Philips Medical Systems

DICOM

CONFORMANCE STATEMENT

BV Family Software
Release 1.4
System Release 1.2

Document Number **4522 981 90231**

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1. DICOM CONFORMANCE STATEMENT OVERVIEW

The BV Family system of Philips Medical Systems is a mobile image generating system. The BV Family system is installed with an Export function based on the DICOM Image Storage to transfer image data from the system to a remote system and a DICOM print function to print image data.

The BV Family system provides the following DICOM data exchange features:

- It allows the operator to print images stored in the database on a DICOM printer.
- It allows the operator to store images stored in the database to a DICOM destination.

Figure 1. BV Family in a DICOM Network

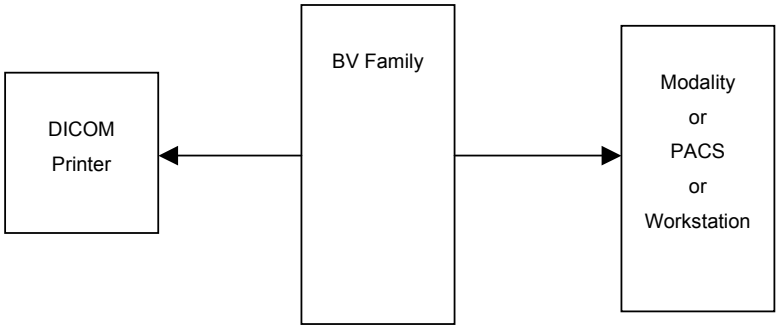

Table 1 provides an overview of all network services and the applicable SOP classes as provided by the BV Family system.

Table 1. Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Image Transfer		
X-Ray Angiographic Image Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Print Management		
Basic Grayscale Print Management (Meta)	Yes	No
> Basic Film Session	Yes	No
> Basic Film Box	Yes	No
> Basic Grayscale Image Box	Yes	No
> Printer	Yes	No

Future Release

In the near future, a new product release will become available. This will provide, besides the DICOM data exchange features mentioned above, also Worklist Management, Modality Performed Procedure Step and Storage Commit features.

2. TABLE OF CONTENTS

3. INTRODUCTION

3.1. Revision History

The revision history provides dates and differences of the different releases.

TABLE 2. Revision History

Document Version	Date of Issue	Author	Description
01	9 December 2003	PMS MIT-IO	DICOM Conformance Statement for the BV Family Software Release 1.4

3.2. 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.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2-2003.

This DICOM 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 an IT 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 analyze 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).

3.4. Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3-2003 and PS 3.4-2003. The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations are used in this document.

AE	Application Entity
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
GUI	Graphic User Interface
ILE	Implicit VR Little Endian
IOD	Information Object Definition
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real World Activity
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet protocol
UID	Unique Identifier
WLM	Worklist Management

3.5. References

[DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 16 (NEMA PS 3.1-2003 – PS 3.16-2003),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Virginia. 22209, United States of America

4. NETWORKING

This section contains the networking related services (vs. the media related ones).

4.1. Implementation model

The implementation model consists of three sections:
- The Application Data Flow Diagram, specifying the relationship between the BV Family Application Entity and the “external world” or Real-World activities,
- a functional description of the BV Family Application Entity, and
- the sequencing constraints among them.

4.1.1. Application Data Flow

The BV Family system defines one DICOM Application Entity (BV Family AE) with 2 basic functions; BV Family DICOM Print and the BV Family DICOM Image Storage (both part of BV Family Export function). The related Implementation Model is shown in Figure 2.

Queue mechanism for Export Targets
Examinations or subsets of examinations that have to be stored or printed by the BV Family system will be put in an export queue. Two different scenarios are possible:

- The BV Family system is connected to the network: In this case the storage or print job(s) will be executed immediately over the network to the store or print destination.
- The network connection is unavailable: In this case the storage or print job(s) will stay in the export queue. When the system is connected to the network again, the user can resume the export function. The export jobs in the queue will be executed.

In the case where the BV Family DICOM Image Storage is used, the Images in the examination will be transmitted as separate Secondary Capture Images or as XA Images.

As depicted in Figure 2, BV Family AE incorporates the following functionality:

- After RWA Export Images (Store) that is initiated by the operator (in case of a connection to a network, see above), the BV Family AE as SCU uses the remote SCP Storage Service Class functionality to store local images on a remote database.
- After RWA Export Images (Print) that is initiated by the operator (in case of a connection to a network, see above), the BV Family AE as SCU uses the remote SCP Print Service Class functionality to print images.
- After RWA Check, the BV Family AE as SCU provides standard Verification Service Class functionality to a remote SCP.

