DICOM
CONFORMANCE STATEMENT
FOR
TOSHIBA SUPERCONDUCTING MRI SYSTEMS
FLEXART-series/VISART-series/SECOND CONSOLE
(MIIMR0001EA)

TOSHIBA CORPORATION

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1 Introduction

This document is a DICOM Conformance Statement for Toshiba′s Superconducting MRI Systems(FLEXART-series/VISART-series/SECOND CONSOLE). It is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details the DICOM Service Classes, Information Objects, and Communication Protocols which are supported by this product.

If the reader is unfamiliar with DICOM, it is recommended that they read the DICOM Specification(referenced below) prior to reading this conformance statement. Also note that this document is formatted according to the DICOM Specification, Part 2:Conformance.

1.1 References

- ACR-NEMA Digital Imaging and Communications in Medicine, DICOM V3.0.

1.2 Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.
- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.
- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.
- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.
- **Information Object Definition (IOD)** - An IOD is a data model which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.
- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.

- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.
- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.
- **SOP Instance** - A specific occurrence of a Information Object.
- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.
- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

1.3 Acronyms, Abbreviations and Symbols

- ACC American College of Cardiology
- ACR American College of Radiology
- ASCII American Standard Code for Information Interchange
- AE Application Entity
- ANSI American National Standards Institute
- CEN TC251 Comite Europeen de Normalisation - Technical Committee 251 - Medical Informatics
- DICOM Digital Imaging and Communications in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element - Composite
- DIMSE-N DICOM Message Service Element - Normalized
- HIS Hospital Information System
- HL7 Health Level 7
- IE Information Entity
- IOD Information Object Definition
- ISO International Standards Organization
- JIRA Japan Industries Association of Radiological Systems
- NEMA National Electrical Manufacturers Association
- OSI Open Systems Interconnection
- PDU Protocol Data Unit
- RIS Radiology Information System
- SCP Service Class Provider
- SCU Service Class User
- SOP Service-Object Pair
- TCP/IP Transmission Control Protocol/Internet Protocol
- UID Unique Identifier

