Philips Medical Systems
DICOM Conformance Statement

Inturis Suite R2.1

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PHILIPS

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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].

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

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).

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
- 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
- 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

This document is the DICOM Conformance statement for the Philips Medical Systems Inturis Suite R2.1, later referred to as Inturis Suite.

The Inturis Suite is primarily intended for archiving and viewing of X-Ray Angiographic multi-frame and SC images, Inturis Suite is also capable to handle Query requests and retrieving images. Images may be viewed that reside on the local file system or directly from CD media.

All of the DICOM features presented in this document are optional and may not be available on all Inturis Suite related products.

The Inturis Suite consists of a Server that handles the Storage, Storage Commitment and Query Retrieve of Images and a several Clients that can read and write media.

Figure Figure 2-1 gives an overview of the Inturis Suite system in a DICOM network.
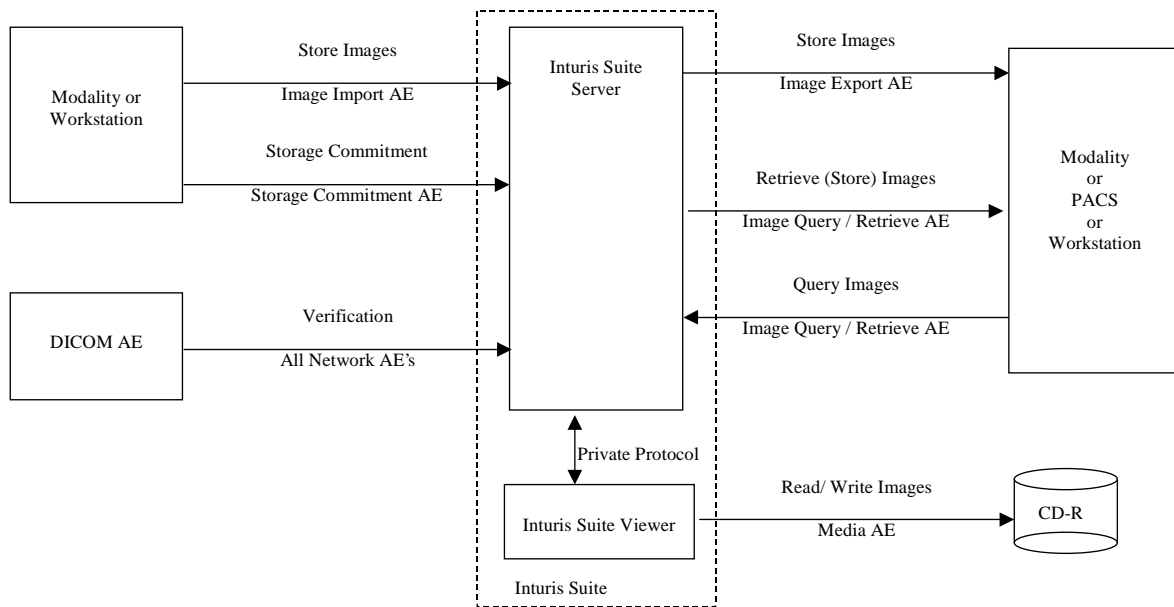
Figure 2-1: Inturis Suite in a DICOM network