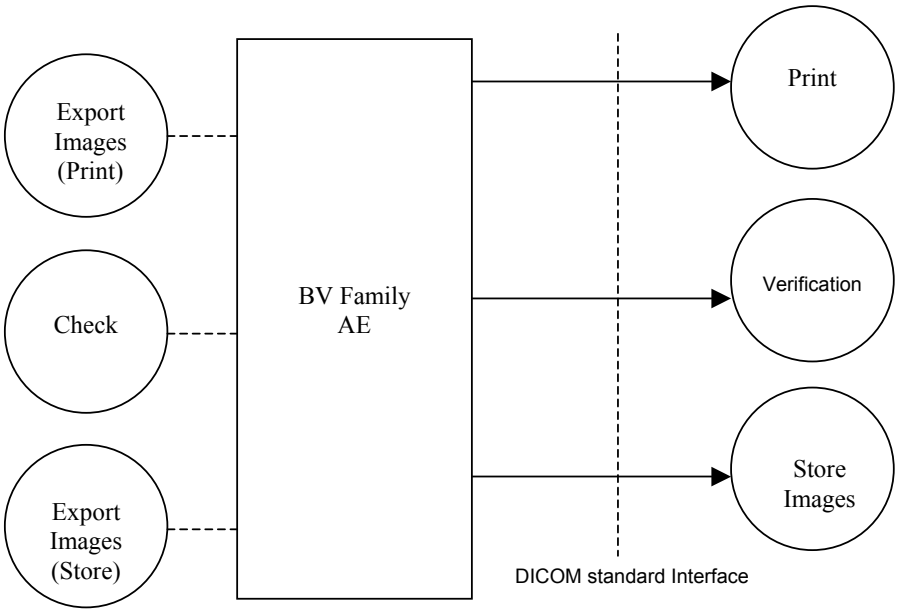

Figure 2. Application Data Flow Diagram

4.1.2. Functional Definition of AE's

4.1.2.1. Functional Definition of BV Family Application Entity

Verification Service Class
The BV Family DICOM Verification function acts as a Service Class User (SCU) of the Verification Service Class (RWA Check).

The BV Family AE will request an association with a remote SCP for the Verification SOP Class. After accepting the association, the remote SCP shall receive and respond to the Verification request. Afterwards the BV Family AE shall release the association.

Storage Service Class
The BV Family DICOM Image Storage function acts as a Service Class User (SCU) of the Storage Service Class (RWA Export Images (Store)).

The BV Family AE will request an association with the selected remote SCP for the Storage Service. After accepting the association, the BV Family AE will send the Storage requests, receive the applicable Storage responses, and release the association when finished.

Print Management Service Class
The BV Family DICOM Print function acts as a Service Class User (SCU) of the DICOM Print Service Class (RWA Export Images (Print)).

The BV Family AE shall request an association with the selected remote SCP (printer) for all applicable SOP Classes of the applicable Print Management Meta SOP Class. When the association is accepted, the BV Family AE shall send the Print requests

(including data from local database), receive the Print responses and act accordingly, and finally release the association.

4.1.3. Sequencing of Real World Activities

This section contains a description of specific sequencing as well as potential constraints of Real-World Activities, including any applicable user interactions, as performed by the BV Family AE.

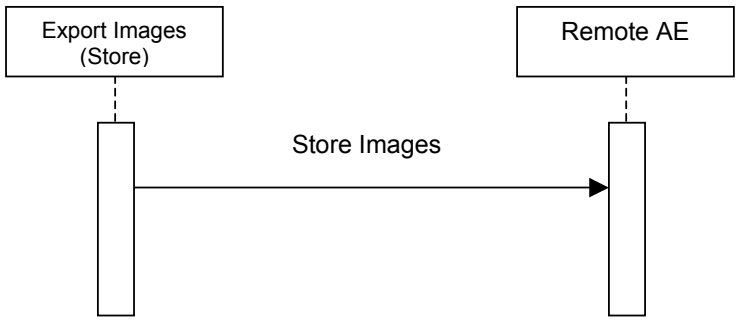

Figure 3. RWA Sequencing for Export Images (Store)

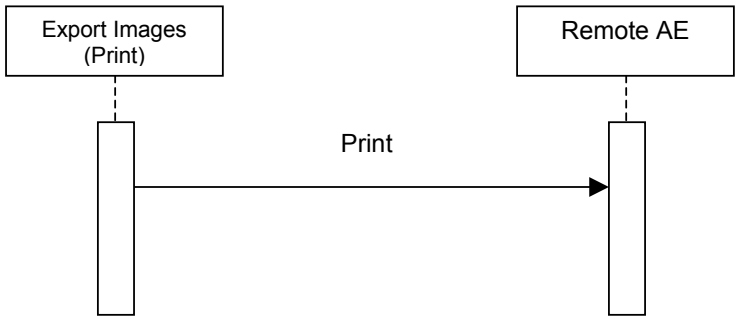

Figure 4. RWA Sequencing for Export Images (Print)

The following sequence of Real World activities are supported by the system:

- Export images (Store): Storage of the images is done with the BV Family system DICOM Image export function; the images can be stored as Secondary Capture or XA Images.
- Export images (Print): The BV Family system DICOM Print Function prints a film conform the selected film layout.

Depending on the availability of the network, the BV Family system will behave as explained in the queue management paragraph in section 4.1.1.

4.2. AE Specifications

This section describes the application entity specifications of the BV Family system.

4.2.1. BV Family AE

4.2.1.1. SOP Classes

BV Family AE provides Standard Conformance to the following DICOM 3.0 SOP classes as SCU:

Table 3. Supported SOP classes by BV Family system

SOP Class Name	UID
Verification SOP Class	1.2.840.10008.1.1
Basic Grayscale Print Management Meta SOP	1.2.840.10008.5.1.1.9
> Printer SOP Class	1.2.840.10008.5.1.1.16
> 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
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
XA Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1

BV Family AE does not support DICOM 3.0 SOP Classes as SCP.

