



Technical Publications

**Direction DOC0671952
Revision 3**

Brivo OEC 850 Version WKS-1.x.x DICOM CONFORMANCE STATEMENT

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REVISION HISTORY

REV	VER	DATE	REASON FOR CHANGE
1	1	Apr 28 2010	Draft for review
1	2	Apr 29 2010	Update according to the review record. Initial Release
2	1	Jun 11 2010	Update document by Support Center Review Comments: Brivo OEC 850 DCS_Review2_Response_FW24'4- HHComments.xls .
3	1	Nov 25 2010	1. Feature Improvement: Modality Type could be configured to both "RF" and "XA" based on XA Image IOD. 2. Update Section 3, add description of Media Viewer AE and Directory Listing activity.

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CONFORMANCE STATEMENT OVERVIEW

This DICOM Conformance Statement captures the DICOM capabilities of the Brivo OEC 850 identified below.

Table 0.1 provides an overview of the network services supported by Brivo OEC 850 system.

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
X-Ray Angiographic Image Storage	Yes	No
Print Management		
Basic Film Session SOP Class	Yes	No
Basic Film Box SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Grayscale Print Management Meta SOP Class	Yes	No
Printer SOP Class	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND SOP Class	Yes	No

Table 0.2 provides an overview of the Media Storage Application Profiles supported by Brivo OEC 850 system.

Table 0.2 - MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose CD-R	Yes	Yes

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1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction), which describes the overall structure, intent, and references for this Conformance Statement

Section 2 (Network Conformance Statement), specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Networking features.

Section 3 (Media Storage Conformance Statement), specifies the Brivo OEC 850 Medical Systems equipment compliance to the DICOM requirements for the implementation of Media Storage features.

Section 4 (X-Ray Angiographic Information Object Implementations), specifies the Brivo OEC 850 Medical Systems equipment compliance to DICOM requirements for the implementation of an X-Ray Information Objects.

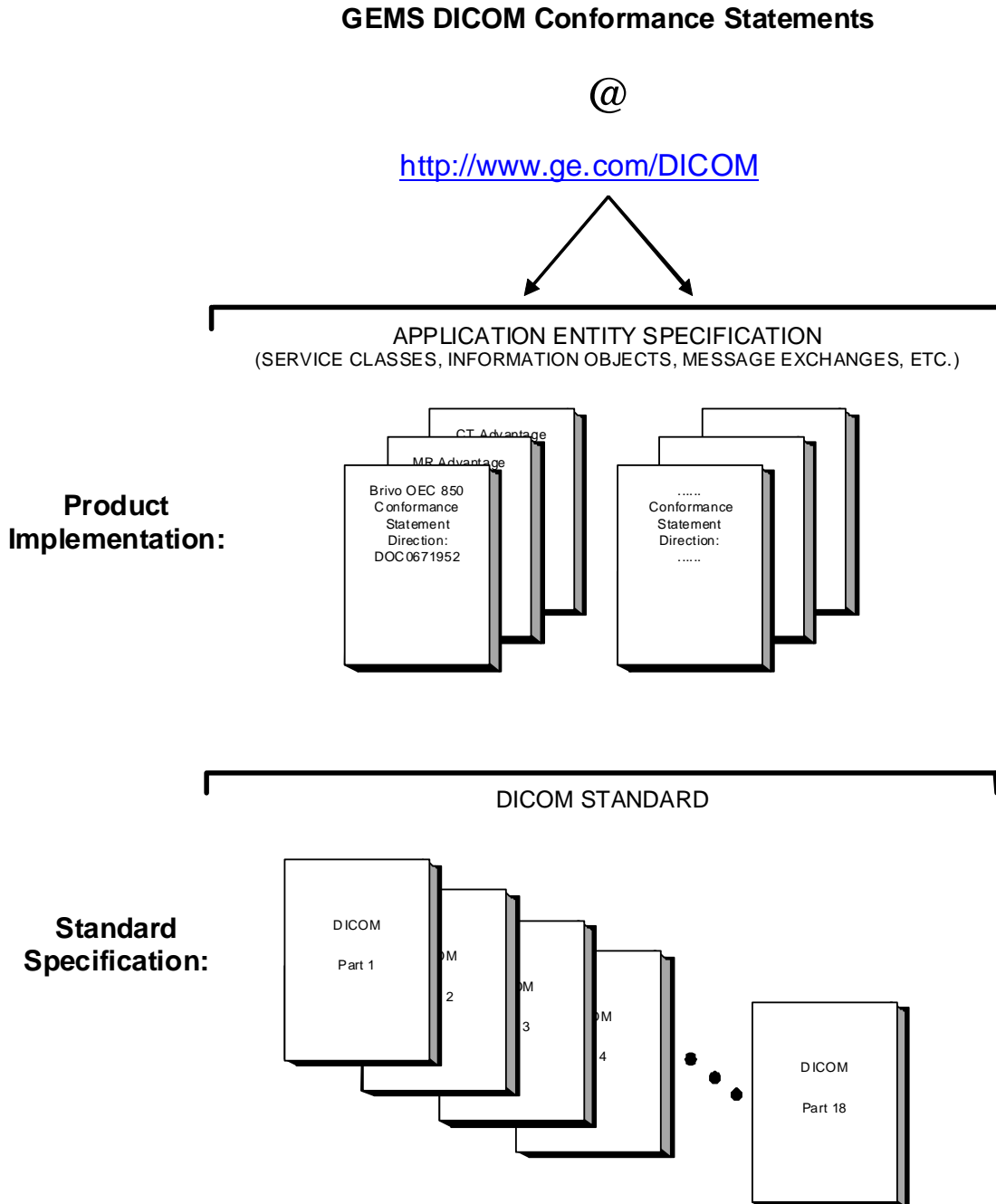
Section 5 (Modality Worklist Query Information Model), specifies the Brivo OEC 850 Medical Systems equipment compliance to DICOM requirements for the implementation of the Modality Worklist service.

Section 6 (Basic Directory Information Object Implementation), specifies the Brivo OEC 850 Medical Systems equipment compliance to DICOM requirements for the implementation of a Basic Directory Information Object.

Section 7 (Print Management Implementation), specifies the Brivo OEC 850 Medical Systems equipment compliance to DICOM requirements for the implementation of the Basic Print Meta SOP Classes (Grayscale).

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEMS DICOM Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

*Brivo OEC 850 Version WKS-1.x.x
Conformance Statement for DICOM
Direction DOC0671952*

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEMS network interface.

The GEMS Conformance Statement, contained in this document, also specifies the Lower Layer communications that it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at <http://medical.nema.org>. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1847
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts that are used in that Standard.

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEMS implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM. The GEMS Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEMS devices are capable of using different Information Object Definitions. For example, a GEMS CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEMS implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEMS devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be**

successful. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.
- **Validation** - Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications.

Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEMS protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements.** The **user** should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the **non-GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 REFERENCES

NEMA PS3	Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/ .
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1.7 DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity (Service Class User)*. Examples: Picture Archiving and Communication System (image storage SCP), and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 SYMBOLS AND ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DNS	Domain Name System
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
IOD	Information Object Definition
ISO	International Organization for Standards

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JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MWL	Modality Worklist
O	Optional (Key Attribute)
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RF	Radio Fluoroscopy
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
VR	Value Representation
XA	X-ray Angiography

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Brivo OEC 850 compliance to DICOM requirements for **Networking** features.

Brivo OEC 850 runs on industrial computer. It provides the following DICOM functionalities:

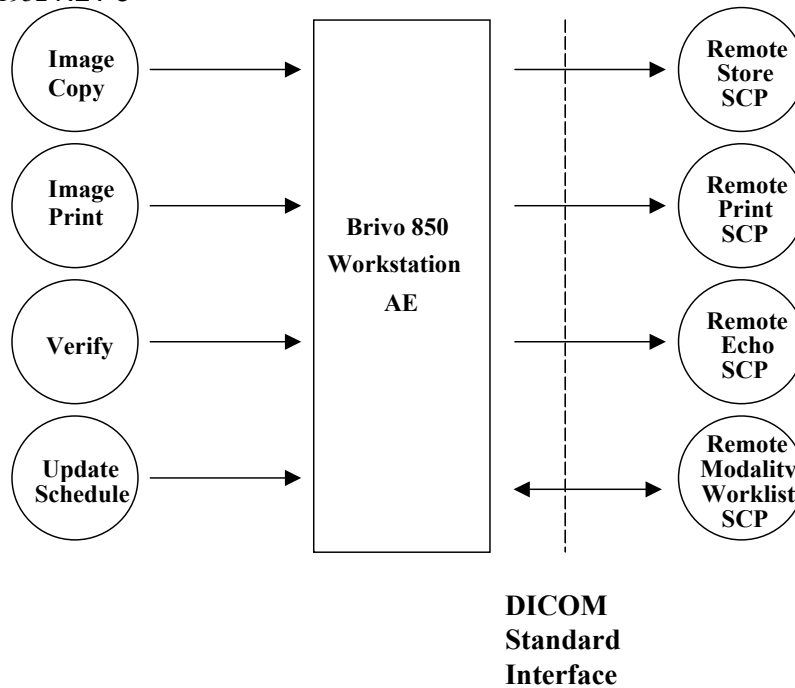
- Send Echo message to DICOM Verification SCP.
- Export DICOM images to a DICOM Storage SCP.
- Query DICOM Modality Worklist from a DICOM Worklist SCP.
- Print acquired images to a DICOM Printer.

