applicable to the storage SOP class of the image (when EasyVision is C-STORE SCU).

3.1.3.2.4 Presentation Context Acceptance Criterion

EasyVision accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes are accepted by EasyVision.

- There is no check for duplicate contexts and are therefore accepted.

3.1.3.3 Query the EasyVision Database

3.1.3.3.1 Associated Real-World Activity

EasyVision accepts Associations from systems that wish to query the EasyVision database using the C-FIND command.

3.1.3.3.2 Presentation Context Table

EasyVision will accept the presentation contexts as given in the next table.

Table 3-22: Accepted Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

Note: Any of the Standard Query Retrieve SOP classes listed in Table 3-2, “Supported SOP classes by the EasyVision AE as SCP,” on page 9.

For performance reasons the EBE is preferred.

3.1.3.3.3 C-FIND SCP Conformance

EasyVision provides standard conformance. Optional keys are not supported. Relational queries are not supported. EasyVision simultaneously handles simultaneous C-FIND requests.

The EasyVision database distinguishes two patients with the same Patient ID but different Patient Name or Patient Birth Date. Because the DICOM Query model has Patient ID as Unique Key at patient level, two patients with the same Patient ID cannot be distinguished via the DICOM Standard Query SOP Class.

3.1.3.3.4 Presentation Context Acceptance Criterion

EasyVision accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes are accepted by EasyVision.

There is no check for duplicate contexts and are therefore accepted.

3.1.3.4 Retrieve Images from the EasyVision Database

3.1.3.4.1 Associated Real-World Activity

EasyVision accepts Associations from systems that wish to retrieve images from the EasyVision database using the C-MOVE command.

3.1.3.4.2 Presentation Context Table

EasyVision will accept the presentation contexts as given in the next table.

Table 3-23: Accepted Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

Note: Any of the Standard Query Retrieve SOP classes listed in Table 3-2, “Supported SOP classes by the EasyVision AE as SCP,” on page 9.

For performance reasons the EBE is preferred.

3.1.3.4.3 C-MOVE SCP Conformance

EasyVision supports all Query Retrieve SOP classes listed in Table 3-2. A C-STORE connection is built after the C-MOVE request, for C-STORE conformance see section 3.1.2.1 on page 11 and Table 3-1 on page 7.

EasyVision does not send Intermediate C-MOVE response with status pending.

3.1.3.4.4 Presentation Context Acceptance Criterion

EasyVision accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes are accepted by EasyVision.

There is no check for duplicate contexts and are therefore accepted.

3.2 EasyVision AE Media Specification

The EasyVision AE provides Standard Conformance to the DICOM Media Storage Service and File Format (PS 3.10) and the Media Storage Application Profiles (PS 3.11) STD-GEN-CD, STD-XABC-CD and STD-XA1K-CD, both for reading and writing.

EasyVision supports **multi-patient** and **multi-session** (both for reading and writing) CD-R disks.

Additionally, the reading of the Philips CD-Medical Basic Cardiac disks is supported (non private DICOM only), the writing of this type of disks is not supported.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 3-24.

Table 3-24: Application Profile, Activities and Roles of the DICOM Media part of EasyVision

<i>Application Profile</i>	<i>Identifier</i>	<i>Real World Activity</i>	<i>Role</i>	<i>SC Option</i>
General Purpose CD-R Image Interchange Profile	STD-GEN-CD	Display Directory of CD-R disk	FSR	Interchange
	STD-GEN-CD	Write image(s) on CD-R disk	FSC/ FSU	Interchange
	STD-GEN-CD	Read image(s) from CD-R disk	FSR	Interchange
Basic Cardiac X-ray Angiographic Studies on CD-R Media	STD-XABC-CD	Transfer of X-ray Examination	FSC/ FSU	Interchange
1024*1024 X-Ray Angiographic Studies on CD-R Media.	STD-XA1K-CD	Write image(s) on CD-R disk	FSC/ FSU	Interchange

3.2.1 File Meta Information

The (Source) Application Entity Title is specified in section 6.1.1 on page 37.

The Implementation Class UID and the Implementation Version Name in the File Meta Header is specified in section 3.1 on page 7.