4.2.1.2. Association Policies

This section contains a description of the General Association Establishment and Acceptance policies of the AE.

4.2.1.2.1. General

The maximum length negotiation is included in all association establishment requests. The maximum length PDU for an association is configurable.

TABLE 4. DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2. Number of Associations

BV Family AE can support one association at a time.

Note: For Export and print requests the system will setup an association at the moment of the actual export. The association will be released after the export.

TABLE 5. Number of Associations as Initiator for BV Family AE

Maximum number of simultaneous associations	1

4.2.1.2.3. Asynchronous Nature

BV Family AE does not support asynchronous operations and will not perform asynchronous window negotiation.

4.2.1.2.4. Implementation Identifying Information

The value supplied for Implementation Class UID is documented here.

TABLE 6. DICOM Implementation Class and Version for BV Family AE

Implementation Class UID	1.3.46.670589.8.15.1.4.1
Implementation Version Name	BV Family R1.4

4.2.1.3. Association Initiation Policy

For Export Images (store or print) requests BV Family AE will setup an association. This association will be released after the export job.

4.2.1.3.1. Check

4.2.1.3.1.1. Description and Sequencing of Activities

In the service mode of the BV Family system, BV Family AE can build up an association to verify the application level communication using the C-ECHO command. The C-ECHO is initiated with a “check” function that is executed via a separate service PC.

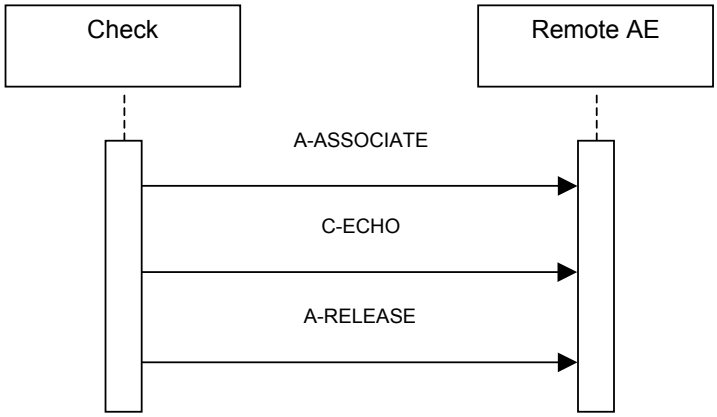

Figure 5. Sequencing of RWA Request Verification

4.2.1.3.1.2. Proposed Presentation Contexts

The BV Family AE Verification (Check) will propose the following presentation contexts:

TABLE 7. Proposed Presentation Context for BV Family 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	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for Verification

BV Family AE provides standard conformance.

4.2.1.3.2. Export Images (Store)

4.2.1.3.2.1. Description and Sequencing of Activities

If the BV Family system RWA Export Images (Store) function is initiated, BV Family AE transmits the images from the examination from a specific patient on the user

interface to the selected target device. Images are sent via the DICOM Secondary Capture Image Storage Service Class or XA Image Storage Service Class depending on the selected image format.

Each Secondary Capture Image will be sent individually with a C-STORE request. XA images are sent as multi-frame images.

At any time, the processing of an export job can be cancelled. In this case, the system will abort the processing immediately.

Figure 6 gives an overview of the sequencing of the Real World Activities.

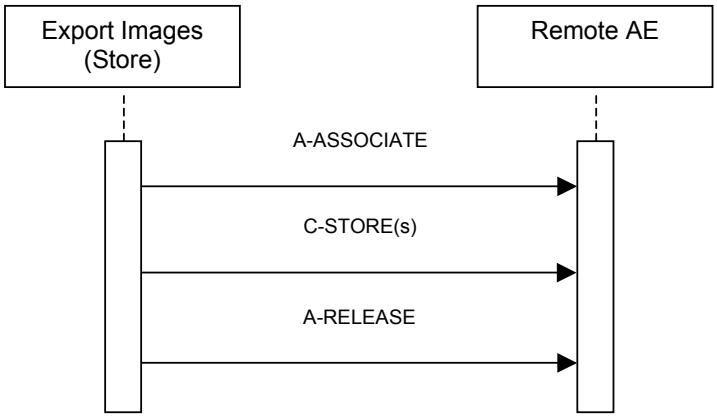

Figure 6. Sequencing of RWA Export Images

4.2.1.3.2.2. Proposed Presentation Contexts

BV Family AE will propose the following presentation contexts:

Table 8. Proposed Presentation Context for BV Family AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.1.3.2.3. SOP Specific Conformance to Storage SOP Classes

Figure 7 gives an overview of the DICOM data model. Also an overview of the real life situation is given. The BV Family system database contains several examinations (not patients). This means that when the patient information is changed it is only changed in one examination, in other examinations based on the same patient the patient information isn't changed.

An image in an examination contains information for only one patient. An examination has several runs; a run is a series of images. When images are exported with the Export function, information such as Patient name and study ID is the same for each individual image.