2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagram

The network application model for the Brivo OEC 850 is shown in the following illustration:

**ILLUSTRATION 2-1
BRIVO OEC 850 NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM**



The product supports activity “CopyTo” which performs images storage and print functions; The results of that functionalities are communicated to Remote Store Server or Remote Printer/Server for DICOM image storage or DICOM image print functions.

The product supports activity “Verify” which interacts with Remote Verify SCP for DICOM Echo purpose.

The product supports activity “Update Schedule” which performs Modality worklist query, from remote Modality Worklist SCP.

2.2.2 Functional Definition of AE's

Application Entity “Brivo OEC 850 ” initiates the following functionalities :

- DICOM Host Verification : Initiate an association and send a C-ECHO-RQ message to the remote DICOM AE; the remote DICOM server will send back a C-ECHO-RSP message with a status of “success” if the operation is successful.
- DICOM Image Storage: Initiate an association to a remote AE to send image(s). If the remote AE accept the presentation context applicable to the image(s), the Brivo OEC 850 AE will send the image(s) by invoking C-STORE-RQ operation for each image on the same association. The remote DICOM server will send back C-STORE-RSP with status “success” if the operation is successful.
- Modality Worklist Query: Initiate an association with a remote AE to query for scheduled exams, a C-FIND-RQ request will be sent to the remote AE. C-FIND-RSP with query results will be received.

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- DICOM Print: Initiate an association with a remote AE to print grayscale images, please refer to Section 2.3.1.2.2.1 for details.

2.2.3 Sequencing of Real-World Activities

Non Applicable.

2.3 AE SPECIFICATIONS

2.3.1 Brivo OEC 850 AE Specification

The Brivo OEC 850 Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU** and/or as an **SCP**:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No

This Brivo OEC 850 Application Entity doesn't provide Standard Conformance to any DICOM SOP Classes as a **SCP**

2.3.1.1 Association Establishment Policies

2.3.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1
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The maximum length PDU receive size for the Brivo OEC 850 is:

Maximum Length PDU	16384
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2.3.1.1.2 Number of Associations

The Brivo OEC 850 will initiate a maximum of 1 simultaneous associations to remote nodes.

The Brivo OEC 850 does not accept DICOM associations.

2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo OEC 850 Implementation UID	1.2.840.113619.6.288
Brivo OEC 850 Implementation Version Name	BRIVO_OEC850_100

2.3.1.2 Association Initiation Policy

When the Brivo OEC 850 Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The Brivo OEC 850 proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.1.2.1 Real-World Activity “Image Copy”

2.3.1.2.1.1 Associated Real-World Activity

Upon a request by the operator the selected images will be sent to the configured DICOM Store SCP.

2.3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by Brivo OEC 850 AE for Activity Image Copy					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1 .12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

When more than one Presentation contexts are accepted by remote application, the selection will according to following sequence:

- 1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Transfer Syntax
- 2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Transfer Syntax
- 3: 1.2.840.10008.1.2 Implicit VR Little Endian Transfer Syntax

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for Storage SOP Classes

The Brivo OEC 850 includes optional data elements in the SOP Instances as described in Section 4 .

Although the Modality Type could be configured to “RF” and “XA” when user copy image to interchange media or remote DICOM server, only XA Image IOD is used.

Following are the status codes that are more specifically processed when receiving messages from a Storage SCP equipment. If store command completed normally, with a status of success or some warning then the image was accepted.

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message “DICOM Operation fails” is displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	DICOM storage operation is success	The DICOM operation progress screen disappearance indicates current operation is success.

2.3.1.2.2 Real-World Activity “Image Print”

2.3.1.2.2.1 Associated Real-World Activity

Upon a request by the operator the selected images will be sent to the configured DICOM Printer (DICOM Print SCP).

2.3.1.2.2.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by Brivo OEC 850 AE for Activity Image Print					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

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When more than one Presentation contexts are accepted by remote application, the selection will according to following sequence:

- 1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Transfer Syntax
- 2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Transfer Syntax
- 3: 1.2.840.10008.1.2 Implicit VR Little Endian Transfer Syntax

2.3.1.2.2.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale Print Management SOP Classes

The Brivo OEC 850 uses the following DIMSE services of the supported SOP Classes:

SOP Class	SOP Class UID	DIMSE Service Element	SCU Usage
Basic Film Session	1.2.840.10008.5.1.1.1	N-CREATE	Used (Mandatory)
		N-SET	Not Used
		N-DELETE	Used
		N-ACTION	Not Used
Basic Film Box	1.2.840.10008.5.1.1.2	N-CREATE	Used (Mandatory)
		N-ACTION	Used (Mandatory)
		N-DELETE	Used
		N-SET	Not Used
Printer	1.2.840.10008.5.1.1.16	N-EVENT-REPORT	Used (Mandatory)
		N-GET	Used
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used (Mandatory)

When a manual print operation is initiated, the AE:

- 1. Initiates a DICOM association and negotiates Presentation Contexts
- 2. N-GETs printer status using the Printer SOP Class
- 2. N-CREATEs a Basic Film Session SOP Instance, then followed by N-DELETE of the Basic Film Session SOP Instance.
- 3. N-CREATEs a Basic Film Box SOP Instance for each film
- 4. N-SETs the Image Box SOP Instance for each image on the film
- 5. Prints by N-ACTION on the Basic Film Box SOP Instances, then followed by N-DELETE of the Basic Film Box SOP Instance
- 6. Receives N-EVENT-REPORTs of the well know Printer SOP Instance indicating printer status if the SCP send a request.

7.Releases the DICOM association after printing is successful or failure has been signaled to the user

8.The DICOM operation progress screen disappearance indicates current operation is success.

The Print management IODs are defined in Section 7

2.3.1.2.2.1.1 Basic Film Session SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Session SOP Class N-CREATE:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message “DICOM Operation fails” displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Film Session SOP Class N-CREATE is performed successfully	The progress screen is still displayed.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Session SOP Class N-DELETE:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message “DICOM Operation fails” displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Film Session SOP Class N-DELETE is performed successfully	The progress screen is still displayed.

2.3.1.2.2.1.2 Basic Film Box SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Box SOP Class N-CREATE:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message "DICOM Operation fails" displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Film Box SOP Class N-CREATE is performed successfully	The progress screen is still displayed.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-ACTION:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message "DICOM Operation fails" displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Film Box SOP Class N-ACTION is performed successfully	The progress screen is still displayed.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-DELETE:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message "DICOM Operation fails" displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Film Box SOP Class N-DELETE is performed successfully	The progress screen is still displayed.

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2.3.1.2.2.1.3 Basic Grayscale Image Box SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Grayscale Image Box SOP Class N-SET:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning and Success status	A screen with message “DICOM Operation fails” displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Basic Grayscale Image Box SOP Class N-SET is performed successfully	The progress screen is still displayed.

2.3.1.2.2.1.4 Printer SOP Class

The Brivo OEC 850 supports the Printer SOP Class to receive information on the status of the printer.

For the product behavior description when receiving N-Event-Report request, refer to Section 7.5.1.

Also, following are the status codes the Application may send back in the **N-Event-Report** response command to the **Printer SOP Class SCP** Equipment that sent the N-Event-Report request:

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCP
Success	0000		If an N-EVENT-REPORT DIMSE service is received when the association is active, Print SCU handles the relevant states but the data received is ignored and send back ”Success”.	None

For the attribute list requested by this product and for the behavior of this product on each returned value, refer to Section 7.5.2 Printer N-Get Attributes

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Printer SOP Class N-GET:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	*	All status codes except Warning	A screen with message “DICOM Operation fails”

		and Success status	displayed
Warning	B000 ~ BFFF	All warning status	Ignored by application and current operation continues
Success	0000	Printer SOP Class N-GET is performed successfully	The progress screen is still displayed.

2.3.1.2.3 Real-World Activity “Verify”

2.3.1.2.3.1 Associated Real-World Activity

The user may initiate a DICOM Verify Request in the configuration screen for each respective remote SCP configuration (Print, Store and Worklist Query).

A valid response from the SCP will result in a “The DICOM server has verified successfully” screen displayed on the screen. In the event that the SCP does not response for some reason, the operation will timeout and the Brivo OEC 850 AE will close the association and results in “The DICOM Operation Fails” screen displayed to user.

Note: The default timeout is 5 seconds for DICOM Echo and this value is not configurable.

2.3.1.2.3.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by Brivo OEC 850 AE for Activity Verify					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

When more than one Presentation contexts are accepted by remote application, the selection will according to following sequence:

- 1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Transfer Syntax
- 2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Transfer Syntax
- 3: 1.2.840.10008.1.2 Implicit VR Little Endian Transfer Syntax

2.3.1.2.3.2.1 SOP Specific DICOM Conformance Statement for Verify SOP Classes

The message “The DICOM server has verified successfully” is displayed when the DICOM Verify is successfully performed, otherwise message “The DICOM Operation Fails” is displayed.

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2.3.1.2.4 Real-World Activity “Update Schedule”

2.3.1.2.4.1 Associated Real-World Activity

Upon a request by the operator, the current scheduled exam list should be updated from the remote Modality Worklist Server..