2 Implementation Model

2.1 Application Data Flow Diagram

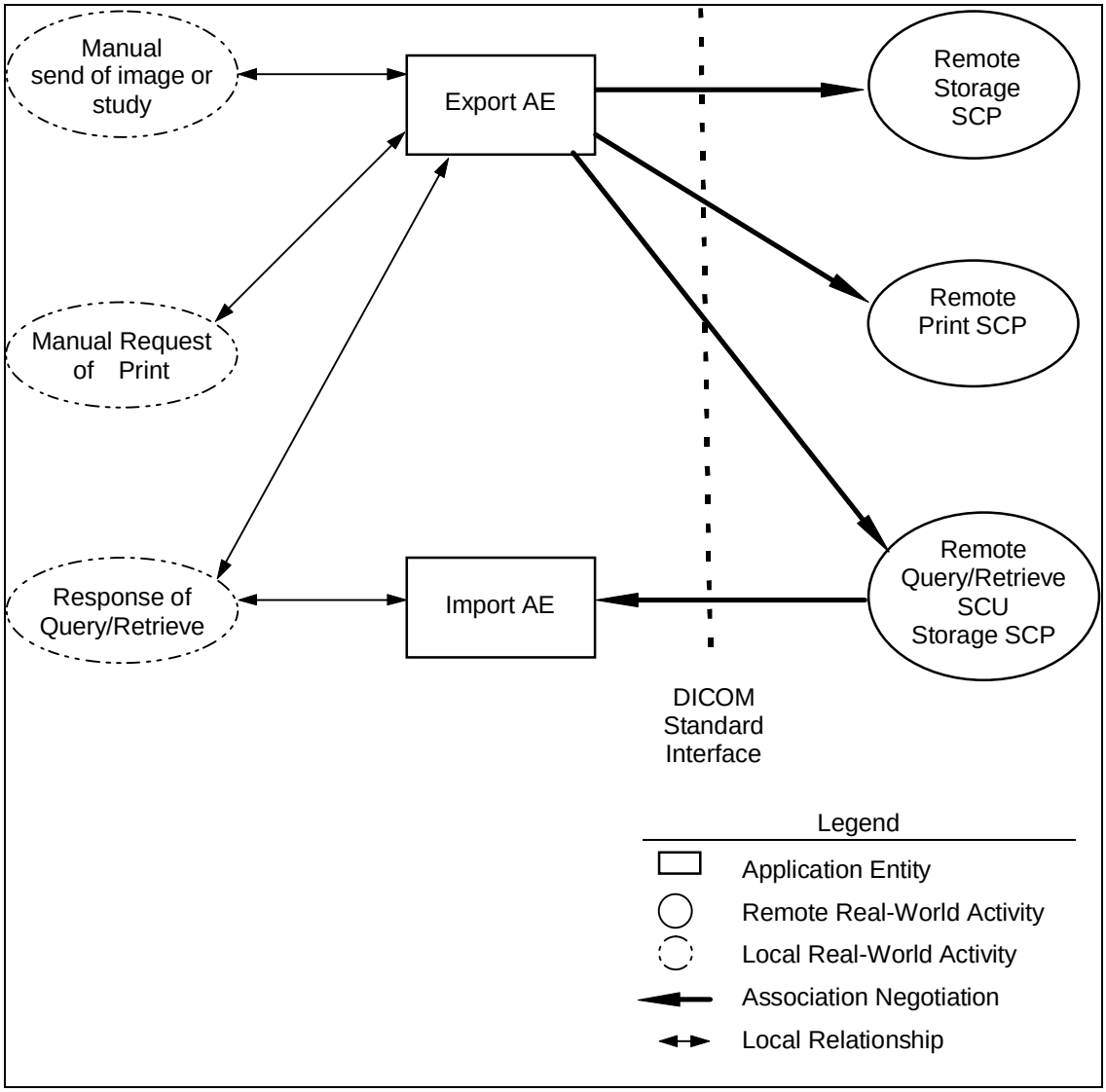

Figure 1

2.2 Functional Definitions of AE's

2.2.1 Export AE

Export AE is used to transmit images to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM MR Information Objects
- Establishes DICOM Association with remote DICOM device
- Performs storage of DICOM MR Information Objects to remote DICOM device

Export AE is used to transmit request for Print images to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM Basic Grayscale Print Objects
- Establishes DICOM Association with remote DICOM device
- Performs transmit of DICOM Basic Grayscale Print Objects to remote DICOM device

2.2.2 Import AE

Import AE is used to respond to requests of Query/Retrieve from a remote DICOM device.

2.3 Sequencing of Real World Activities

2.3.1 Features

2.3.1.1 Manual send of image or study

- Operator requests to send images after selecting the images to be transferred.
- When the transfer fails, Operator can manually attempt to resend the study at a later time.

2.3.1.2 Manual Request of Print

- The number of frames in the rows and columns on each film can be specified as desired, up to a total maximum of 48 frames per film.
- If an error occurs during printing, a request to retry printing is issued automatically.
- Print requests are placed on a queue, and are executed in the background.

2.3.1.3 Response of Query/Retrieve

- It returns the result of the search corresponding to the search request.
- Returns the requested images.

2.3.2 Operation

2.3.2.1 Manual send of image or study

The operation for manual image transferring is described below:
Step-1: Select the destination of image transfer.
Step-2: Select the image or study to be transferred.
Step-3: Request transfer.

2.3.2.2 Manual Request of Print

The operation for printing is described below:
Step-1: Enter the information for the film, and select each of the images to be printed.
Step-2: Execute the print request.

3 AE Specifications

3.1 Export Specification

Export AE provides Standard Conformance to the following DICOM SOP Classes as an SCU:
Table 1

SOP Class Name	SOP Class UID
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9

3.1.1 Export Association Establishment Policies

3.1.1.1 Export General

Export AE will utilize and understand the following Application Context Name:

Table 2

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Export AE supports a minimum PDU size of 16Kbytes and a maximum PDU size of 16Kbytes. The default value is set to 16Kbytes.