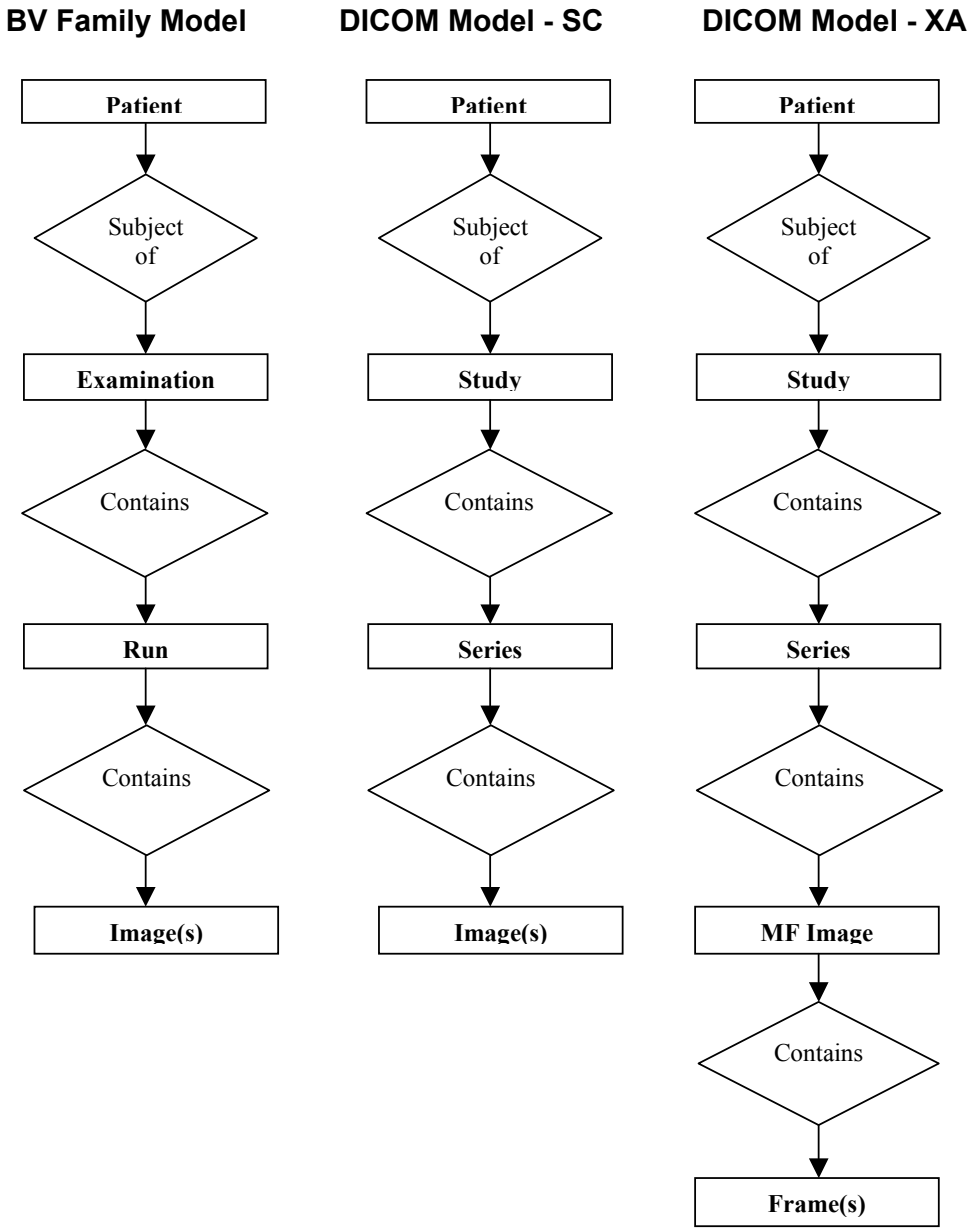

Figure 7. DICOM Data Model and BV Family Data Model

Upon receiving a C-STORE response containing an Error or a Refused status the implementation will release the association. All of the selected images generated of that examination will be considered by the BV Family AE to have failed to transfer. The user of has the ability to resume export jobs manually.

TABLE 9. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success		0000	Normal Completion
Refused	Out of Resources	A7xx	Image transfer considered failed. Images remain in queue. User can initiate re-transfer. Status logged in system file
Error	Data Set does not match SOP Class Cannot understand	A9xx C000	Image transfer considered failed. Images remain in queue. User can initiate re-transfer. Status logged in system file
Warning	Coercion of Data Elements Data Set does not match SOP Class Elements Discarded	B000 B007 B006	Image transfer considered successful. Status logged in system file

The behavior of BV Family AE during communication failure is summarized in Table 10.

Table 10. DICOM Command Communication Failure Behavior

Exception	Behavior
Association setup failure	No automatic retry. Session should be resumed manually
Network Timeout behaviour	See section 4.4.2 for corresponding Time to wait parameters

4.2.1.3.3. Export Images (Print)

4.2.1.3.3.1. Description and Sequencing of Activities

The BV Family system RWA Export Images (Print) has the capability to print images. BV Family AE uses the DICOM Basic Print services using the Presentation Contexts defined in the Table 11 shown on page 15, to the selected Print target device.

BV Family AE will create a Film Session (based on the selected Layout) containing one or more Film Boxes. BV Family AE will subsequently fill in the content of the image box and request the print at the Film Session level. The Film Session is deleted once the Print session has completed. A new Film Box is created for each successive film within the Film session.