3.2.2 Media related Real-World Activities

3.2.2.1 RWA Display Directory

The EasyVision AE will act as a FSR when reading the directory of the medium. This will

result in an overview of the patients, studies, series and images on the EasyVision screen.

3.2.2.1.1 Application Profile(s) for this RWA

See Table 3-24.

3.2.2.1.2 Required and optionally DICOMDIR Keys

The Mandatory DICOMDIR Keys are required for the correct display of Directory information. The display is structured according the DICOM Composite Information Model: Patient, Study, Series, Image.

Possibly present optional DICOMDIR Keys are not displayed.

3.2.2.2 RWA Write images on CD-R disk

The EasyVision AE will act as a FSC/FSU when writing all/selected images in a patient folder onto the CD-R medium.

Implementation remarks and restriction:

- The DSI Pro can generate so-called “High Speed Angio” RF images. Such images can be transferred to the EV 5.1 via a private Philips protocol. An EV 5.1 can convert runs of such images to multiframe XA images on a CDROM. Such CDROM’s meet the requirements of the STD-XABC-CD or the STD-XA1K-CD application profile.

3.2.2.2.1 Application Profile(s) for this RWA

See Table 3-24.

3.2.2.2.2 Support for Attributes in the images

The same remarks as in section 3.1.2.1 on page 11 about the existence of Optional, Retired and Private Attributes are applicable.

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in the images but are specified as Mandatory in the DICOMDIR definition in DICOM Media, a dummy value will be filled in.

Implementation remarks and restriction:

- When writing the DICOMDIR records the keys values are generated when no value of the corresponding attribute is supplied:
 - PATIENT_ID
 - STUDY_ID
 - STUDY_INSTANCE_UID
 - SERIES_NUMBER
 - SERIES_INSTANCE_UID
 - IMAGE_NUMBER
 - SOP_INSTANCE_UID
- The mechanism of generating a value for PATIENT_ID creates each time a new value based on PATIENT_NAME for each new study written to the CD-R, even if this study belongs to a patient recorded earlier.

- The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.

3.2.2.3 RWA Read images from CD-R disk

The EasyVision AE will act as a FSR when reading all/selected images from the CD-R medium.

Implementation remarks and restriction:

- EasyVision is also able to read images coded in all of the JPEG codes as specified in Table 3-3, “Proposed Presentation Contexts for EasyVision to Other,” on page 11.

3.2.2.3.1 Application Profile(s) for this RWA

See Table 3-24.

3.2.2.3.2 Support for Attributes in the images

The Mandatory Attributes of the DICOM images are required for the correct storage of the images in the EasyVision internal image database. Optionally Attributes and Retired/Private Attributes are stored too if present; this is equivalent with the Level 2 (Full) conformance for the Storage Service Class in the Network support, see section 3.1.3.2 on page 28.

The same remarks as in section 3.1.3.2.3 on page 28 about the storage of read multi-frame/Bi-plane images and about requirements to process read images via the dedicated EasyVision application functions, are applicable.

3.2.3 Augmented Application Profile

EasyVision supports all transfer syntaxes as mentioned Table 3-3 on page 11.

Instances of the Private SOP Classes (see Table 3-1 on page 7) may be written on the CD-R disk.

4 Communication Profiles

4.1 Supported Communication Stacks

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

4.2 TCP/IP Stack

EasyVision inherits its TCP/IP stack from the SUN Solaris system upon which it executes.

4.2.1 Physical Media Support

Ethernet ISO.8802-3. Standard AUI, optional twisted pair 10/100-BaseT.

5 Extensions/Specializations/Privatizations

The Standard DICOM SOP Classes may be Extended with additional attributes:

- Standard attributes of other SOP Classes; the presence of these attributes in exported images can be configured, see section 6.2 on page 37
- Retired (from ACR NEMA 1.0 or 2.0) attributes; the presence of these attributes in exported images can be configured, see section 6.2 on page 37
- Private attributes; the presence of these attributes in exported images can be configured, see section 6.2 on page 37.