2.1 Application Data Flow Diagram

The Inturis Suite related Implementation Model is shown in Figure 2-2 on page 5.
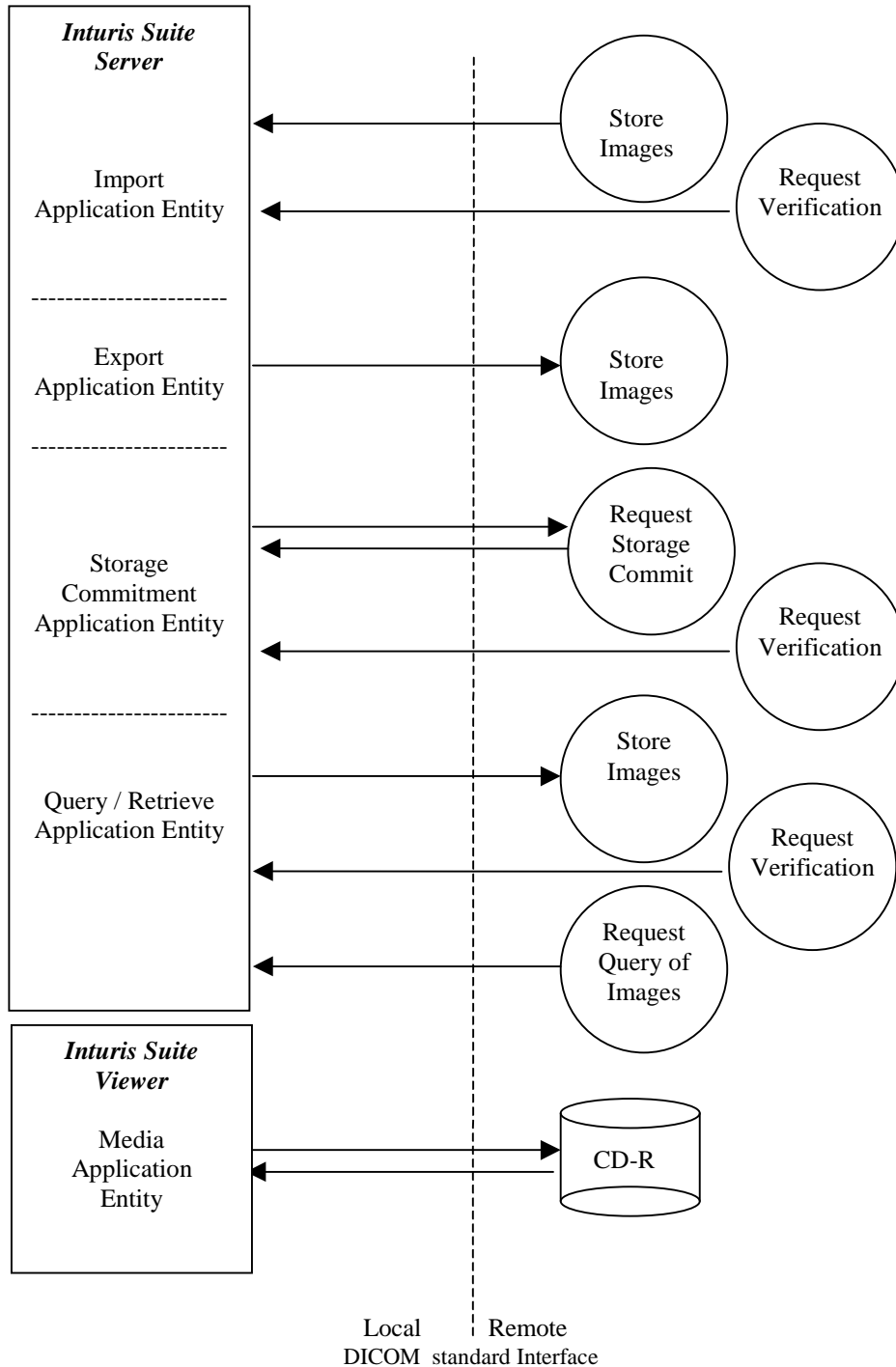
Figure 2-2: Implementation Model Inturis Suite Release 2

As documented in the PS3.4-2000, the arrows in the diagram on the following page have the following meanings:
- An arrow pointing to the right indicates the local application entity initiates an association
- An arrow pointing to the left indicates the local application entity accepts an association.

2.2 Functional definition of Application Entities

2.2.1 Import and Export Application Entity

The Inturis Suite accepts an association with a remote DICOM AE when the remote system requests image storage using the DICOM Storage service class. Images are stored based on the study information of the Image.

2.2.2 Storage Commitment Application Entity

The Inturis Suite accepts an association with a remote DICOM AE when the remote system requests image Storage Commitment.

2.2.3 Query / Retrieve Application Entity

The Inturis Suite accepts an association with a remote DICOM AE when the remote system requests a query using the DICOM Query / Retrieve service class. The images are transmitted using a Storage service.