3.1.1.2 Export Number of Associations

Export AE can only establish one association at a time, independent of the number of destinations chosen.

3.1.1.3 Export Asynchronous Nature

Export AE allows a single outstanding operation on any association. Therefore, Export AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.1.1.4 Export Implementation Identifying Information

Export AE will specify the following Implementation Identifying Information:

- Implementation Class UID 1.2.392.200036.9116.4.1.11
- Implementation Version Name TM_MR_DCM_V1.1

3.1.2 Export Association Initiation by Real-World Activity

Export AE initiates an association when the following activity is chosen by the operator.

- "Manual send of image or study"
  - ♦ Storage - Create and store an MR image to a remote DICOM device
- "Manual Request of Print"
  - ♦ Print - Request print image to a remote DICOM device

Export AE also initiates an association when the following activity occurs.

- "Response of Query/Retrieve"
  - ♦ Storage - Create and store an MR image to a remote DICOM device

3.1.2.1 Export Real-World Activity - Storage

3.1.2.1.1 Export Associated Real-World Activity - Storage

Storage is executed by the MRI System after the operator's image transfer requests are queued.

3.1.2.1.2 Export Proposed Presentation Contexts - Storage

Export AE proposes the following Presentation Contexts shown below:

Table 3

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.2.1 Export SOP Specific Conformance - MR Image Storage

- Export AE operation involves the following sequence of steps for each image transfer.
  (1) Association establishment(requestor only)
  (2) Data transfer(SCU only)
  (3) Association release(requestor only)

  Export AE judges that the transfer of one image succeeded when the result of (2) "Data transfer" is "Success" even if the result of (3) "Association release" is "Failure".
- MR Information Object Definition is described in chapter 8.

3.1.2.2 Export Real-World Activity - Print

3.1.2.2.1 Export Associated Real-World Activity - Print

Export AE performs DICOM printing to a destination device. If a communication or printing error occurs, the print operation is automatically retried several times.

3.1.2.2.2 Export Proposed Presentation Contexts - Print

Export AE proposes the following Presentation Contexts shown below:

Table 4

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.2.2.1 Export SOP Specific Conformance - Basic Grayscale Print Management

- Export AE operation involves the following sequence of steps for each request print image.
  (1) Association establishment (requestor only)
  (2) Print request (SCU only)
  (3) Association release (requestor only)

  Export AE judges that the request printing images succeeded when the result of (2) "Print request" is "Success" even if the result of (3) "Association release" is "Failure".
- DIMSE-Service and Attributes are described in chapter 9.

3.1.3 Export Association Acceptance Policy

Export AE does not accept any associations generated by remote applications.

3.2 Import Specification

Import AE provides Standard Conformance to the following DICOM SOP Classes as an SCP:

Table 5

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient/ Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient/ Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2

3.2.1 Import Association Establishment Policies

3.2.1.1 Import General

Import AE will utilize and understand the following Application Context Name:

Table 6

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Import AE supports a minimum PDU size of 16Kbytes and a maximum PDU size of 16Kbytes. The default value is set to 16Kbytes.

3.2.1.2 Import Number of Associations

Import AE can accept a maximum of five simultaneous associations.

3.2.1.3 Import Asynchronous Nature

Import AE allows a single outstanding operation on any association. Therefore, Import AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.2.1.4 Import Implementation Identifying Information

Import AE will specify the following Implementation Identifying Information:

- Implementation Class UID 1.2.392.200036.9116.4.1.11
- Implementation Version Name TM_MR_DCM_V1.1

3.2.2 Import Association Initiation by Real-World Activity

Import AE never initiates an association.

3.2.3 Import Association Acceptance Policy

Import AE accepts an association generated by remote applications.