2.3.1.2.4.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by Brivo OEC 850 AE for Activity Update Schedule					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

When more than one Presentation contexts are accepted by remote application, the selection will according to following sequence:

- 1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Transfer Syntax
- 2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Transfer Syntax
- 3: 1.2.840.10008.1.2 Implicit VR Little Endian Transfer Syntax

2.3.1.2.4.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model - FIND SOP Class

The Brivo OEC 850 includes matching keys in the Modality Worklist queries as described in Section 5.

The results of the Worklist query are displayed to the user in the Scheduled Exam Screen. Currently, the maximal capability of received scheduled exams is 500 and not configurable.

The Brivo OEC 850 AE checks the Specific Character Set tag (0008,0005) contained in a C-FIND RSP, ISO_IR 100 or blank will be accepted, and all other value will be discarded. Responses without this tag will also be accepted.

A C-FIND CANCEL will be sent when the maximal capability of received scheduled exams is reached or user cancels operation by clicking the Cancel button on the progressing screen.

Following are the status codes that are more specifically processed when receiving messages from a **Modality Worklist** SCP equipment :

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Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Cancel	FE00	Matching terminated due to cancel	The progress screen is disappeared, the received scheduled exams will be displayed
Success	0000	Matching is complete - No final identifier is supplied	The progress screen is disappeared, all the received scheduled exams will be displayed.
Pending	FF00~FFFF	Matching is continuing - Current Matching is supplied and any Optional Keys were supported in the same manner as Required Keys.	The progress screen is still displayed.
	FF01	Matching is continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	The progress screen is still displayed.
*	*	All status codes except Cancel, Pending and Success status	do nothing but go ahead and try to receive the next C-FIND-RSP

2.4 COMMUNICATION PROFILES

2.4.1 Supported Communication Stacks

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

The TCP/IP stack is inherited from the UNIX Operating System.

2.4.2 Physical Media Support

The product is provided with Intel Corporation 82573L Gigabit Ethernet Controller.

2.5 EXTENSIONS / SPECIALIZATIONS/ PRIVATIZATIONS

Not Applicable.

2.6 CONFIGURATION

2.6.1 AE Title/Presentation Address Mapping

The AE Title is configurable on the Network Config screen

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2.6.2 Configurable Parameters

The following fields are configurable:

The default value for these fields is blank unless otherwise specified.

Network

- Use DHCP or static IP (Default –DHCP).
- Local IP Address
- Local Subnet mask
- Default Gateway

Configuration:

- Local AE Title (Default – OEC850)
- Station Name
- Hospital Name

CD Options (Media Exchange)

- Remove Patient Information (Default - No).
- Modality Type (Default - RF)
- Include Viewer (Default - Include)

Every Remote DICOM AE SCP: (Store, Print, Modality Worklist)

- Server Alias
- Remote AE Title
- Remote IP Address
- Remote Port Number
- Gateway IP Address.
- Modality Type (Default - RF)

Additional fields for Remote DICOM Print

- Min Density for Printer
- Max Density for Printer
- Configuration Information
- Border Density
- Empty Density
- Number of Copies

- Print Priority
- Film Destination
- Medium Type
- Film Size
- Format
- Film Orientation

Additional fields for Remote DICOM Query Worklist Filter

- Get Today's Exams
- Patient Name
- Patient Birth date
- Patient ID
- Accession Number
- Exam Date
- Exam Time
- Performing Physician Name
- Modality Type (Default - RF)

Timeout values are not configurable:

- For association request, the timeout is 5 seconds
- If there is an exception encountered during the data transfer transaction, the timeout is 60 seconds

2.7 SUPPORT OF EXTENDED CHARACTER SETS

As a Query SCU, it will similarly accept response items with ISO_IR 100 values of Specific Character Set or empty value of Specific Character Set (absence of (0008,0005) which mean usage of ASCII Chars only).

The product user interface will allow the user to enter characters from the console keyboard that are within ASCII. Responses with non-compatible values of (0008,0005) will be discarded.

2.8 CODES AND CONTROLLED TERMINOLOGY

The product uses no coded terminology.

2.9 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- 1.Firewall or router protections to ensure that only approved external hosts have network access to the product.
- 2.Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
- 3.Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

3. MEDIA STORAGE CONFORMANCE STATEMENT

3.1 INTRODUCTION

This section of the DICOM conformance statement specifies the Brivo OEC 850 compliance to DICOM requirements for **Media Interchange**. It details the DICOM Media Storage Application Profiles and roles, which are supported by this product.

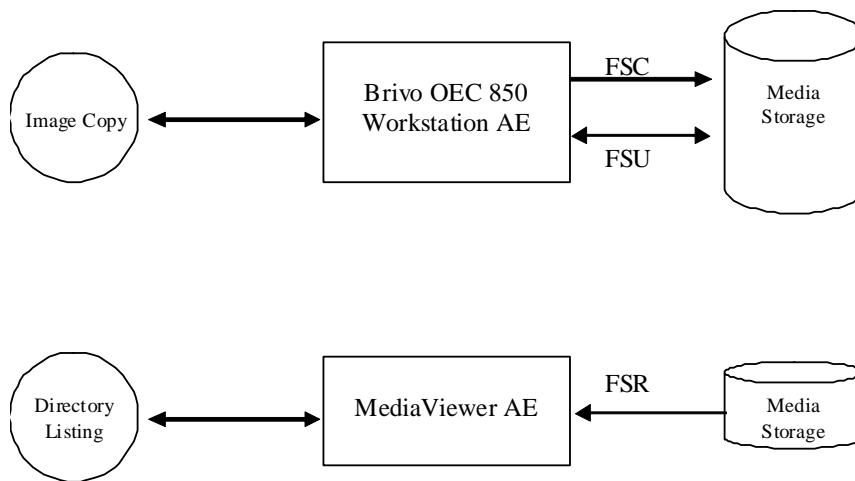
The Brivo OEC 850 is able to export images to DICOM media.

3.2 IMPLEMENTATION MODEL

3.2.1 Application Data Flow Diagram

The media interchange application model for the Brivo OEC 850 is shown in the following Illustration:

ILLUSTRATION 3-1
BRIVO OEC 850 MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM



The Brivo OEC 850 supports the General Purpose CD-R interchange profiles.

3.2.2 Functional Definition of AE's

The Brivo OEC 850 Workstation AE can perform these functions:

- Create a new DICOM File-Set on Media
- Update a DICOM File-Set by adding new SOP instance to the CD which supports multi-session.

The Media Viewer AE can perform this function:

- Reads a DICOM File-Set from media and reviews images.

3.2.3 Sequencing of Real-World Activities

Image Copy – Images are acquired and archived on Brivo OEC 850; From the Image Directory screen, images can be selected and copied to media; Images can be viewed by any DICOM application that supports Media Exchange FSR.

Directory Listing – During the Image Copy, user could choice copying image with a Media Viewer, then the images will be copied with a Media Viewer instance; Images can be viewed by this media viewer only on Windows OS (Independent of the Brivo 850 Workstation AE).

3.2.4 File Meta Information (See PS3.10)

The File Meta-Information for this implementation is :

File Meta-Information Version	1
Brivo OEC 850 Implementation UID	1.2.840.113619.6.288
Implementation Version Name	BRIVO_OEC850_100

For image instance implementation:

Attribute Name	Tag	Type	Attribute Description
Media Storage SOP Class UID	(0002,0002)	1	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
Media Storage SOP Instance UID	(0002,0003)	1	UID for XA image instance

For Media Storage Directory instance implementation:

Attribute Name	Tag	Type	Attribute Description
Media Storage SOP Class UID	(0002,0002)	1	1.2.840.10008.1.3.10 (Media Storage Directory Storage)
Media Storage SOP Instance UID	(0002,0003)	1	UID for Media Storage Directory Storage instance, SOP Instance UID in the File Meta Information (header of the DICOMDIR File) contains the File-set UID Value

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3.3 AE SPECIFICATIONS

3.3.1 Brivo OEC 850 AE Specification

The Brivo OEC 850 Application Entity provides standard conformance to DICOM Interchange of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role
STD-GEN-CD	Image Copy	FSC, FSU

3.3.1.1 File Meta Information for the Brivo OEC 850 Application Entity

Following are the values set in the File Meta Information for this AE Title :

Source Application Entity Title	Not used
Brivo OEC 850 Implementation UID	1.2.840.113619.6.288
Implementation Version Name	BRIVO_OEC850_100

3.3.1.2 Real-World Activities for the Brivo OEC 850 Application Entity

3.3.1.2.1 Real-World Activity Image Copy

The Brivo OEC 850 AE acts as a FSC/FSU when requested to copy SOP instance from local database to the interchange media.

When user selects “Image Copy” function, the selected images should be saved as DICOM SOP instances and copied to media. The DICOM File set on the media should be created or updated accordingly.

3.3.1.2.1.1 Media Storage Application Profile for the RWA Update File Set

For the list of Application Profiles that invoke this AE for the Real-World Activity Image Copy, see the Table in Section 3.3.1 “Brivo OEC 850 AE Specification ”where the table describing the Application Profiles and Real-World Activity is defined.

3.3.1.2.1.1.1 STD-GEN-CD Application Profile

Following are the SOP Classes supported by this AE. All SOP Instances use the Explicit VR Little Endian Uncompressed Transfer Syntax, UID 1.2.840.10008.1.2.1.