2.2.4 Media Application Entity

The Media AE in the Inturis Suite clients (viewers) supports the following functions;
- Read the DICOMDIR file that represents the contents of the (image) data as recorded. This information is displayed as an ordered list of icon images together with pertinent identifying information (patient name, etc.).
- Read the selected image from CD-R device and display it on the monitor of the View Station. This information is displayed as an ordered list of frames of the selected image or as a dynamic review of the selected image.
- Initialization of the CD-R Media, writing a DICOM File-set onto the media.
- Creation of images onto a Media.
- Creation of a DICOMDIR file that represents the contents of the (image) data as recorded.

2.3 Sequencing of Real World Activities

All Real-World Activities as specified in Figure 2.2 may occur independently from each other.

3 AE Specifications

The Network capabilities of the Inturis Suite consists of four DICOM Application Entities:
- An Imaging Import AE
- An Imaging Export AE
- A Storage Commitment AE
- A Query / Retrieve AE

These are specified in section 3.1 to section 3.4.

3.1 Inturis Suite Imaging Import AE

The Inturis Suite Imaging Import Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as an SCP specified in Table 3.1.

Table 3-1: Supported SOP Classes as SCP by the Import AE

SOP class Name	UID
Verification	1.2.840.10008.1.1
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

3.1.1 Association Establishment Policies

3.1.1.1 General

The Inturis Suite always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The maximum length PDU negotiation is included in all association establishment requests. The default maximum length PDU for an association initiated by the Inturis Suite is: 28 kB.

3.1.1.2 Number of Associations

The number of associations for the storage SCP service that may be active simultaneously is 10. For the verification service only one association can be handled.

3.1.1.3 Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be out-standing over an association at any given point in time.

3.1.1.4 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.7.11.1.1
The implementation version name: "InturisSuite R21"

3.1.2 Association Initiation Policy

The Imaging Import AE doesn't initiates associations.

3.1.3 Association Acceptance Policy

3.1.3.1 Verify Application Level Communication

3.1.3.1.1 Associated Real-World Activity

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

3.1.3.1.2 Presentation Context Table

Inturis Suite will accept the presentation contexts as given in the next table.

Table 3-2: Supported Presentation Context by the Import AE

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

3.1.3.1.3 C-ECHO SCP Conformance

Inturis Suite provides standard conformance.

3.1.3.1.4 Presentation Context Acceptance Criterion

Inturis Suite 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 Inturis Suite.
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 shown in Table 3-2, are acceptable.

3.1.3.2 Store Images in the Inturis Suite (Image import)

3.1.3.2.1 Associated Real-World Activity

The Inturis Suite is always ready to accept a new transport connection. The Inturis Suite will accept the presentation context associated with the Image Storage request and reply with a C-STORE response when the complete image has been received on the established association.

The image will be accepted only, if the next tags are available (present with a value):
Modality   0008,0060
Series Instance UID   0020,000E
Study Instance UID   0020,0010

| SOP Class UID | 0008,0016 |
| SOP Instance UID | 0008,0018 |

For biplane images if the Referenced Images Sequence is present, the following attributes must be present:

| Referenced SOP Class UID | 0008,1150 |
| Referenced SOP Instance UID | 0008,1155 |

3.1.3.2.2   Accepted presentation Contexts

The following table illustrates the Accept presentation contexts for the Image Storage request.

Table 3-3: Accepted Presentation Context by the Import AE

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
X-Ray Angiographic Image Storage	1.2.840.1008.5.1.4.1.1.12.1	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	SCP	None
Secondary Capture Image Storage	1.2.840.1008.5.1.4.1.1.7	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	SCP	None

Note: The JPEG process 14 transfer syntax is preferred.

3.1.3.2.3   SOP Specific Conformance

The Inturis Suite can not handle the import of images from different patients in one association.

The Inturis Suite conforms to the SOP's of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the Inturis Suite. The following Attributes can be modified by the Inturis Suite:

Patient Name	0010,0010
Patient Sex	0010,0040
Patient Birthdate	0010,0030
Patient ID	0010,0020
Accession Number	0008,0050

C-Store Status Responses that are returned by the Inturis Suite Import AE are:
- FAILURE   PROCESSING_FAILURE
- FAILURE   REFUSED_PROCESSING_FAILURE
- SUCCES

3.1.3.2.4   Presentation Context Acceptance Criterion

Not Applicable

3.2 Inturis Suite Imaging Export AE

The Inturis Suite Imaging Export Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as an SCU specified in Table 3.4.