- "Response of Query/Retrieve"
  - ♦ Query/Retrieve (Find) - Receive a search request from a remote DICOM device
  - ♦ Query/Retrieve (Move) - Receive a request for image transfer from a remote DICOM device

3.2.3.1 Import Real-World Activity - Query/Retrieve (Find)

3.2.3.1.1 Import Associated Real-World Activity - Query/Retrieve (Find)

When a request for a search is performed by a remote system, an association is accepted.

3.2.3.1.2 Import Presentation Context Table - Query/Retrieve (Find)

Import AE accepts the following Presentation Contexts shown below:

Table 7

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient/ Study Only Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2.3.1.2.1 Import SOP Specific Conformance - Query/Retrieve (Find)

- The status is indicated by C-FIND-RSP as shown below:

Table 8

Status	Meaning	Code
Cancel	Matching terminated due to Cancel request.	FE00H
Success	Matching is complete - No final identifier is supplied.	0000H
Pending	Matches are continuing - Current Match is supplied and any Optional keys were supported in the same manner as Required keys.	FF00H
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.	FF01H

- If an error should occur, A-ABORT request is sent to a remote DICOM device.
- Search keys for Query/Retrieve SCP are described in chapter 10.1.

3.2.3.1.3 Import Presentation Context Acceptance Criterion – Query/Retrieve (Find)

Import AE accepts the Presentation Contexts listed in the Presentation Context Table.(Table 7)

3.2.3.1.4 Import Transfer Syntax Selection Policies - Query/Retrieve (Find)

Import AE supports only the Implicit VR Little Endian transfer syntax. It rejects any proposed Presentation Contexts which does not specify the default Implicit VR Little Endian transfer syntax.

3.2.3.2 Import Real-World Activity - Query/Retrieve (Move)

3.2.3.2.1 Import Associated Real-World Activity - Query/Retrieve (Move)

When a request for the image transfer is made of a remote system, an association is accepted.

3.2.3.2.2 Import Presentation Context Table - Query/Retrieve (Move)

Import AE accepts the following Presentation Contexts shown below:

Table 9

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient/ Study Only Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2.3.2.2.1 Import SOP Specific Conformance - Query/Retrieve (Move)

- The status is indicated by C-MOVE-RSP as shown below:

Table 10

Status	Meaning	Code
Refused	Out of Resources - Unable to perform Sub-operations	A702H
Success	Sub-operations complete - No Failures	0000H

- If an error should occur, A-ABORT request is sent to a remote DICOM device.

3.2.3.2.3 Import Presentation Context Acceptance Criterion – Query/Retrieve (Move)

Import AE accepts the Presentation Contexts listed in the Presentation Context Table.(Table 9)

3.2.3.2.4 Import Transfer Syntax Selection Policies - Query/Retrieve (Move)

Import AE supports only the Implicit VR Little Endian transfer syntax. It rejects any proposed Presentation Contexts which does not specify the default Implicit VR Little Endian transfer syntax.

4 Communication Profiles

4.1 Supported Communication Stacks

This product provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

This product inherits its TCP/IP stack from the computer system upon which it executes.

4.3.1 API

Not applicable to this product.

4.3.2 Physical Media Support

This product is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

4.4 Point-to-Point Stack

Not applicable to this product.

5 Extensions/Specializations/Privatizations

Not applicable to this product.

6 Configuration

For the MR Systems, the configuration can be set using the Online Setup interface.
Note: Settings and changes are performed by Toshiba Service Personnel at the time of installation of the system.

6.1 AE Title/Presentation Address Mapping

Mapping from the AE titles to the presentation address are as follows:

- One port number and one AE title can be described for one host name.
- Each AE title is mapped to one port number.
- The MR Systems has following default values:

  Local AE Title TM_MR_DCM_V1.0
"Response of Query/Retrieve"
  Local Port No. 8500

6.2 Configurable Parameters

6.2.1 Time-out Value, Retry Count, Retry Interval

The time-out value, retry count , and retry interval in each status are shown below.