The BV Family system is configured to acquire Grayscale images. As a result BV Family AE negotiates for the Basic Grayscale DICOM print on each output.
At any time, the processing of a print job can be cancelled. In this case, BV Family AE will abort the processing immediately.

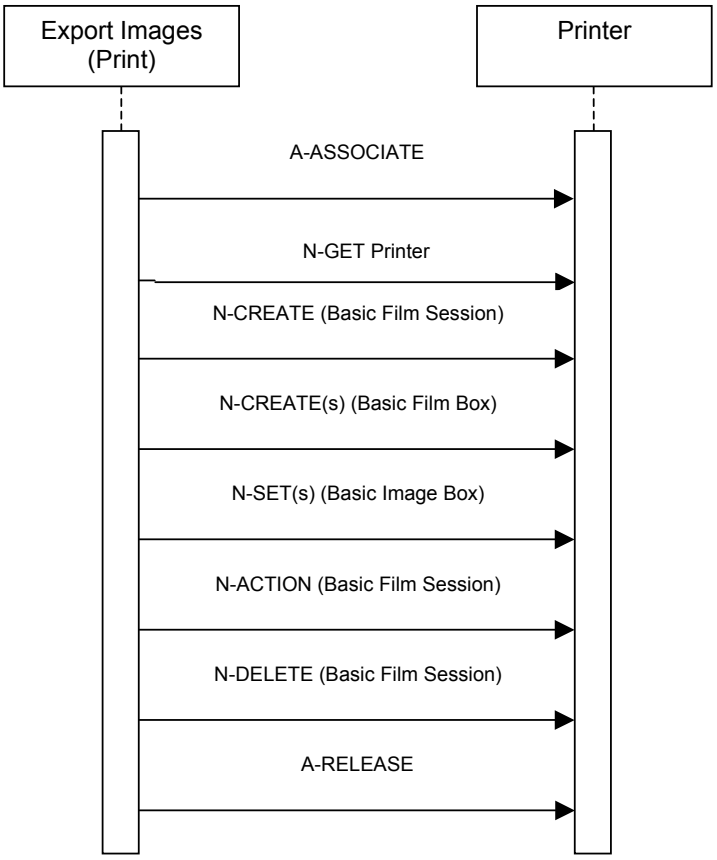

Figure 8. Sequencing of RWA Export Images (Print)

4.2.1.3.3.2. Proposed Presentation Contexts

BV Family AE Export images (Print) will propose the following presentation contexts:

Table 11. Proposed Presentation Context for BV Family AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
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	None

Note: Any of the standard Print Meta SOP classes and their subsequent Print SOP classes as listed in Table 3.

The following DIMSE Services are supported:

Table 12. Supported DIMSE Service Elements

SOP Class	Supported DIMSE Service Element
Printer SOP Class	N-GET, N-EVENT-REPORT
Basic Film Session SOP Class	N-CREATE, N-ACTION, N-DELETE
Basic Film Box SOP Class	N- CREATE
Basic Greyscale Image Box SOP Class	N-SET

4.2.1.3.3.3. SOP Specific Conformance to Print SOP Classes

BV Family AE Export Images (Print) function supports the Basic Grayscale Print Management SOP Classes. Films are printed according to the real world activity described earlier.

Upon receiving a normalised service response (N-CREATE, N-SET) containing a Failure Status, BV Family AE will release the association. The printing of the whole session will be considered failed. The BV Family system has the ability to recover from this situation. In this case the user has to resume the print job manually.

Before a job in the print export queue is actually started, the system will retrieve the printer status. Upon receiving a normalised service response (N-GET) containing a Failure Status, the system should not start to export the job.

Errors that occur are logged in a system file; no information is given through the user interface.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 13 to 16.

TABLE 13. DICOM Command Response Status Handling Behavior for Basic Film Session N-CREATE

Service Status	Further Meaning	Error Code	Behavior
Success	Film Session successfully created	0000	Normal Completion
Warning		B6XX	Print Film Session considered successful. Status logged in system file
Failure			Print Film Session considered failed. Status logged in system file

TABLE 14. DICOM Command Response Status Handling Behavior for Basic Film Box N-CREATE

Service Status	Further Meaning	Error Code	Behavior
Success	Film Box successfully created	0000	Normal Completion
Warning		B6XX	Print Film Session considered successful. Status logged in system file
Failure		C6XX	Print Film Session considered failed. Status logged in system file

TABLE 15. DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box N-SET

Service Status	Further Meaning	Error Code	Behavior
Success	Image successfully stored in Image Box	0000	Normal Completion
Warning		B6XX	Print Film Session considered successful. Status logged in system file
Error		C6XX	Print Film Session considered failed. Status logged in system file

TABLE 16. DICOM Command Response Status Handling Behavior for Basic Film Box N-ACTION

Service Status	Further Meaning	Error Code	Behavior
Success	Film accepted for printing	0000	Normal Completion
Warning		B6XX	Print Film Session considered successful. Status logged in system file
Failure		C6XX	Print Film Session considered failed. Status logged in system file

The behavior of BV Family AE during communication failure is summarized in Table 17

Table 17. DICOM Command Communication Failure Behavior

Exception	Behavior
Association setup failure	No automatic retry. Session should be resumed manually
Network Timeout behaviour	See section 4.4.2 for corresponding Time to wait parameters

The supported attributes for the Print Management Service SOP Classes can be found sorted per IOD Module in next the Tables:

Table 18. Basic Film Session SOP Class - N-CREATE-RQ - Basic Film Session Presentation Module

Attribute Name	Tag	Note
Number of Copies	2000,0010	Integer (1-99), DEFAULT
Print Priority	2000,0020	LOW, MED, HIGH, DEFAULT
Medium Type	2000,0030	CURRENT, BLUE FILM, CLEAR FILM, PAPER, TRANSPARENCY, DEFAULT
Film Destination	2000,0040	CURRENT, PROCESSOR, MAGAZINE, BIN (integer), DEFAULT
Film Session Label	2000,0050	Equal to study ID.