Table 3-4: Supported SOP Classes as SCU by the Export AE

SOP class Name	UID
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

3.2.1 Association Establishment Policies

3.2.1.1 General

The Inturis Suite always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The maximum length PDU negotiation is included in all association establishment requests. The default maximum length PDU for an association initiated by the Inturis Suite is: 28kB.

3.2.1.2 Number of Associations

For the storage SCU service only one association can be active.

3.2.1.3 Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be outstanding over an association at any given point in time.

3.2.1.4 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.7.11.1.1
The implementation version name: "InturisSuite R21"

3.2.2 Association Initiation Policy

3.2.2.1 Copy Images from Inturis Suite (Image Export)

3.2.2.1.1   Associated Real-World Activity

The Inturis Suite Export AE will only export the XA and SC images when configured to do so. Via the Configuration file on the system, 2 destinations can be declared/configured. On association as SCP the received images will be automatically sent to the destination sequentially.

3.2.2.1.2   Proposed presentation Contexts

The following table illustrates the proposed presentation contexts for the Image Storage request.

Table 3-5: Proposed presentation Context by the Imaging Export AE

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
X-Ray Angiographic Image Storage	1.2.840.1008.5.1.4.1.1.12.1	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	SCU	None
Secondary Capture Image Storage	1.2.840.1008.5.1.4.1.1.7	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	SCU	None

Note: The JPEG process 14 transfer syntax is preferred.

3.2.2.1.3   SOP Specific Conformance

The Inturis Suite conforms to the SOP's of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the Inturis Suite.

The behaviour on successful and unsuccessful transfer of images is given in the table below.

Table 3-6: C-STORE STATUS Responses

Service Status	Codes	Further Meaning Status
Refused	A7xx	Text logging, close association, application released and returns an error. Inturis Suite retry's to send the Images.
Error	A9xx	Text logging, close association, application released and returns an error. Inturis Suite retry's to send the Images.
	Cxxx	Text logging, close association, application released and returns an error. Inturis Suite retry's to send the Images.
Warning	B00x	Text logging. Inturis Suite retry's to send the Images.
Success	0000	

3.2.3 Association Acceptance Policy

Inturis Suite doesn't accepts Associations.

3.3 Inturis Suite Storage Commitment AE

The Inturis Suite Storage Commitment Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as an SCP specified in Table 3-7.

Table 3-7: Supported SOP Classes as SCP by the Storage Commitment AE

SOP class Name	UID
Storage Commitment Push Model	1.2.840.10008.1.20.1
Verification	1.2.840.10008.1.1

3.3.1 Association Establishment Policies

3.3.1.1 General

The Inturis Suite always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The maximum length PDU negotiation is included in all association establishment requests. The default maximum length PDU for an association initiated by the Inturis Suite is: 28 kB.

3.3.1.2 Number of Associations

The number of associations for the storage commitment SCP service that may be active simultaneously is 10. For the verification service only one associations can be handled.

3.3.1.3 Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be outstanding over an association at any given point in time.

3.3.1.4 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.7.11.1.1
The implementation version name: "InturisSuite R21"

3.3.2 Association Initiation Policy

3.3.2.1 Invoke Storage commitment notification

3.3.2.1.1   Associated Real-World Activity

The Inturis Suite will invoke a notification to inform the SCU whether or not it has executed the storage commitment request. In case a failure occurred the Inturis Suite will invoke the notification after 8 hours.

3.3.2.1.2   Propose presentation Contexts

The following table illustrates the proposed presentation contexts for the Storage Commitment service.

Table 3-8: Proposed Presentation Context by the Storage Commitment AE

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commit-ment Push Model	1.2.840.10008.1.20.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

3.3.2.1.3   SOP Specific Conformance

The Inturis Suite conforms to the N-Event-Report Storage commitment Push Model SOP Class.