SOP Class	SOP Class UID
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1

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Common DICOMDIR Directory Records created by this AE will include key attributes as described in Section 6. Following are the Additional DICOMDIR Keys supported for this profile:

Key Attribute	Tag	Directory Record Type	Type	Notes
Image Type	(0008,0008)	IMAGE	1C	FSC/FSU: Present when the DICOMDIR file is created, and this value should be extracted from referenced image file.

3.3.2 Media Viewer AE Specification

The Media Viewer Application Entity provides standard conformance to DICOM Interchange of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role
STD-GEN-CD	Directory Listing	FSR

3.3.2.1 File Meta Information for the Media Viewer Application Entity

Following are the values set in the File Meta Information for this AE Title:

Source Application Entity Title	Not used
Media Viewer Implementation UID	Not used
Implementation Version Name	Not used

Since Media Viewer just used to read file-set and display image, so, above information could not be set by Media Viewer.

3.3.2.2 Real-World Activities for the Media Viewer Application Entity

3.3.2.2.1 Real-World Activity Directory Listing

The Media Viewer AE acts as a FSR when listing the directory information from interchange media.

When user load the media on Window OS, the Media Viewer will read the DICOM File-Set and display/list the DICOM directory entries for those instances in the File-Set on the media.

3.3.2.2.1.1 Media Storage Application Profile for the RWA Directory Listing

For the list of Application Profiles that invoke this AE for the Real-World Activity Directory Listing, see the Table in Section 3.3.2 “Media Viewer AE Specification” where the table describing the Application Profiles and Real-World Activity is defined.

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3.3.2.1.1.1 STD-GEN-CD Application Profile

Following are the SOP Classes supported by this AE and only the Explicit VR Little Endian Uncompressed Transfer Syntax (UID 1.2.840.10008.1.2.1) is supported.

SOP Class	SOP Class UID
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1

Common DICOMDIR Directory Records read by this AE will include key attributes as described in Section 6. Following are the Additional DICOMDIR Keys supported for this profile:

Key Attribute	Tag	Directory Record Type	Type	Notes
Image Type	(0008,0008)	IMAGE	1C	FSR: Used.

3.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

No augmented/private profile is implemented.

3.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

No Extensions / Specializations / Privatizations are implemented.

3.6 CONFIGURATION

Please refer to Section 2.6.

3.7 SUPPORT OF EXTENDED CHARACTER SETS

The Brivo OEC 850 supports extended character sets as specified in Section 2.7.

4. X-RAY ANGIOGRAPHIC INFORMATION OBJECT IMPLEMENTATION

4.1 INTRODUCTION

This section specifies the use of the DICOM X-Ray Angiographic Image IOD to represent the information included in X-Ray Angiographic Images produced by this implementation. Corresponding attributes are conveyed using the module construct.

4.2 BRIVO OEC 850 MAPPING OF DICOM ENTITIES

The Brivo OEC 850 maps DICOM Information Entities to local Information Entities in the product’s database and user interface.

TABLE 4-1
MAPPING OF DICOM ENTITIES TO BRIVO OEC 850 ENTITIES

DICOM IE	Brivo OEC 850 Entity
Patient	Patient
Study	Exam
Series	Series
Equipment	Equipment
Image	Image

4.3 IOD MODULE TABLE

The X-Ray Angiographic Image Information Object Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 4.5.

TABLE 4-2
X-RAY ANGIOGRAPHIC IMAGE IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.4.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.4.2.1
	Patient Study	Not Used	N/A
	Clinical Trial Study	Not Used	N/A
Series	General Series	Used	4.4.3.1
	Clinical Trial Series	Not Used	N/A
Frame of Reference	Synchronization	Not Used	N/A
Equipment	General Equipment	Used	4.4.4.1

Image	General Image	Used	4.4.5.1
	Image Pixel	Used	4.4.5.2
	Contrast/Bolus	Not Used	N/A
	Cine	Not Used	N/A
	Multi-Frame	Not Used	N/A
	Frame Pointers	Not Used	N/A
	Mask	Not Used	N/A
	Display Shutter	Not Used	N/A
	Device	Not Used	N/A
	Intervention	Not Used	N/A
	X-Ray Image	Used	4.4.5.3
	X-Ray Acquisition	Used	4.4.5.4
	X-Ray Collimator	Not Used	N/A
	X-Ray Table	Not Used	N/A
	XA Positioner	Used	4.4.5.5
	DX Detector	Not Used	N/A
	Overlay Plane	Not Used	N/A
	Multi-Frame Overlay	Not Used	N/A
	Modality LUT	Not Used	N/A
	VOI LUT	Used	4.4.5.6
SOP Common	Used	4.4.5.7	

4.4 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the X-Ray Angiographic Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported and/or expected. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance as well as what are the expected values when loading such instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

4.4.1 Patient Entity Modules

4.4.1.1 Patient Module

**TABLE 4-3
PATIENT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	May be entered from user interface or copied

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			from Worklist. Truncated to 64 bytes for First Name component and Last Name component, truncated to 1 byte for Middle Name component. Totally length of this value is 64 bytes, end truncated.
Patient ID	(0010,0020)	2	May be entered from user interface or copied from Worklist. Truncated to 64 bytes, end truncated
Issuer of Patient ID	(0010,0021)	3	Not Used
Patient's Birth Date	(0010,0030)	2	May be entered from user interface or copied from Worklist Truncated to 8 bytes, end truncated
Patient's Sex	(0010,0040)	2	May be entered from user interface or copied from Worklist. Truncated to 2 bytes, end truncated
Referenced Patient Sequence	(0008,1120)	3	Not Used
<i>>Include 'SOP Instance Reference Macro'</i>			
Patient's Birth Time	(0010,0032)	3	Not Used
Other Patient IDs	(0010,1000)	3	Not Used
Other Patient IDs Sequence	(0010,1002)	3	Not Used
>Patient ID	(0010,0020)	1	Not Used
>Issuer of Patient ID	(0010,0021)	1	Not Used
>Type of Patient ID	(0010,0022)	1	Not Used
Other Patient Names	(0010,1001)	3	Not Used
Ethnic Group	(0010,2160)	3	Not Used
Patient Comments	(0010,4000)	3	May be entered from user interface or taken from Worklist Truncated to 512, end truncated
Patient Species Description	(0010,2201)	1C	Not Used
Patient Species Code Sequence	(0010,2202)	1C	Not Used
<i>>Include 'Code Sequence Macro'</i>			
Patient Breed Description	(0010,2292)	2C	Not Used
Patient Breed Code Sequence	(0010,2293)	2C	Not Used
<i>>Include 'Code Sequence Macro'</i>			
Breed Registration Sequence	(0010,2294)	2C	Not Used
>Breed Registration Number	(0010,2295)	1	Not Used
>Breed Registry Code Sequence	(0010,2296)	1	Not Used
<i>>>Include 'Code Sequence Macro'</i>			
Responsible Person	(0010,2297)	2C	Not Used
Responsible Person Role	(0010,2298)	1C	Not Used
Responsible Organization	(0010,2299)	2C	Not Used

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Patient Identity Removed	(0012,0062)	3	Not Used
De-identification Method	(0012,0063)	1C	Not Used
De-identification Method Code Sequence	(0012,0064)	1C	Not Used
>Include 'Code Sequence Macro'			

4.4.2 Study Entity Modules

4.4.2.1 General Study Module

**TABLE 4-4
GENERAL STUDY MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	The product will adopt the Study Instance UID which is returned in the MWL response. If there is no Study Instance UID returned from MWL server, then new Study Instance UID will be created
Study Date	(0008,0020)	2	This value is set to the study started date
Study Time	(0008,0030)	2	This value is set to the study started time
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician
Referring Physician Identification Sequence	(0008,0096)	3	Not Used
>Include 'Person Identification Macro'			
Study ID	(0020,0010)	2	Generated by equipment
Accession Number	(0008,0050)	2	Taken from the Worklist, or the user can enter from the user interface.
Study Description	(0008,1030)	3	Taken from the Worklist, or the user can enter from the user interface
Physician(s) of Record	(0008,1048)	3	Not Used
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Used
>Include 'Person Identification Macro'			
Name of Physician(s) Reading Study	(0008,1060)	3	Not Used
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Used
>Include 'Person Identification Macro'			
Referenced Study Sequence	(0008,1110)	3	Not Used
>Include 'SOP Instance Reference Macro'			
Procedure Code Sequence	(0008,1032)	3	Not Used
>Include 'Code Sequence Macro'			

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4.4.3 Series Entity Modules

4.4.3.1 General Series Module

**TABLE 4-5
 GENERAL SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	This value could be set to RF or XA. The proper SOP class will be created based on XA Image IOD.
Series Instance UID	(0020,000E)	1	This ID is uniquely generated by the equipment.
Series Number	(0020,0011)	2	A number that identifies this Series.
Laterality	(0020,0060)	2C	Not Used
Series Date	(0008,0021)	3	This value is set to the series started date
Series Time	(0008,0031)	3	This value is set to the series started time
Performing Physicians' Name	(0008,1050)	3	Taken from the Worklist scheduled performing physician, or the user can enter from the user interface. The user is free to modify this field.
Performing Physician Identification Sequence	(0008,1052)	3	Not Used
<i>>Include 'Person Identification Macro'</i>			
Protocol Name	(0018,1030)	3	Not Used
Series Description	(0008,103E)	3	Not Used
Operators' Name	(0008,1070)	3	Not Used
Operator Identification Sequence	(0008,1072)	3	Not Used
<i>>Include 'Person Identification Macro'</i>			
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Used
<i>>Include 'SOP Instance Reference Macro'</i>			
Related Series Sequence	(0008,1250)	3	Not Used
<i>>Study Instance UID</i>	(0020,000D)	1	Not Used
<i>>Series Instance UID</i>	(0020,000E)	1	Not Used
<i>>Purpose of Reference Code Sequence</i>	(0040,A170)	2	Not Used
<i>>>Include 'Code Sequence Macro'</i>			
Body Part Examined	(0018,0015)	3	Not Used
Patient Position	(0018,5100)	2C	Not Used
Smallest Pixel Value in Series	(0028,0108)	3	Not Used
Largest Pixel Value in Series	(0028,0109)	3	Not Used
Request Attributes Sequence	(0040,0275)	3	Not Used
<i>>Requested Procedure ID</i>	(0040,1001)	1C	Not Used
<i>>Accession Number</i>	(0008,0050)	3	Not Used
<i>>Study Instance UID</i>	(0020,000D)	3	Not Used
<i>>Referenced Study Sequence</i>	(0008,1110)	3	Not Used