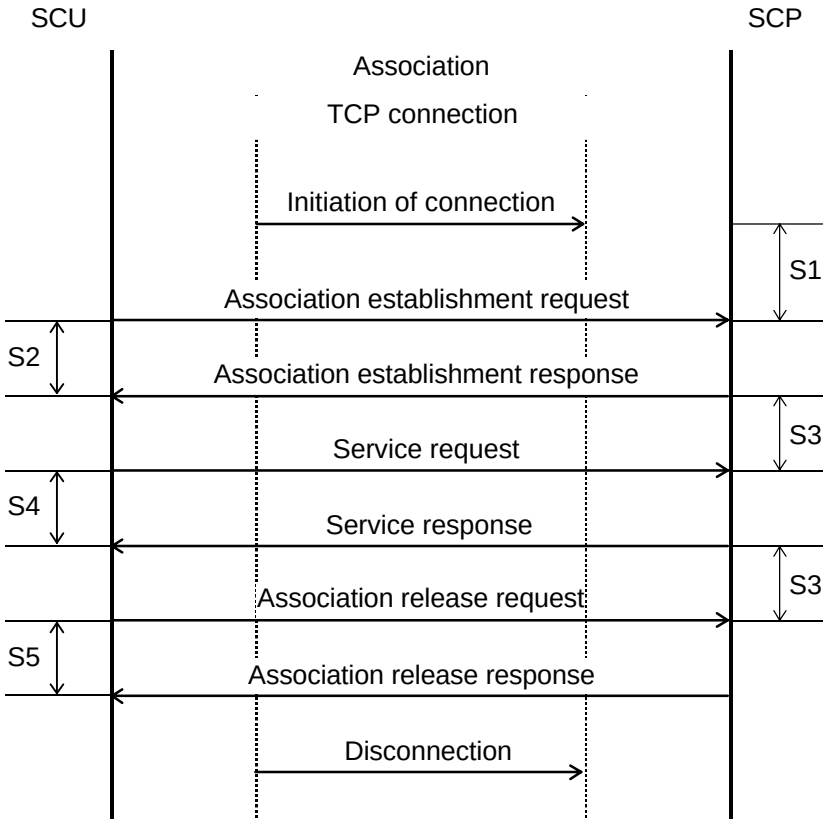

Figure 2

Table 11

Status	Item	Time-out value	Retry count	Retry interval	Remarks
S1	Association establishment request waiting time	default:30 seconds range:1 to 10000	Not set	Not set	Only one parameter can be set in Toshiba MRI Systems.
S2	Association establishment response waiting time	default:30 seconds range:1 to 10000	Not set	Not set	Only one parameter can be set in Toshiba MRI Systems.
S3	Service request waiting time	default:30 seconds range:1 to 10000	Not set	Not set	Only one parameter can be set in Toshiba MRI Systems.
S4	Service response waiting time	default:300 seconds range:1 to 10000	Not set	Not set	Only one parameter can be set in Toshiba MRI Systems.
S5	Association release waiting time	default:30 seconds range:1 to 10000	Not set	Not set	Only one parameter can be set in Toshiba MRI Systems.

6.3 Warning Status Criteria

6.3.1 MR Image Storage

6.3.1.1 C-STORE response

If SUCCESS is set, this product judges that C-STORE request succeeded.
If FAIL is set, this product judges that C-STORE request failed.

Table 12

Warning response	Default	Parameter setting range
Coercion of Data Elements	FAIL	Not change
Data Set does not match SOP Class	FAIL	Not change
Elements discarded	FAIL	Not change

6.3.2 Basic Grayscale Print Management

6.3.2.1 Basic Film Session SOP Class

6.3.2.1.1 N-CREATE response

If SUCCESS is set, this product judges that N-CREATE request succeeded.
If FAIL is set, this product judges that N-CREATE request failed.