Note: The Value Range and DEFAULT values are printer type dependent

Table 19. Basic Film Box SOP Class - N-CREATE-RQ - Basic Film Box Presentation Module

Attribute Name	Tag	Note
Image Display Format	2010,0010	STANDARD\1,1, STANDARD\1,2, STANDARD\2,2, STANDARD\2,3, STANDARD\4,3
Film Orientation	2010,0040	LANDSCAPE, PORTRAIT
Film Size ID	2010,0050	CURRENT, 10INX12IN, 10INX14IN, 11INX11IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, 8INX10IN, 8_5INX11IN, A4, A3, DEFAULT
Magnification Type	2010,0060	BILINEAR, CUBIC, NONE, REPLICATE, DEFAULT
Smoothing Type	2010,0080	0, 1, 10, 11, 12, 13, 14, 140, 15, 2, 3, 4, 5, 6, 7, 8, 9, ENHANCED, ENHANCED1, MEDIUM, NORMAL, SHARP, SMOOTH
Border Density	2010,0100	BLACK, WHITE, OD (Integer), DEFAULT

Attribute Name	Tag	Note
Empty Image Density	2010,0110	BLACK, WHITE
Min Density	2010,0120	0...1000, DEFAULT
Max Density	2010,0130	0...1000, DEFAULT
Trim	2010,0140	NO, YES, DEFAULT
Configuration Information	2010,0150	Printer configurable: Character string (max. 1024 char.), DEFAULT

Note: The Value Range and DEFAULT values are printer type dependent

Table 20. Basic Film Box SOP Class - N-CREATE-RQ - Basic Film Box Relationship Module

Attribute Name	Tag	Note
Referenced Film Session Sequence	2010,0500	
>Referenced SOP Class UID	0008,1150	Applied Value(s): 1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	0008,1155	

Table 21. Basic Grayscale Image Box SOP Class - N-SET-RQ - Image Box Pixel Presentation Module

Attribute Name	Tag	Note
Image Position	2020,0010	Generated
Polarity	2020,0020	NORMAL, REVERSE, DEFAULT
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	See Table 22
>Columns	0028,0011	See Table 22
>Pixel Aspect Ratio	0028,0034	See Table 22
>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): 0x0000
>Pixel Data	7FE0,0010	

Note: The Value Range and DEFAULT values are printer type dependent

Table 22. Applied values for Rows, Columns and Aspect Ratio

Interpolation	Rows	Columns	Pixel Aspect Ratio
On	768	1008	Not sent
Off	560	1008	753\549

4.2.1.4. Association Acceptance Policy

BV Family AE does not accept any association.

4.3. Network Interfaces

4.3.1. Physical Network Interface

BV Family AE provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard. The TCP/IP stack is inherited from the Vx Works Operating system.

BV Family AE supports Ethernet and IEEE 802.3, 10/100 BASE-T.

4.3.2. Additional Protocols

No additional protocols are used.

4.4. Configuration

The configuration of a BV Family system is done by means of a Web based service program, called BV-Scope.

4.4.1. AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to Presentation Address. How this is to be performed is described in this section.

4.4.1.1. Local AE Titles

Per default the BV Family AE Application Entity Title is “No Name”. At installation the Customer Support Engineer can change the host name. The BV Family AE can be changed independently.

TABLE 23. AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
BV Family AE	“No Name”	Fixed: 104

4.4.1.2. Remote AE Title/Presentation Address Mapping

4.4.1.2.1. Remote Association Initiators

BV Family AE does not accept associations from remote Initiators.

4.4.1.2.2. Remote Association Acceptors

The following information must be provided for all relevant remote applications that are able to accept DICOM associations from BV Family AE:

- 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.

4.4.2. Parameters

The specification of important operational parameters, and if configurable, their default value and range, are specified here.