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>> Include 'SOP Instance Reference Macro'			
>Requested Procedure Description	(0032,1060)	3	Not Used
>Requested Procedure Code Sequence	(0032,1064)	3	Not Used
>>Include 'Code Sequence Macro'			
Reason for the Requested Procedure	(0040,1002)	3	Not Used
Reason for Requested Procedure Code Sequence	(0040,100A)	3	Not Used
>>Include 'Code Sequence Macro'			
>Scheduled Procedure Step ID	(0040,0009)	1C	Not Used
>Scheduled Procedure Step Description	(0040,0007)	3	Not Used
>Scheduled Protocol Code Sequence	(0040,0008)	3	Not Used
>>Include 'Code Sequence Macro'			
>>Protocol Context Sequence	(0040,0440)	3	Not Used
>>>Include 'Content Item Macro'			
>>>Content Item Modifier Sequence	(0040,0441)	3	Not Used
>>>>Include 'Content Item Macro'			
Performed Procedure Step ID	(0040,0253)	3	Not Used
Performed Procedure Step Start Date	(0040,0244)	3	Not Used
Performed Procedure Step Start Time	(0040,0245)	3	Not Used
Performed Procedure Step Description	(0040,0254)	3	Not Used
Performed Protocol Code Sequence	(0040,0260)	3	Not Used
>Include 'Code Sequence Macro'			
>>Protocol Context Sequence	(0040,0440)	3	Not Used
>>>Include 'Content Item Macro'			
>>>Content Item Modifier Sequence	(0040,0441)	3	Not Used
>>>>Include 'Content Item Macro'			
Comments on the Performed Procedure Step	(0040,0280)	3	Not Used

4.4.4 Equipment Entity Modules

4.4.4.1 General Equipment Module

TABLE 4-6
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	This value is set to "GE MEDICAL SYSTEMS".
Institution Name	(0008,0080)	3	Configurable by user on setup screen (The field name is "Hospital Name").
Institution Address	(0008,0081)	3	Not Used

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Station Name	(0008,1010)	3	Configurable by user on DICOM setup screen
Institutional Department Name	(0008,1040)	3	Not Used
Manufacturer's Model Name	(0008,1090)	3	This value is set to type and model of the system: "Brivo OEC 850".
Device Serial Number	(0018,1000)	3	This value is set to serial number of the system, this number is fixed when build the system..
Software Versions	(0018,1020)	3	This value is set to workstation software version.
Gantry ID	(0018,1008)	3	Not Used
Spatial Resolution	(0018,1050)	3	Not Used
Date of Last Calibration	(0018,1200)	3	Not Used
Time of Last Calibration	(0018,1201)	3	Not Used
Pixel Padding Value	(0028,0120)	1C	Not Used

4.4.5 Image Entity Modules

4.4.5.1 General Image Module

**TABLE 4-7
GENERAL IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	This value is set to image number
Patient Orientation	(0020,0020)	2C	Currently, this value is set to empty.
Content Date	(0008,0023)	2C	This value is set to the date image was taken.
Content Time	(0008,0033)	2C	This value is set to the time image was taken.
Image Type	(0008,0008)	3	This value is set to "ORIGINAL\PRIMARY\SINGLE PLANE".
Acquisition Number	(0020,0012)	3	Not Used
Acquisition Date	(0008,0022)	3	Not Used
Acquisition Time	(0008,0032)	3	Not Used
Acquisition DateTime	(0008,002A)	3	Not Used
Referenced Image Sequence	(0008,1140)	3	Not Used
<i>>Include 'SOP Instance Reference Macro'</i>			
>Purpose of Reference Code Sequence	(0040,A170)	3	Not Used
<i>>>Include 'Code Sequence Macro'</i>			
Derivation Description	(0008,2111)	3	Not Used
Derivation Code Sequence	(0008,9215)	3	Not Used
<i>>Include 'Code Sequence Macro'</i>			
Source Image Sequence	(0008,2112)	3	Not Used
<i>>Include 'SOP Instance Reference Macro'</i>			
>Purpose of Reference Code Sequence	(0040,A170)	3	Not Used

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>>Include 'Code Sequence Macro'			
>Spatial Locations Preserved	(0028,135A)	3	Not Used
>Patient Orientation	(0020,0020)	1C	Not Used
Referenced Instance Sequence	(0008,114A)	3	Not Used
>Include 'SOP Instance Reference Macro'			
>Purpose of Reference Code Sequence	(0040,A170)	1	Not Used
>>Include 'Code Sequence Macro'			
Images in Acquisition	(0020,1002)	3	Not Used
Image Comments	(0020,4000)	3	Not Used
Quality Control Image	(0028,0300)	3	Not Used
Burned In Annotation	(0028,0301)	3	Not Used
Lossy Image Compression	(0028,2110)	3	Not Used
Lossy Image Compression Ratio	(0028,2112)	3	Not Used
Lossy Image Compression Method	(0028,2114)	3	Not Used
Icon Image Sequence	(0088,0200)	3	Not Used
>Include 'Image Pixel Macro'		Not Used	
Presentation LUT Shape	(2050,0020)	3	Not Used

4.4.5.2 Image Pixel Module

TABLE 4-8
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	The value is set to 1.
Photometric Interpretation	(0028,0004)	1	The value is set to "MONOCHROME2".
Rows	(0028,0010)	1	This image resolution is 1000
Columns	(0028,0011)	1	This image resolution is 1000
Bits Allocated	(0028,0100)	1	This value is set to 8
Bits Stored	(0028,0101)	1	This value is set to 8
High Bit	(0028,0102)	1	This value is set to 7
Pixel Representation	(0028,0103)	1	This value is set to 0 for unsigned integer.
Pixel Data	(7FE0,0010)	1	Pixel data of the image.
Planar Configuration	(0028,0006)	1C	Not Used
Pixel Aspect Ratio	(0028,0034)	1C	Not Used
Smallest Image Pixel Value	(0028,0106)	3	Not Used
Largest Image Pixel Value	(0028,0107)	3	Not Used
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Used
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Used

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Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Used
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Used
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Used
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Used
ICC Profile	(0028,2000)	3	Not Used
Pixel Data Provider URL	(0028,7FE0)	1C	Not Used
Pixel Padding Range Limit	(0028,0121)	1C	Not Used

4.4.5.3 X-Ray Image Module

TABLE 4-9
X-RAY IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1C	Not Used
Lossy Image Compression	(0028,2110)	1C	Not Used
Image Type	(0008,0008)	1	ORIGINAL\PRIMARY\SINGLE PLANE
Pixel Intensity Relationship	(0028,1040)	1	DISP
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028, 0103)	1	0
Scan Options	(0018,0022)	3	Not Used
Anatomic Region Sequence	(0008,2218)	3	Not Used
> Include 'Code Sequence Macro'			Not Used
>Anatomic Region Modifier Sequence	(0008,2220)	3	Not Used
>> Include 'Code Sequence Macro'			Not Used
Primary Anatomic Structure Sequence	(0008,2228)	3	Not Used
> Include 'Code Sequence Macro'			Not Used
>Primary Anatomic Structure Modifier Sequence	(0008,2230)	3	Not Used
>> Include 'Code Sequence Macro'			Not Used
R Wave Pointer	(0028,6040)	3	Not Used
Reference Image Sequence	(0008,1140)	1C	Not Used
>Referenced SOP Class UID	(0008,1150)	1	Not Used
>Referenced SOP Class UID	(0008,1155)	1	Not Used
>Referenced Frame Number	(0008,1160)	1C	Not Used

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>Referenced Segment Number	(0062,000B)	1C	Not Used
>Purpose of Reference Code Sequence	(0040,A170)	3	Not Used
>> <i>Include 'Code Sequence Macro'</i>			Not Used
Derivation Description	(0008,2111)	3	Not Used
Acquisition Device Processing Description	(0018,1400)	3	Not Used
Frame Label Vector	(0018,2002)	3	Not Used
Frame Dimension Pointer	(0028,000A)	3	Not Used
Calibration Image	(0050,0004)	3	Not Used

4.4.5.3.1 Image Type

The following values should be always sent

Value 1 shall have the following Enumerated Values:

- ORIGINAL identifies an Original Image

Value 2 shall have the following Enumerated Value:

- PRIMARY identifies a Primary Image

Specify which Enumerated Values of Value 3 are created/supported:

- SINGLE PLANE

4.4.5.4 X-Ray Acquisition Module

**TABLE 4-10
X-RAY ACQUISITION MODULE**

Attribute Name	Tag	Type	Attribute Description
KV	(0018,0060)	2	KVp of the shot.
Radiation Setting	(0018,1155)	1	Identify the general level of X-Ray dose exposure: SC = low dose exposure using fluoroscopic. GR = high dose for diagnostic quality image acquisition (digital spot or cine)
X-Ray Tube Current	(0018,1151)	2C	mA of the shot.
X-Ray Tube Current in microA	(0018,8151)	3	Not Used
Exposure Time	(0018,1150)	2C	mSec of the shot.
Exposure Time in microS	(0018,8150)	3	Not Used
Exposure	(0018,1152)	2C	Not Used
Exposure in microAs	(0018,1153)	3	Not Used
Grid	(0018,1166)	3	IN
Average Pulse Width	(0018,1154)	3	Not Used
Radiation Mode	(0018,115A)	3	Not Used
Type of Filters	(0018,1161)	3	Not Used
Intensifier Size	(0018,1162)	3	Not Used
Field of View Shape	(0018,1147)	3	Not Used

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Field of View Dimension(s)	(0018,1149)	3	Not Used
Imager Pixel Spacing	(0018,1164)	3	Not Used
Pixel Spacing	(0028,0030)	1C	Not Used
Pixel Spacing Calibration Type	(0028,0A02)	3	Not Used
Pixel Spacing Calibration Description	(0028,0A04)	1C	Not Used
Focal Spot	(0018,1190)	3	Not Used
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	Not Used

4.4.5.5 XA Positioner Module

**TABLE 4-11
XA POSITIONER MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Distance Source to Patient	(0018,1111)	3	Not Used
Distance Source to Detector	(0018,1110)	3	1000 mm
Estimated Radiographic Magnification Factor	(0018,1114)	3	Not Used
Positioner Motion	(0018,1500)	2C	Not Used
Positioner Primary Angle	(0018,1510)	2	Send with empty.
Positioner Secondary Angle	(0018,1511)	2	Send with empty.
Positioner Primary Angle Increment	(0018,1520)	2C	Not Used
Positioner Secondary Angle Increment	(0018,1521)	2C	Not Used
Detector Primary Angle	(0018,1530)	3	Not Used
Detector Secondary Angle	(0018,1531)	3	Not Used

4.4.5.6 VOI LUT Module

**TABLE 4-12
VOI LUT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	1C	Not Used
>LUT Descriptor	(0028,3002)	1	Not Used
>LUT Explanation	(0028,3003)	3	Not Used
>LUT Data	(0028,3006)	1	Not Used
Window Center	(0028,1050)	1C	Only one value is present. Set to 128 when export to DICOM images

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Window Width	(0028,1051)	1C	Only one value is present. Set to 255 when export to DICOM images
Window Center & Width Explanation	(0028,1055)	3	Not Used

4.4.5.7 SOP Common Module

**TABLE 4-13
SOP COMMON MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	SOP Class UID for the Class that the dataset contains, just XA UID
SOP Instance UID	(0008,0018)	1	Created by equipment, using GEMS Brivo OEC 850 prefix 1.2.840.113619.2.288.
Specific Character Set	(0008,0005)	1C	Always set to ISO_IR 100(= Latin Alphabet No. 1)
Instance Creation Date	(0008,0012)	3	The date image instance is created
Instance Creation Time	(0008,0013)	3	The time image instance is created
Instance Creator UID	(0008,0014)	3	Not Used
Related General SOP Class UID	(0008,001A)	3	Not Used
Original Specialized SOP Class UID	(0008,001B)	3	Not Used
Coding Scheme Identification Sequence	(0008,0110)	3	Not Used
>Coding Scheme Designator	(0008,0102)	1	Not Used
>Coding Scheme Registry	(0008,0112)	1C	Not Used
>Coding Scheme UID	(0008,010C)	1C	Not Used
>Coding Scheme External ID	(0008,0114)	2C	Not Used
>Coding Scheme Name	(0008,0115)	3	Not Used
>Coding Scheme Version	(0008,0103)	3	Not Used
>Coding Scheme Responsible Organization	(0008,0116)	3	Not Used
Timezone Offset From UTC	(0008,0201)	3	Not Used
Contributing Equipment Sequence	(0018,A001)	3	Not Used
>Purpose of Reference Code Sequence	(0040,A170)	1	Not Used
>>Include 'Code Sequence Macro'		Not Used	
>Manufacturer	(0008,0070)	1	Not Used
>Institution Name	(0008,0080)	3	Not Used
>Institution Address	(0008,0081)	3	Not Used
>Station Name	(0008,1010)	3	Not Used
>Institutional Department Name	(0008,1040)	3	Not Used
>Manufacturer's Model Name	(0008,1090)	3	Not Used

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>Device Serial Number	(0018,1000)	3	Not Used
>Software Versions	(0018,1020)	3	Not Used
>Spatial Resolution	(0018,1050)	3	Not Used
>Date of Last Calibration	(0018,1200)	3	Not Used
>Time of Last Calibration	(0018,1201)	3	Not Used
>Contribution DateTime	(0018,A002)	3	Not Used
>Contribution Description	(0018,A003)	3	Not Used
Instance Number	(0020,0013)	3	Set to image number
SOP Instance Status	(0100,0410)	3	Not Used
SOP Authorization Date and Time	(0100,0420)	3	Not Used
SOP Authorization Comment	(0100,0424)	3	Not Used
Authorization Equipment Certification Number	(0100,0426)	3	Not Used
MAC Parameters Sequence	(4FFE,0001)	3	Not Used
>MAC ID Number	(0400,0005)	1	Not Used
>MAC Calculation Transfer Syntax UID	(0400,0010)	1	Not Used
>MAC Algorithm	(0400,0015)	1	Not Used
>Data Elements Signed	(0400,0020)	1	Not Used
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Used
>MAC ID Number	(0400,0005)	1	Not Used
>Digital Signature UID	(0400,0100)	1	Not Used
>Digital Signature DateTime	(0400,0105)	1	Not Used
>Certificate Type	(0400,0110)	1	Not Used
>Certificate of Signer	(0400,0115)	1	Not Used
>Signature	(0400,0120)	1	Not Used
>Certified Timestamp Type	(0400,0305)	1C	Not Used
>Certified Timestamp	(0400,0310)	3	Not Used
>Digital Signature Purpose Code Sequence	(0400,0401)	3	Not Used
>>Include 'Code Sequence Macro'		Not Used	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Used
>Encrypted Content Transfer Syntax UID	(0400,0510)	1	Not Used
>Encrypted Content	(0400,0520)	1	Not Used
Original Attributes Sequence	(0400,0561)	3	Not Used
>Source of Previous Values	(0400,0564)	2	Not Used
>Attribute Modification DateTime	(0400,0562)	1	Not Used
>Modifying System	(0400,0563)	1	Not Used
>Reason for the Attribute Modification	(0400,0565)	1	Not Used

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>Modified Attributes Sequence	(0400,0550)	1	Not Used
>>Any Attribute from the main data set that was modified or removed; may include Sequence Attributes and their Items.			
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Used
>Referenced SOP Class UID	(0008,1150)	1	Not Used
>Referenced SOP Instance UID	(0008,1155)	1	Not Used
>HL7 Instance Identifier	(0040,E001)	1	Not Used
>Retrieve URI	(0040,E010)	3	Not Used

4.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Not applicable

4.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

Not applicable

5. MODALITY WORKLIST QUERY IMPLEMENTATION

5.1 INTRODUCTION

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed.

5.2 BRIVO OEC 850 MAPPING OF DICOM ENTITIES

The Brivo OEC 850 maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 5-1
MAPPING OF DICOM ENTITIES TO BRIVO OEC 850 ENTITIES

DICOM	Brivo OEC 850 Entity
Scheduled Procedure Step	Exam
Requested Procedure	Exam
Imaging Service Request	Exam
Visit	Not Applicable
Patient	Patient

5.3 WORKLIST QUERY MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

**TABLE 5-2
MODALITY WORKLIST INFORMATION MODEL MODULES**

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	5.4.1.1
	Scheduled Procedure Step	5.4.1.2
Requested Procedure	Requested Procedure	5.4.2.1
Imaging Service Request	Imaging Service Request	5.4.3.1
Visit	Visit Identification	5.4.4.1
	Visit Status	5.4.4.2
	Visit Relationship	5.4.4.3
	Visit Admission	5.4.4.4
Patient	Patient Relationship	5.4.5.1
	Patient Identification	5.4.5.2
	Patient Demographic	5.4.5.3
	Patient Medical	5.4.5.4

5.4 WORKLIST QUERY MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the query key attributes contained within the Modality Worklist Information Model.

5.4.1 Common Scheduled Procedure Step Entity Modules

5.4.1.1 SOP Common Module

**TABLE 5-3
SOP COMMON MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Specific Character Set	(0008,0005)	O	1C	Yes	See Section 5.4.1.1.1 below

5.4.1.1.1 Specific Character Set

The attribute Specific Character Set (0008,0005) will always be sent.

As a Query SCU, it will similarly accept response items with ISO_IR 100 values of Specific Character Set or empty value of Specific Character Set (absence of (0008,0005) which mean usage of ASCII Chars only).

The product user interface will allow the user to enter characters from the console keyboard that are within ASCII characters.