The Table 3-1 on page 7 and Table 3-2 on page 9 list the supported Private SOP Classes. The usage of these SOP Classes are in the EasyVision domain only. However instances of these Private SOP Classes may be exported towards a PACS environment and stored in a (central) DICOM archive and should be configured in order to make this possible.

Table 5-1: Private SOP classes of EasyVision

SOP Class	Description
3D Volume Storage (Private class)	1.3.46.670589.5.0.1
3D Volume Object Storage (Private class)	1.3.46.670589.5.0.2
Surface Storage (Private class)	1.3.46.670589.5.0.3
Composite Object Storage (Private class)	1.3.46.670589.5.0.4
MR Cardio Profile Storage (Private class)	1.3.46.670589.5.0.7
MR Cardio Storage (Private class)	1.3.46.670589.5.0.8
CT Synthetic Image Storage (Private class)	1.3.46.670589.5.0.9
MR Synthetic Image Storage (Private class)	1.3.46.670589.5.0.10
MR Cardio Analysis Storage (Private class)	1.3.46.670589.5.0.11
CX Synthetic Image Storage (Private class)	1.3.46.670589.5.0.12
Reconstructed X-ray (Private class)	1.3.46.670589.2.4.1.1

6 Configuration

The EasyVision system is configured by means of a configuration program. This program is accessible at start-up of the EasyVision system. It is password protected and intended to be used by Philips Customer Support Engineers only. The program prompts the Customer Support Engineer to enter configuration information needed by the EasyVision application.

6.1 AE Title/Presentation Address mapping

6.1.1 Local AE Title and Presentation Address

The EasyVision AE title is default equal to the IP host name. This host name can be changed by the Customer Support Engineer at installation.

EasyVision listens on port **3010**. This port number is **not** configurable.

6.1.2 Remote AE Titles and Presentation Addresses

All relevant remote applications able to setup a DICOM Association towards EasyVision must be configured at EasyVision configuration time. The Customer Support Engineer must provide the following information for each remote application:

- The Application Entity title.
- The SOP classes and Transfer Syntaxes for which EasyVision accepts Associations.

All relevant remote applications able to accept DICOM Associations from EasyVision, the following information must be provided:

- The Application Entity title.
- The host name/IP address on which the remote application resides.
- The port number at which the remote application accepts Association requests.

6.2 Configurable parameters

6.2.1 Configuration per EasyVision system

The following items are configurable **per EasyVision installation**:

- The SOP classes (out of the full list of SOP Classes in Table 3-1 on page 7 and Table 3-2 on page 9) and Transfer Syntaxes (out of the full list in Presentation Context tables in this Statement) to be used.
- The maximum PDU size for associations initiated by EasyVision (default is 0 meaning unlimited PDU size)
- Storage Commitment request must be send after Storage request.
- Conversion from Multi to Single Frame.

6.2.2 Configuration per remote system

The following items are configurable **per remote system**:

- The SOP classes and Transfer Syntaxes for which EasyVision sets-up and accepts Associations.
- Automatic conversion of images of SOP classes not supported by remote systems into SC Image Storage SOP instances,

- The maximum PDU size for Associations initiated by EasyVision,
- Export of 'pure' DICOM images (i.e. only the standard DICOM attributes defined in the related IOD) or extended DICOM images (with additional Standard DICOM, Private and Retired Attributes)
- Support of Overlays

6.2.3 Print Configuration

Configurable per EasyVision installation:

- The DICOM printers to be selected by the operator.

The following print parameters are configurable per DICOM printer type:

- The Medium Type
- Film Size ID (i.e. Media Size)
- Film Orientation
- Image Display Format
- Film Size in X and Y direction (this influences the Rows and Columns in the Image Box instances)
- Configuration Information (configurable per print destination)
This is a character string containing implementation specific print parameters.
- Magnification Type.
- Trim.
- Film Destination.
- Max. Density.

These print parameters can be selected from choice lists. These choice lists are defined via so-called prototypes for each type of printer and print medium. These prototypes are also configurable.

7 Support of Extended Character Sets

EasyVision supports Extended Character Set “ISO_IR 100” which is the Latin alphabet No 1, supplementary set.