Table 13

Warning response	Default	Parameter setting range
Memory allocation not supported	FAIL	Not change

6.3.2.2 Basic Film Box SOP Class

6.3.2.2.1 N-ACTION response

If SUCCESS is set, this product judges that N-ACTION request succeeded.
If FAIL is set, this product judges that N-ACTION request failed.

Table 14

Warning response	Default	Parameter setting range
Film Box SOP Instance hierarchy does not contain Image Box SOP Instances(empty page)	FAIL	Not change

6.3.2.3 Printer SOP Class

6.3.2.3.1 N-GET response

If SUCCESS is set, this product judges that N-GET request succeeded.
If FAIL is set, this product judges that N-GET request failed.

Table 15

Warning response	Default	Parameter setting range
Attribute list error	FAIL	Not change

6.4 Implementation Information and Maximum Reception PDU Size

The default values for the MRI System are used for the Implementation Class UID, the Implementation Version Name, and the Maximum length received. They cannot be changed.

Table 16

Parameter	Default
Implementation Class UID	1.2.392.200036.9116.4.1.11
Implementation Version Name	TM_MR_DCM_V1.1
Maximum length received (unit: byte)	0x4000

7 Support of Extended Character Sets

This product supports the following character sets:

- ISO-IR 6 (default) ISO 646

8 MR Information Object Definition

8.1 Entity Module Definitions

The information modules for the MR scanner are defined below.

8.1.1 MR IOD Modules

Table 17

Information Entity	Module	Reference	Usage*1
Patient	Patient Module	8.2.1	M
Study	General Study Module	8.2.2	M
Study	Patient Study Module	8.2.3	U
Series	General Series Module	8.2.4	M
Frame of Reference	Frame of Reference Module	8.2.5	M
Equipment	General Equipment Module	8.2.6	M
Image	General Image Module	8.2.7	M
Image	Image Plane Module	8.2.8	M
Image	Image Pixel Module	8.2.9	M
Image	Contrast/bolus Module	8.2.10	C
Image	MR Image Module	8.2.11	M
Image	VOI LUT Module	8.2.12	U
Image	SOP Common Module	8.2.13	M

*1:M=Mandatory, C=Conditional, U=User option

8.2 Information Object Definitions

8.2.1 Patient Module

Table 18

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Length=0 when no entry is made
Patient ID	(0010,0020)	2	Length=0 when no entry is made
Patient's Birth Date	(0010,0030)	2	Length=0 when no entry is made
Patient's Sex	(0010,0040)	2	Length=0 when no entry is made
Patient Comment	(0010,4000)	3	Not set when no entry is made

8.2.2 General Study Module

Table 19

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Always set
Study Date	(0008,0020)	2	Always set
Study Time	(0008,0030)	2	Always set
Referring Physician's Name	(0008,0090)	2	Length=0 when no entry is made
Study ID	(0020,0010)	2	Always set
Accession Number	(0008,0050)	2	Length=0 when no entry is made
Name of Physician(s) Reading Study	(0008,1060)	3	Not set when no entry is made

8.2.3 Patient Study Module

Table 20

Attribute Name	Tag	Type	Attribute Description
Patient’s Size	(0010,1020)	3	Not set when no entry is made
Patient’s Weight	(0010,1030)	3	Not set when no entry is made

8.2.4 General Series Module

Table 21

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Always set
Series Instance UID	(0020,000E)	1	Always set
Series Number	(0020,0011)	2	Always set
Laterality	(0020,0060)	2C	Length=0 when no entry is made
Series Date	(0008,0021)	3	Not set when no data is available
Series Time	(0008,0031)	3	Not set when no data is available
Operator's Name	(0008,1070)	3	Not set when no entry is made
Patient Position	(0018,5100)	2C	Always set

8.2.5 Frame of Reference Module

Table 22

Attribute Name	Tag	Type	Attribute Description
Position Reference Indicator	(0020,1040)	2	Length=0 when no data is available
Frame of Reference UID	(0020,0052)	1	Always set