The following N-Event-Report attributes are sent:

Table 3-9: N-EVENT-REPORT Attributes

Event Type Name	Event Type ID	Attribute	Tag	Note
Storage Commit-ment Request Successful	1	Transaction UID	(0008,1195)	
		Retrieve AE Title	(0008,0054)	
		Storage Media File-Set ID	(0088,0130)	
		Storage Media File-Set UID	(0088,0140)	
		Referenced SOP Sequence	(0008,1199)	
		>Referenced SOP Class UID	(0008,1150)	
		>Referenced SOP Instance UID	(0008,1155)	
		>Retrieve AE Title	(0008,0054)	
		>Storage Media File-Set ID	(0088,0130)	
		>Storage Media File-Set UID	(0088,0140)	
Storage Commit-ment Request Complete - Fail-ures Exist	2	Transaction UID	(0008,1195)	
		Retrieve AE Title	(0008,0054)	
		Storage Media File-Set ID	(0088,0130)	
		Storage Media File-Set UID	(0088,0140)	
		Referenced SOP Sequence	(0008,1199)	
		>Referenced SOP Class UID	(0008,1150)	

Event Type Name	Event Type ID	Attribute	Tag	Note
		>Referenced SOP Instance UID	(0008,1155)	
		>Retrieve AE Title	(0008,0054)	
		>Storage Media File-Set ID	(0088,0130)	
		>Storage Media File-Set UID	(0088,0140)	
		Failed SOP Sequence	(0008,1198)	
		>Referenced SOP Class UID	(0008,1150)	
		>Referenced SOP Instance UID	(0008,1155)	
		>Failure Reason	(0008,1197)	

3.3.3 Association Acceptance Policy

3.3.3.1 Verify Application Level Communication

3.3.3.1.1   Associated Real-World Activity

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

3.3.3.1.2   Presentation Context Table

Inturis Suite will accept the presentation contexts as given in the next table

.

Table 3-10: Accepted presentation context by the Storage Commitment AE

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

3.3.3.1.3   C-ECHO SCP Conformance

Inturis Suite provides standard conformance.

3.3.3.1.4   Presentation Context Acceptance Criterion

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

3.3.3.1.5   Transfer Syntax Selection Policies

Any of the presentation context show in Table 3-10, are acceptable.

3.3.3.2 Storage Commitment Acceptance

3.3.3.2.1   Associated Real-World Activity

Incase no archiving is configured or connected the server shall always notify the requester that the storage commitment has been failed. In case this number is exceeded the server shall respond to the requestor with a DICOM error. In other cases the Storage Commitment service will accept the Storage commitment request.

3.3.3.2.2   Accepted presentation Contexts

The table Table 3-10, "Accepted presentation context by the Storage Commitment AE," on page 15 illustrates the accepted presentation contexts for the Image Storage request.

3.3.3.2.3   SOP Specific Conformance

The Inturis Suite provides standard conformance to the Storage commitment Push Model SOP class. Inturis Suite returns the following status codes:

- FAILURE   N-ACTION_PROCESSING_FAILURE
- SUCCESS

In case part of the images in an storage commitment request can't be committed, the Inturis Suite reports a failure of the complete storage commitment request.

3.3.3.2.4   Presentation Context Acceptance Criterion

Not Applicable.

3.4 Inturis Suite Query / Retrieve AE

The Inturis Suite Query / Retrieve Imaging Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as an SCP specified in Table 3-11.

Table 3-11: Supported SOP Classes as SCP by the Query/ Retrieve AE

SOP class Name	UID
Verification	1.2.840.10008.1.1
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

When a Query / Retrieve MOVE service is requested the Services in Table 3-12 are supported as an SCU

Table 3-12: Supported Storage SOP Classes as SCU by the Query/ Retrieve AE

SOP class Name	UID
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

3.4.1 Association Establishment Policies

3.4.1.1 General

The Inturis Suite always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The maximum length PDU negotiation is included in all association establishment requests. The default maximum length PDU for an association initiated by the Inturis Suite is: 28 kB.

3.4.1.2 Number of Associations

The number of associations for the storage SCP service that may be active simultaneously is 7. For the verification service at least one associations can be handled simultaneous.

3.4.1.3 Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be outstanding over an association at any given point in time.

3.4.1.4 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.7.11.1.1
The implementation version name: "InturisSuite R21"

3.4.2 Association Initiation Policy

The Inturis Suite Query / Retrieve AE will not initiate associations.

3.4.3 Association Acceptance Policy

3.4.3.1 Verify Application Level Communication

3.4.3.1.1   Associated Real-World Activity

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

3.4.3.1.2   Presentation Context Table

Inturis Suite will Accept the presentation contexts as given in the next table.