Please also refer to Section 2.7.

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5.4.1.2 Scheduled Procedure Step Module

TABLE 5-4
 SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Instance	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
>Scheduled Station AE Title	(0040,0001)	R	1	No	In the request, but not used or set for matching.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1*	No	Using the date configured from the DICOM query filter screen, the following matching can be done: YYYY- year, MM- month, DD- day. Range matching can also be done YYYYMMDD-YYYYMMDD - all matches included between those dates. The “dash” is important -YYYYMMDD - all matches prior to and including this date. The beginning “dash” is important. YYYYMMDD- all matches after and including this date. The ending “dash” is important. Single matching where the dates entered are equal The data entered on the user interface is passed to the Server as entered; if it does not work see the Server DICOM conformance statement.
>Scheduled Procedure Step Start Time	(0040,0003)	R	1	No	Using the time configured from the DICOM query filter screen, the following matching can be done: HH – Hour 00-23, MM – minute 00-59, SS – second 00-59. Single matching where the date entered is HHMMSS – Matching only this time The data entered on the user interface is passed to the Server as entered; if it does not work see the Server DICOM conformance statement.
>Modality	(0008,0060)	R	1*	No	Matching is supported and is configured by the user interface. This value could be set to “RF”, “XA” or “ALL”. “ALL” means any modality. Note: Send the field as empty to request universal matching when "ALL" is selected from the UI.
>Scheduled Performing Physician's Name	(0040,0006)	R	2*	Yes	Matching is performed here. The data entered on the user interface is passed to the server as it is. Truncated to 64 bytes, end truncated.

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>Scheduled Procedure Step Description	(0040,0007)	O	1C	No	In the request, but not used or set for matching.
>Scheduled Station Name	(0040,0010)	O	2	No	In the request, but not used or set for matching.
>Scheduled Procedure Step Location	(0040,0011)	O	2	No	In the request, but not used or set for matching.
>Scheduled Procedure Step ID	(0040,0009)	O	1	No	In the request, but not used or set for matching.
>Pre-Medication	(0040,0012)	O	2C	No	In the request, but not used or set for matching.
>Comments on the Scheduled Procedure Step	(0040,0400)	O	3	No	In the request, but not used or set for matching.
>Requested Contrast Agent	(0032,1070)	O	2C	No	In the request, but not used or set for matching.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.1.2.1 Scheduled Station AE Title

Always empty in the request, and not used or set for matching..

5.4.2 Common Requested Procedure Entity Modules

5.4.2.1 Requested Procedure Module

**TABLE 5-5
REQUESTED PROCEDURE MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Requested Procedure ID	(0040,1001)	O	1	No	In the request, but not used or set for matching.
Requested Procedure Description	(0032,1060)	O	1C *	Yes	Not populated for matching. Return value is mapped into the "Study Description" field of the Exam. Truncated to 64 bytes, end truncated
Study Instance UID	(0020,000D)	O	1	Yes	See Study Instance UID section below.
Requested Procedure Priority	(0040,1003)	O	2	No	In the request, but not used or set for matching.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

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5.4.2.1.1 Study Instance UID

The product will adopt the Study Instance UID which is returned in the MWL response. If there is no Study Instance UID returned from MWL server, then new Study Instance UID will be created.

5.4.3 Common Imaging Service Request Entity Modules

5.4.3.1 Imaging Service Request Module

**TABLE 5-6
 IMAGING SERVICE REQUEST MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Accession Number	(0008,0050)	O	2 *	Yes	The value is for matching from the Worklist query filter screen. Truncated to 16 bytes, end truncated
Requesting Physician	(0032,1032)	O	2	No	In the request, but not used or set for matching. Truncated to 64 bytes, end truncated

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.4 Common visit Entity Modules

Not applicable

5.4.4.1 Visit Identification

Not applicable

5.4.4.2 Visit Status

Not applicable

5.4.4.3 Visit Relationship

Not applicable

5.4.4.4 Visit Admission

Not applicable

5.4.5 Common Patient Entity Modules

5.4.5.1 Patient Relationship

Not applicable

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5.4.5.2 Patient Identification

TABLE 5-7
PATIENT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patient's Name	(0010,0010)	R	1 *	Yes	Matching is performed. Truncated to 64 bytes, end truncated
Patient ID	(0010,0020)	R	1 *	Yes	Matching is performed. Truncated to 64 bytes, end truncated

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.5.3 Patient Demographic

TABLE 5-8
PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patients Birth Date	(0010,0030)	O	2 *	Yes	Matching is performed. In the context of a Query with range matching (see PS3.4), the length is 18 bytes maximum. Truncated to 8 bytes, end truncated
Patient's Sex	(0010,0040)	O	2 *	Yes	No Matching is performed. Truncated to 2 bytes, end truncated
Patient Comments	(0010,4000)	O	3*	Yes	No Matching is performed, Truncated to 512 bytes, end truncated

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.5.4 Patient Medical

TABLE 5-9
PATIENT MEDICAL MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Medical Alerts	(0010,2000)	O	2	No	In the request, but not used or set for matching.
Contrast Allergies	(0010,2110)	O	2	No	In the request, but not used or set for matching.

6. BASIC DIRECTORY INFORMATION OBJECT IMPLEMENTATION

6.1 IOD MODULE TABLE

Table 6-1 identifies the defined modules within the entities which comprise the Basic Directory IOD. Modules are identified by Module Name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

TABLE 6-1
BASIC DIRECTORY IOD MODULES

Entity Name	Module Name	Reference
File Set Identification	File Set Identification	6.2.1
Directory Information	Directory Information	6.2.2

The FSC of this implementation creates a Directory Information Module for new media and creates XA IOD..

6.2 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the Basic Directory Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

6.2.1 File Set identification Module

TABLE 6-2
FILE-SET IDENTIFICATION MODULE

Attribute Name	Tag	Type	Attribute Description
File-set ID	(0004,1130)	2	EVR_DICOM
File-set Descriptor File ID	(0004,1141)	3	Not Used
Specific Character Set of File-set Descriptor File	(0004,1142)	1C	Not Used

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6.2.2 Directory Information Module

TABLE 6-3
 DIRECTORY INFORMATION MODULE

Attribute Name	Tag	Type	Attribute Description
Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	1	The number of bytes from the beginning of the file to the first byte of the first Directory Record. When the Root Directory entity contains no directory record, this offset is set to 00000000H
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	The number of bytes from the beginning of the file to the first byte of the last Directory Record. When the Root Directory entity contains no directory record, this offset is set to 00000000H
File-set Consistency Flag	(0004,1212)	1	FSC writes 0000H: no known inconsistencies.
Directory Record Sequence	(0004,1220)	2	FSC creates items in this sequence (Directory Records).
>Offset of the Next Directory Record	(0004,1400)	1C	
>Record In-use Flag	(0004,1410)	1C	Set the value to 0xFFFF for record is in use
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
>Directory Record Type	(0004,1430)	1C	Enumerated Values are created by an FSC/FSU: PATIENT STUDY SERIES IMAGE
>Private Record UID	(0004,1432)	1C	Not Used
>Referenced File ID	(0004,1500)	1C	Present only when record type is IMAGE. Contains relative path to the file with the image.
>Referenced SOP Class UID in File	(0004,1510)	1C	Present only when record type is IMAGE. Unique ID for the SOP Class of the Instance stored in the referenced File.
>Referenced SOP Instance UID in File	(0004,1511)	1C	Present only when record type is IMAGE. Unique Identifier for the SOP Instance stored in the referenced file.
>Referenced Transfer Syntax UID in File	(0004,1512)	1C	Present only when record type is IMAGE. Unique Identifier for the Transfer Syntax used to encode the Instance stored in the referenced file.
> Referenced Related General SOP Class UID in File	(0004,151A)	1C	Not Used
>Record Selection Keys			See Section 6.2.3

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6.2.3 Definition of Specific Directory Records

6.2.3.1 Patient Directory Record Definition

**TABLE 6-4
PATIENT KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	ISO_IR 100
Patient's Name	(0010,0010)	2	FSC/FSU will fill this attribute with the value in the referenced composite object instance.
Patient ID	(0010,0020)	1	FSC/FSU will fill this attribute with the value in the referenced composite object instance. FSC/FSU will fill this mandatory attribute with a value "DCMTKPAT + 6 digits" if it is empty in the referenced composite object instance.

6.2.3.2 Study Directory Record Definition

**TABLE 6-5
STUDY KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	ISO_IR 100
Study Date	(0008,0020)	1	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. This value is mandatory for Brivo OEC 850, can't be empty.
Study Time	(0008,0030)	1	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. This value is mandatory for Brivo OEC 850, can't be empty.
Study Description	(0008,1030)	2	FSC/FSU will fill this attribute with the value in the referenced composite object instance.
Study Instance UID	(0020,000D)	1C	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. This value is mandatory for Brivo OEC 850, can't be empty.
Study ID	(0020,0010)	1	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. FSC/FSU will fill this mandatory attribute with a value "DCMTKSTUDY+ 6 digits" if it is empty in the referenced composite object instance.
Accession Number	(0008,0050)	2	FSC/FSU will fill this attribute using the value in the referenced composite object instance.