8.2.6 General Equipment Module

Table 23

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Always set
Institution Name	(0008,0080)	3	Not set when no data is available
Station Name	(0008,1010)	3	Not set when no data is available
Manufacturer's Model Name	(0008,1090)	3	Not set when no data is available
Device Serial Number	(0018,1000)	3	Not set when no data is available
Software Version(s)	(0018,1020)	3	Not set when no data is available

8.2.7 General Image Module

Table 24

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Always set
Patient Orientation	(0020,0020)	2C	Length=0 when no entry is made
Acquisition Number	(0020,0012)	3	Always set
Acquisition Date	(0008,0022)	3	Not set when no data is available
Acquisition Time	(0008,0032)	3	Not set when no data is available

8.2.8 Image Plane Module

Table 25

Attribute Name	Tag	Type	Attribute Description
Pixel Spacing	(0028,0030)	1	Always set
Image Orientation (Patient)	(0020,0037)	1	Always set
Image Position (Patient)	(0020,0032)	1	Always set
Slice Thickness	(0018,0050)	2	Always set
Slice Location	(0020,1041)	3	Always set

8.2.9 Image Pixel Module

Table 26

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Always set(1)
Photometric Interpretation	(0028,0004)	1	Always set("MONOCROME2")
Rows	(0028,0010)	1	Always set
Columns	(0028,0011)	1	Always set
Bits Allocated	(0028,0100)	1	Always set(16)
Bits Stored	(0028,0101)	1	Always set(16)
High Bit	(0028,0102)	1	Always set(15)
Pixel Representation	(0028,0103)	1	Always set(1)
Pixel Data	(7FE0,0010)	1	Always set
Smallest Image Pixel Value	(0028,0106)	3	Not set when no data is available
Largest Image Pixel Value	(0028,0107)	3	Not set when no data is available

8.2.10 Contrast/Bolus Module

Table 27

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Agent	(0018,0010)	2	Length=0 when no entry is made

8.2.11 MR Image Module

Table 28

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Always set
Samples per Pixel	(0028,0002)	1	Always set(1)
Photometric Interpretation	(0028,0004)	1	Always set
Bits Allocated	(0028,0100)	1	Always set
Scanning Sequence	(0018,0020)	1	Always set
Sequence Variant	(0018,0021)	1	Always set("NONE")
Scan Options	(0018,0022)	2	Length=0 when no entry is made
MR Acquisition Type	(0018,0023)	2	Length=0 when no entry is made
Repetition Time	(0018,0080)	2C	Always set
Echo Time	(0018,0081)	2	Always set
Echo Train Length	(0018,0091)	2	Length=0 when no entry is made
Inversion Time	(0018,0082)	2C	Length=0 when no entry is made
Trigger Time	(0018,1060)	2C	Length=0 when no entry is made
Number of Averages	(0018,0083)	3	Always set
Imaging Frequency	(0018,0084)	3	Not set when no entry is made
Imaged Nucleus	(0018,0085)	3	Always set
Echo Number(s)	(0018,0086)	3	Always set
Flip angle	(0018,1314)	3	Always set

8.2.12 VOI LUT Module

Table 29

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	3	Always set
Window Width	(0028,1051)	1C	Always set

8.2.13 SOP Common Module

Table 30

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Always set
SOP Instance UID	(0008,0018)	1	Always set

9 DIMSE-Service and Attributes

9.1 DIMSE-Services

Table 31

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Basic Film Session SOP Class	N-CREATE	M	used
	N-SET	U	not used
	N-DELETE	U	used
	N-ACTION	U	not used
Basic Film Box SOP Class	N-CREATE	M	used
	N-SET	U	not used
	N-DELETE	U	used
	N-ACTION	M	used
Image Box SOP Class	N-SET	M	used
Printer SOP Class	N-EVENT-REPORT	M	used
	N-GET	U	used