Table 3-13: Accepted Presentation Context by the Query Retrieve AE

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

3.4.3.1.3   C-ECHO SCP Conformance

Inturis Suite provides standard conformance.

3.4.3.1.4   Presentation Context Acceptance Criterion

Inturis Suite 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 Inturis Suite.

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

3.4.3.1.5   Transfer Syntax Selection Policies

Any of the presentation context show in Table 3-13, are acceptable.

3.4.3.2 Query the Inturis Suite Database

3.4.3.2.1   Associated Real-World Activity

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

3.4.3.2.2   Presentation Context Table

Inturis Suite will Accept the presentation contexts as given in the next table.

Table 3-14: Accepted Presentation Context by the Query Retrieve AE

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	SCP	None

Note: Any of the Standard Query Retrieve FIND SOP classes listed in Table 3-11, "Supported SOP Classes as SCP by the Query/ Retrieve AE," on page 17.

3.4.3.2.3   C-FIND SCP Conformance

Queries performed on Inturis Suite using the Patient Root and Patient/Study model will result in a Study based response from Inturis Suite. This is not DICOM compliant and is caused by the study based hierarchy of Inturis Suite. Relational queries are not supported. Inturis Suite simultaneously handles simultaneous C-FIND requests.

The DICOM Query / Retrieve SCP supports hierarchical queries only
The DICOM Query / Retrieve SCP supports queries for all unique and required patient, study, series and instance level keys / attributes, as follows:
• Patient ID
• Patient's Name
• Study Instance UID
• Study ID
• Accession Number
• Study Date
• Study Time
• Modality
• Series Number
• Series Instance UID
• Instance Number
• SOP Instance UID

The DICOM Query / Retrieve SCP supports queries for the following optional patient study, series and instance level keys / attributes
• Patient's Birth Date
• Patient's Sex
• Referring Physicians Name
• Body Part

• Protocol Name

The DICOM Q/R SCP supports all the attribute matching types defined in the DICOM standard document PS 3.4-2000 except Sequence Matching, as follows
• Single Value Matching for all acquirable data elements
• Universal Matching for all acquirable data elements
• List of UID Matching for all Instance UID data elements
• Wild Card Matching for Person Name data elements
• Wild Card Matching for ID strings
• Range Matching for Date data elements

If the FIND query is such that more than 1000 matches are found the Query/Retrieve SCP returns an error "out of resources" indicating there are more matches than the system can handle. Other errors that are returned are shown in:

Table 3-15: Returned status responses by the Query / Retrieve AE

Service Status	Further Meaning	Status Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	Cxxx	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied.	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.	FF01	Identifier

3.4.3.2.4   Presentation Context Acceptance Criterion

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

3.4.3.3 Request Retrieve Images from the Inturis Suite Database

3.4.3.3.1   Associated Real-World Activity

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

3.4.3.3.2   Presentation Context Table

Inturis Suite will accept the presentation contexts as given in the next table:

Table 3-16: Accepted Presentation context by the Query Retrieve AE

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	SCP	None

Note: Any of the Standard Query Retrieve MOVE SOP classes listed in Table 3-12, "Supported Storage SOP Classes as SCU by the Query/ Retrieve AE," on page 17.

3.4.3.3.3   C-MOVE SCP Conformance

Inturis Suite supports all Query Retrieve SOP classes listed in Table 3-12. A C-STORE connection is built after the C-MOVE request, for C-STORE conformance see section 3.4.3.4 on page 22.

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

Errors that are returned by the Inturis Suite Query / Retrieve AE are:

Table 3-17: Returned status responses by the Query / Retrieve AE

Service Status	Further Meaning	Status Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	Cxxx	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied.	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.	FF01	Identifier

3.4.3.3.4   Presentation Context Acceptance Criterion

Inturis Suite 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 Inturis Suite.

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

3.4.3.4 Retrieve Images from Inturis Suite

3.4.3.4.1   Associated Real-World Activity

The Inturis Suite will export the XA and SC images as a result of the Query Retrieve Move request.

3.4.3.4.2   Proposed presentation Contexts

The following table illustrates the proposed presentation contexts for the Image Storage request.