The configuration parameters are given in Table 24, categorized in the following sections:

- Local system Configurable Parameters of the BV Family AE
- Export Target (Store) Configurable Parameters
- Export Target (Print) Configurable Parameters

TABLE 24. Configuration Parameters table

Parameter	Configurable	Default Value, comment
Local System Parameters		
AE Title	Yes	“No Name”
Host Name	Yes	“No Name”
IP Address	Yes	0.0.0.0

Parameter	Configurable	Default Value, comment
Subnet Mask	Yes	0.0.0.0
Default Gateway	Yes	0.0.0.0
Interpolation (on/off)	Yes	On
Max. PDU size	Yes	28672
Receive Message Timeout	Yes	60
Association Close Timeout	Yes	1
Association Reply Timeout	Yes	60
Association Release Timeout	Yes	60
Write Timeout	Yes	60
Connect Timeout	Yes	60
Export Target		
AE Title	Yes	“No Name”
Name	Yes	Max. 25 char. Unique
IP Address	Yes	
Port number	Yes	
Printer Target		
AE Title	Yes	“No Name”
Name	Yes	Max. 25 char. Unique
IP Address	Yes	
Port number	Yes	
Printer type	Yes	Predefined List
Printer Priority	Yes	MED
Film Destination	Yes	PROCESSOR
Film Orientation	Yes	PORTRAIT
Film Size	Yes	Depending on Printer Type
Border Density	Yes	BLACK
Border Density Value	Yes	1
Number of Copies	Yes	1
Magnification Type	No	Depending on Printer Type
Smoothing Type	No	Depending on Printer Type
Minimum Density	No	Depending on Printer Type
Maximum Density	No	Depending on Printer Type
Empty Image Density	No	Depending on Printer Type
Polarity	No	Depending on Printer Type
Trim	No	Depending on Printer Type
Configuration Information	No	Depending on Printer Type

Note: Parameters that are part of a specific DICOM IOD are specified in section 4.2.1.3.3: Export Images (Print)

5. MEDIA INTERCHANGE

BV Family AE does not support Media Interchange.

6. SUPPORT OF CHARACTER SETS

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

7. SECURITY

7.1. Security Profiles

Not applicable

7.2. Association level security

Not applicable

7.3. Application level security

- For the DICOM configuration two levels of access are supported by the application: via a password and/or via a hardware dongle.

8. ANNEXES

8.1. IOD Contents

8.1.1. Created SOP Instance(s)

This section specifies each IOD created by the system. It specifies the attribute name, tag and value.

8.1.1.1. Secondary Capture Image Storage SOP Class

The details of applied modules are given in the tables below. The lists of possible attribute values are given. It is indicated whether the operator enters the attribute.

Table 25. Secondary Capture Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	Entered by operator
Patient ID	0010,0020	Entered by operator
Patient's Birth Date	0010,0030	Entered by operator
Patient's Sex	0010,0040	Entered by operator

Table 26. Secondary Capture Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Exam Date, generated by BV Family
Study Time	0008,0030	Exam Time, generated by BV Family
Accession Number	0008,0050	Entered by operator
Referring Physician's Name	0008,0090	Always empty
Study Description	0008,1030	Examination type selected by operator
Study Instance UID	0020,000D	Generated by the BV Family system
Study ID	0020,0010	Always empty

Table 27. Secondary Capture Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Modality	0008,0060	Applied Value(s): OT
Performing Physician’s Name	0008,1050	Entered by the operator
Series Instance UID	0020,000E	Generated by the BV Family system
Series Number	0020,0011	Running counter, increasing from “1” to “n”, with “n” the total number of exported series in the study export job.
Laterality	0020,0060	Always empty

Table 28. Secondary Capture Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips Medical Systems
Institution Name	0008,0080	Fixed value (Configurable).
Station Name	0008,1010	Fixed value (Configurable).
Manufacturer's Model Name	0008,1090	Applied Value(s): BV Family XA

Table 29. Secondary Capture Image Storage SOP Class - Sc Image Equipment Module

Attribute Name	Tag	Note
Conversion Type	0008,0064	Applied Value(s): DI
Secondary Capture Device ID	0018,1010	BV System ID
Secondary Capture Device Manufacturer	0018,1016	Fixed: Philips Medical Systems
Secondary Capture Device Manufacturer's Model Name	0018,1018	Fixed: BV Family XA
Secondary Capture Device Software Version.	0018,1019	Fixed: BV Family R1.4

Table 30. Secondary Capture Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Applied Value(s): DERIVED
Instance Number	0020,0013	Running counter, increasing from “1” to “n”, with “n” the total number of exported frames in the series (run) of the study export job. As a result, for the exported series (runs) that are containing only one single frame, the instance number will always be “1”.
Patient Orientation	0020,0020	Always Empty.

Table 31. Secondary Capture Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Applied Value(s): 1
Photometric Interpretation	0028,0004	Fixed: MONOCHROME2
Rows	0028,0010	See Table 46
Columns	0028,0011	See Table 46
Pixel Aspect Ratio	0028,0034	See Table 46
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	Pixel Data

Table 32. Secondary Capture Image Storage SOP Class - Sc Image Module

Attribute Name	Tag	Note
Date of Secondary Capture	0018,1012	Generated by BV Family system
Time of Secondary Capture	0018,1014	Generated by BV Family system

Table 33. Secondary Capture Image Storage SOP Class - Sop Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100
SOP Class UID	0008,0016	Applied Value(s): 1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	0008,0018	Generated by BV Family system

8.1.1.2. X-Ray Angiographic Image Storage SOP Class

The details of applied modules are given in the tables below. The lists of possible attribute values are given.