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6.2.3.3 Series Directory Record Definition

**TABLE 6-6
SERIES KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	ISO_IR 100
Modality	(0008,0060)	1	RF or XA, this will be consistent with Image Content
Series Instance UID	(0020,000E)	1	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. This value is mandatory for Brivo OEC 850, can't be empty.
Series Number	(0020,0011)	1	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance. FSC/FSU will fill this mandatory attribute with a value start from 1 (+1 for each series) if it is empty in the referenced composite object instance.
Icon Image Sequence	(0088,0200)	3	Not Used
>Include 'Image Pixel Macro'			

6.2.3.3.1 Icon Image Key Definition

Not applicable

6.2.3.4 Image Directory Record Definition

**TABLE 6-7
IMAGE KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	ISO_IR 100
Image Type	(0008,0008)	3	FSC/FSU will fill this mandatory attribute with the value in the referenced composite object instance.
Instance Number	(0020,0013)	1	FSC/FSU will fill this mandatory attribute with a value start from 1 (+1 for each series) if it is empty in the referenced composite object instance.
Icon Image Sequence	(0088,0200)	3	FSC/FSU will create Icon Images at the image level.
>Include 'Image Pixel'			See Section 6.2.3.4.1

- Note: Please also refer to Section 3.3.1.2.1.1.1 for information about Additional Keys sent in DICOMDIR.

6.2.3.4.1 Icon Image Key Definition

- The FSC creates the icon image sequence from the referenced composite object instance. The FSR displays image icons to the user without reading the actual image pixel from the media.

- Samples Per pixel (0028,0002) is set to 1
- Photometric Interpretations (0028,0004) is set to MONOCHROME2,
- Row (0028,0010) and Column (0028,0011) are set to 128,128.
- Bits Allocated (0028,0100) and Bits Stored (0028,0101) are created and set to 8
- High Bit (0028,0102) is created and set to 7.
- Pixel Representation (0028,0103) is created and set to 0.
- Pixel Data (7EF0,0010) is set with the 128x128 icon image data.

6.3 PRIVATE DATA DICTIONARY

Not applicable.

7. PRINT MANAGEMENT IMPLEMENTATION

7.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the Basic Grayscale Print Management Meta SOP Class, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

7.2 BASIC FILM SESSION SOP CLASS

7.2.1 Basic Film Session N-Create Attributes

This table lists the attributes that are sent in the Basic Film Session N-Create Request:

Attribute name	Tag	Use
Specific Character Set	(0008,0005)	Not Used
Number of Copies	(2000,0010)	Range of this value is 1-10, default is 1.
Print Priority	(2000,0020)	Enumerated Terms can be sent: HIGH or MED or LOW
Medium Type	(2000,0030)	Enumerated Terms can be sent: PAPER or CLEAR FILM or BLUE FILM
Film Destination	(2000,0040)	Enumerated Terms can be sent: MAGAZINE or PROCESSOR
Film Session Label	(2000,0050)	Set to "Brivo OEC 850"
Memory Allocation	(2000,0060)	Not Used
Owner ID	(2100,0160)	Set to "Brivo OEC 850"

7.2.2 Basic Film Session N-Delete

The N-DELETE is used to delete the complete Basic Film Session SOP Instance hierarchy. As a result, all references to Image SOP Instances within the film session are deleted.

7.3 BASIC FILM BOX SOP CLASS

7.3.1 Basic Film Box N-Create Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-Create Request, and that are received in the Basic Film Box N-Create Response from the SCP

Attribute Name	Tag	Use
Image Display Format	(2010,0010)	User configurable. Default is STANDARD\1,1. User values =:

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		STANDARD\1,1 STANDARD\1,2 STANDARD\2,1 STANDARD\2,2 STANDARD\2,3 STANDARD\3,3 STANDARD\3,4 STANDARD\4,4 STANDARD\4,5 STANDARD\5,4
Referenced Film Session Sequence	(2010,0500)	Used
>Referenced SOP Class UID	(0008,1150)	Set to 1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008,1155)	This value should be returned from SCP in N-CREATE-RSP Basic Film Session SOP Class; Then this value is sent to SCP in N-CREATE-RQ Basic Film Box SOP Class requesting for Basic Grayscale Image Box SOP Class Instance UID which contained in Referenced Image Box Sequence from SCP.
Referenced Image Box Sequence	(2010,0510)	Used
>Referenced SOP Class UID	(0008,1150)	Set to 1.2.840.10008.5.1.1.4
>Referenced SOP Instance UID	(0008,1155)	Received in the N-Create Response from SCP, this value should be sent to SCP in N-SET-RQ Basic Grayscale Image Box SOP Class
Referenced Basic Annotation Box Sequence	(2010,0520)	Not Used
>Referenced SOP Class UID	(0008,1150)	Not Used
>Referenced SOP Instance UID	(0008,1155)	Not Used
Film Orientation	(2010,0040)	Enumerated Terms can be sent: PORTRAIT or LANDSCAPE
Film Size ID	(2010,0050)	Enumerated Terms can be sent: 8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM
Magnification Type	(2010,0060)	Set to BILINEAR
Max Density	(2010,0130)	User configurable. The default is 300
Configuration Information	(2010,0150)	User configurable. This value specifies the DICOM printer parameters. It is defined in the DICOM Printer's Conformance Statement file.
Referenced Presentation LUT Sequence	(2050,0500)	Not Used
>Referenced SOP Class UID	(0008,1150)	Not Used

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>Referenced SOP Instance UID	(0008,1155)	Not Used
Annotation Display Format ID	(2010,0030)	Not Used
Smoothing Type	(2010,0080)	Not Used
Border Density	(2010,0100)	Enumerated Terms can be sent: BLACK or WHITE
Empty Image Density	(2010,0110)	Enumerated Terms can be sent: BLACK or WHITE
Min Density	(2010,0120)	User configurable. The default is 20
Trim	(2010,0140)	Set to NO
Illumination	(2010,015E)	Not Used
Reflected Ambient Light	(2010,0160)	Not Used
Requested Resolution ID	(2020,0050)	Not Used
ICC Profile	(0028,2000)	Not Used

7.3.2 Basic Film Box N-Action Attributes

Following are the Action Reply arguments that are supported if present in the N-Action response of the Basic Film Box SOP Class

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not Used
		>Referenced SOP Class UID	(0008,1150)	Not Used
		>Referenced SOP Instance UID	(0008,1155)	Not Used
		>Print Job ID	(2100,0010)	Not Used

7.3.3 Basic Film Box N-Delete

The N-DELETE is used to delete the last created Basic Film Box SOP Instance hierarchy. As a result all the information describing the last film is deleted.

7.4 BASIC GRAYSCALE IMAGE BOX SOP CLASS

7.4.1 Basic Grayscale Image Box Pixel N-Set Attributes

This table lists the attributes that are sent in the Basic Grayscale Image Box N-Set Request:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format (2010,0010), range of values sent is [1 ~ 20].

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Basic Grayscale Image Sequence	(2020,0110)	A sequence which provides the content of the grayscale image pixel data to be printed
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	1024
>Columns	(0028,0011)	1280
>Pixel Aspect Ratio	(0028,0034)	Not Used
>Bits Allocated	(0028,0100)	16
>Bits Stored	(0028,0101)	12
>High Bit	(0028,0102)	11
>Pixel Representation	(0028,0103)	0
>Pixel Data	(7FE0,0010)	Image Pixels
Polarity	(2020,0020)	Not Used
Magnification Type	(2010,0060)	Not Used
Smoothing Type	(2010,0080)	Not Used
Min Density	(2010,0120)	Not Used
Max Density	(2010,0130)	Not Used
Configuration Information	(2010,0150)	Not Used
Requested Image Size	(2020,0030)	Not Used
Requested Decimate/Crop Behavior	(2020,0040)	Not Used
Referenced Presentation LUT Sequence	(2050,0500)	Not Used
> Referenced SOP Class UID	(0008,1150)	Not Used
> Referenced SOP Instance UID	(0008,1155)	Not Used

7.5 PRINTER SOP CLASS

7.5.1 Printer N-Event-Report Attributes

The following table describes the product behavior when receiving a **N-Event-Report** request from the Printer SCP depending on the Event Type ID value.

If an N-EVENT-REPORT DIMSE service is received when the association is active, Print SCU handles the relevant states but the data received is ignored and send back "Success".

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Event Type Name	Event Type ID	Attribute	Tag	Use
Normal	1			Ignored
Warning	2	Printer Status Info	(2110,0020)	Ignored
		Film Destination	(2000,0040)	Ignored
		Printer Name	(2110,0030)	Ignored
Failure	3	Printer Status Info	(2110,0020)	Ignored
		Film Destination	(2000,0040)	Ignored
		Printer Name	(2110,0030)	Ignored

7.5.2 Printer N-Get Attributes

The Print SCU retrieves the Print SCP status by using the N-GET service of Printer SOP Class. But current implementation only handles the return values of N-GET request and N-GET response between Print SCU and Printer (the print session will be terminated if N-GET request or N-GET response is fail), all the following attributes are ignored by Print SCU.

Attribute Name	Tag	Use
Printer Status	(2110,0010)	Ignored
Printer Status Info	(2110,0020)	Ignored
Printer Name	(2110,0030)	Ignored
Manufacturer	(0008,0070)	Ignored
Manufacturer Model Name	(0008,1090)	Ignored
Device Serial Number	(0018,1000)	Ignored
Software Versions	(0018,1020)	Ignored
Date Of Last Calibration	(0018,1200)	Ignored
Time Of Last Calibration	(0018,1201)	Ignored