Table 3-18: Proposed presentation Context by the Imaging Export AE

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
X-Ray Angiographic Image Storage	1.2.840.1008.5.1.4.1.1.12.1	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	SCU	None
Secondary Capture Image Storage	1.2.840.1008.5.1.4.1.1.7	ILE ELE EBE JPEG Lossless First-Order Prediction (Process 14) (Selection Value 1) JPEG Lossy Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50	ACU	None

Note: The JPEG process 14 transfer syntax is preferred.

3.4.3.4.3   SOP Specific Conformance

The Inturis Suite conforms to the SOP's of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the Inturis Suite.

Table 3-19: C-STORE STATUS Responses

Service Status	Codes	Further Meaning Status
Refused	A7xx	Text logging, close association, application released and returns an error
Error	A9xx	Text logging, close association, application released and returns an error
	Cxxx	Text logging, close association, application released and returns an error
Warning	B00x	Text logging
Success	0000	

3.5 Inturis Suite AE Media Specification

The Inturis Suite 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).

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 3-20.

Table 3-20: Supported Application Profiles

Application Profile	Identifier	Real World Activity	Role	SC Option
Basic cardiac X-Ray Angio-graphic Studies on CD-R media.	STD-XABC-CD	Write image(s) on CD-R disk	FSC	Interchange
	STD-XABC-CD	Read image(s) from CD-R disk	FSR	Interchange
1024 X-Ray Angiographic Studies on CD-R Media.	STD-XA1K-CD	Write image(s) on CD-R disk	FSC	Interchange
	STD-XA1K-CD	Read image(s) on CD-R disk	FSR	Interchange
	STD-GEN-CD	Write image(s) on CD-R disk	FSC	Interchange
	STD-GEN-CD	Read image(s) on CD-R disk	FSR	Interchange

3.5.1 AE Specification: DICOM Recording

3.5.1.1 Application Entity Title

The Application Entity title is registered into the DICOM File Meta Information header and is supported by the CD-writer (CD write option) acting as a FSC.

Application Entity Title: "INTURISPRO_FSU"

3.5.1.2 RWA Transfer of an Examination

The SOP instances as provided by the RWA are written to the CD-R media and a correspond-ing DICOMDIR is created.

3.5.1.3 Application Profile(s) for this RWA

Refer to Table 3-20 for the list of Application Profiles that invoke this AE.

3.5.1.4 DICOMDIR keys.

In the DICOMDIR file a Basic Directory IOD is present, containing Directory records at the patient, study, series and image level.

3.5.2 AE Specification: DICOM Reading

3.5.2.1 Application Entity Title

Not applicable.

3.5.2.2 RWA Review and Analysis of an Examination

The "DICOM Reader" AE will act as a FSR using the Interchange option when reading the

directory of the medium and when reading the requested images.

Reading images send to the Inturis Suite and viewed on the viewer will only be properly displayed for XA: 512*512, 512*1024, 1024*512 and 1024*1024 8 and 10 bits uncompressed or lossless JPEG. For SC: 512*512, 512*1024, 1024*512 and 1024*1024 8 and 10 bits and 1280*1024 8 bit (uncompressed)

3.5.2.3 Application Profile(s) for this RWA

Refer to Table 3-20 for the list of Application Profiles that invoke this AE.

4 Communication Profiles

4.1 Supported Communication Stacks

TCP/IP is the only protocol stack supported.

4.2 TCP/IP Stack

The TCP/IP stack as supported by the underlying Operating System.

4.3 API

The API is the WinSock 2 interface as supported by the underlying Operating System.

4.3.1 Physical Media Support

Supported physical medium include:
- IEEE 802.3-1995 (Fast Ethernet) 100BASE-TX.
- IEEE 802.3-1995 10BASE-TX

5 Extensions/Specializations/Privatizations

The viewer can write complete studies to one or more CDs depending on the study size. Further more one viewer can review and upload:
- Multi Patient CDs
- Multi Study CDs
- Multi CD study's

6 Configuration

6.1 AE Title/Presentation Address mapping

The Network and Media AE title as well as the IP Address and the TCP listen port associated with this AE is configurable.

7 Support of Extended Character Sets

The Inturis Suite supports Extended Character Set "ISO_IR 100" which is the Latin alphabet
No 1, supplementary set.