Table 34. X-Ray Angiographic Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	Entered by operator
Patient ID	0010,0020	Entered by operator
Patient's Birth Date	0010,0030	Entered by operator
Patient's Sex	0010,0040	Entered by operator

Table 35. X-Ray Angiographic Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Exam Date, generated by BV Family
Study Time	0008,0030	Exam Time, generated by BV Family
Accession Number	0008,0050	Entered by operator
Referring Physician's Name	0008,0090	Always empty
Study Description	0008,1030	Examination type selected by operator.
Study Instance UID	0020,000D	Generated by the BV Family System
Study ID	0020,0010	Always empty

Table 36. X-Ray Angiographic Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Modality	0008,0060	Applied Value(s): XA
Performing Physician’s Name	0008,1050	Entered by the operator
Series Instance UID	0020,000E	Generated by the BV Family System
Series Number	0020,0011	Running counter, increasing from “1” to “n”, with “n” the total number of exported series in the study export job.
Laterality	0020,0060	Always Empty

Table 37. X-Ray Angiographic Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Fixed Value(s): Philips Medical Systems
Institution Name	0008,0080	Fixed value (Configurable).
Station Name	0008,1010	Configurable name identifying the machine that produced the digital images.
Manufacturer's Model Name	0008,1090	Fixed value: Applied Value(s): BV Family XA

Table 38. X-Ray Angiographic Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Content Date	0008,0023	Generated by the BV Family System
Content Time	0008,0033	Generated by the BV Family System
Instance Number	0020,0013	Equal to Series Number (0020,0011) The relation between different series (runs) and instance numbers that are displayed on certain viewing applications is maintained.
Patient Orientation	0020,0020	Always Empty

Table 39. X-Ray Angiographic Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Applied Value(s): 1

Attribute Name	Tag	Note
Photometric Interpretation	0028,0004	Fixed: MONOCHROME2
Rows	0028,0010	See Table 46
Columns	0028,0011	See Table 46
Pixel Aspect Ratio	0028,0034	See Table 46
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	Pixel Data

Table 40. X-Ray Angiographic Image Storage SOP Class - Cine Module

Attribute Name	Tag	Note
Start Trim	0008,2142	1
Stop Trim	0008,2143	Number of images in the run
Recommended Display Frame Rate	0008,2144	Acquisition speed
Cine Rate	0018,0040	Calculated from acquisition speed
Frame Time	0018,1063	Calculated from acquisition speed, in msec

Table 41. X-Ray Angiographic Image Storage SOP Class - Multi-frame Module

Attribute Name	Tag	Note
Number of Frames	0028,0008	Number of exported images of the run
Frame Increment Pointer	0028,0009	Fixed: 0x00181063

Table 42. X-Ray Angiographic Image Storage SOP Class - X-ray Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Applied Value(s): ORIGINAL\PRIMARY
Samples per Pixel	0028,0002	Applied Value(s): 1
Photometric Interpretation	0028,0004	Applied Value(s): MONOCHROME2
Frame Increment Pointer	0028,0009	Fixed: 0x00181063
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 Intensity Relationship	0028,1040	Applied Value(s): LIN

Table 43. X-Ray Angiographic Image Storage SOP Class - X-ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	Always Empty.
Field of View Shape	0018,1147	Applied Value(s): ROUND
Exposure	0018,1152	Always Empty
Radiation Setting	0018,1155	Applied Value(s): GR, SC
Type of Filters	0018,1161	Applied Value(s): NONE
Intensifier Size	0018,1162	Applied Value(s): 150, 230, 310
Grid	0018,1166	Applied Value(s): IN

Table 44. X-Ray Angiographic Image Storage SOP Class – XA Positioner Module

Attribute Name	Tag	Note

Attribute Name	Tag	Note
Distance Source to Detector	0018,1110	Applied Value(s): 995
Positioner Motion	0018,1500	Always Empty
Positioner Primary Angle	0018,1510	Applied Value(s): 0
Positioner Secondary Angle	0018,1511	Applied Value(s): 0

Table 45. X-Ray Angiographic Image Storage SOP Class - Sop Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100
SOP Class UID	0008,0016	Applied Value(s): 1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	Generated by the BV Family System

8.1.1.3. Overview of the applied values for Rows, Columns and aspect ratio

The actual pixel matrix used in case of exporting objects as mentioned in sections 8.1.1.5 and 8.1.1.6 depends on the “interpolation” parameter for the particular export target. Table 46 shows the values used by the BV Family system.

Table 46. Applied values for Rows, Columns and Aspect Ratio

Interpolation – Image Type	Rows	Columns	Pixel Aspect Ratio
On - Secondary Capture	768	1008	Not sent
On - XA Image	768	792	Not sent
Off - Secondary Capture	560	1008	753\549
Off - XA Image	560	792	753\549

8.1.2. Usage of Attributes from received IODs

This section specifies each IOD that can influence the BV Family system behavior in case BV Family AE receives it. It specifies the attribute name, tag and value. Also an explanation of the behavior is given.

8.1.2.1. Printer SOP Class

Table 47. Printer SOP Class - N-GET-RQ - Printer Module

Attribute Name	Tag	Note
Printer Status	2110,0010	Displayed in user interface. Applied Value(s): FAILURE, NORMAL, WARNING
Printer Status Info	2110,0020	

Only in case the printer Target responds with a Printer Status of “NORMAL” or “WARNING” the BV Family system starts to export the actual printing of the images.

8.2. Standard Extended/Specialized/Private SOPs

No private Extended/Specialized/Private Transfer Syntaxes are supported by the system.

8.3. Private Transfer Syntaxes

No private Transfer Syntaxes are supported by the system.