*1 : M = Mandatory, U = User option

9.2 Basic Film Session SOP Class

9.2.1 N-CREATE Attributes

Table 32

Attribute Name	Tag	Usage	Attribute Description
Number of Copies	(2000,0010)	U	Always set
Print Priority	(2000,0020)	U	Always set("LOW")
Media Type	(2000,0030)	U	Always set("CLEAR FILM")
Film Destination	(2000,0040)	U	Not set when no data is available
Film Session Label	(2000,0050)	U	Always set("TOSHIBA_MRI")
Memory Allocation	(2000,0060)	U	Not set when no data is available

9.3 Basic Film Box SOP Class

9.3.1 N-CREATE Attributes

Table 33

Attribute Name	Tag	Usage	Attribute Description
Image Display Format	(2010,0010)	M	Always set
Film Orientation	(2010,0040)	U	Always set
Film Size ID	(2010,0050)	U	Always set
Magnification Type	(2010,0060)	U	Always set
Border Density	(2010,0100)	U	Always set
Empty Image Density	(2010,0110)	U	Always set
Trim	(2010,0140)	U	Always set
Referenced Film Session Sequence	(2010,0500)	M	Always set
>Referenced SOP Class UID	(0008,1150)	M	Always set
>Referenced SOP Instance UID	(0008,1155)	M	Always set

9.4 Basic Grayscale Image Box SOP Class

9.4.1 N-SET Attributes

Table 34

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020,0010)	M	Always set
Polarity	(2020,0020)	U	Always set
Magnification Type	(2010,0060)	U	Always set
Preformatted Grayscale Image Sequence	(2020,0110)	M	Always set
>Samples Per Pixel	(0028,0002)	M	Always set(1)
>Photometric Interpretation	(0028,0004)	M	Always set("MONOCHROME2")
>Rows	(0028,0010)	M	Always set
>Columns	(0028,0011)	M	Always set
>Pixel Aspect Ratio	(0028,0034)	M	Always set
>Bits Allocated	(0028,0100)	M	Always set(16 or 8)
>Bits Stored	(0028,0101)	M	Always set
>High Bit	(0028,0102)	M	Always set
>Pixel Representation	(0028,0103)	M	Always set(0)
>Pixel Data	(7FE0,0010)	M	Always set

9.5 Printer SOP Class

9.5.1 N-EVENT-REPORT

Table 35

Event Type Name	Event	Attribute	Tag	Usage SCU/SCP
NORMAL	1			
WARNING	2	Printer Name	(2110,0030)	U/U
		Printer Status Information	(2110,0020)	U/M
FAILURE	3	Printer Name	(2110,0030)	U/U
		Printer Status Information	(2110,0020)	U/M

9.5.2 N-GET Attributes

Table 36

Attribute Name	Tag	Usage SCU/SCP
Printer Status	(2110,0010)	U/M
Printer Status Info	(2110,0020)	U/M
Printer Name	(2110,0030)	U/U
Manufacturer	(0008,0070)	U/U
Manufacturer's Model Name	(0008,1090)	U/U
Device Serial Number	(0018,1000)	U/U
Software Version	(0018,1020)	U/U
Date of Last Calibration	(0018,1200)	U/U
Time of Last Calibration	(0018,1201)	U/U

10 Search Keys

10.1 Query/Retrieve SCP (C-FIND)

The search keys used for the Query/Retrieve SCP(C-FIND) are shown.

10.1.1 Patient Root Q/R Information Model - FIND

10.1.1.1 Patient Level

Table 37

Attribute Name	Tag	Type
Patient's Name	(0010,0010)	R
Patient ID	(0010,0020)	U

10.1.1.2 Study Level

Table 38

Attribute Name	Tag	Type
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Study ID	(0020,0010)	R
Study Instance UID	(0020,000D)	U

10.1.1.3 Series Level

Table 39

Attribute Name	Tag	Type
Modality	(0008,0060)	R
Series Number	(0020,0011)	R
Series Instance UID	(0020,000E)	U

10.1.1.4 Image Level

Table 40

Attribute Name	Tag	Type
Image Number	(0020,0013)	R
SOP Instance UID	(0008,0018)	U

10.1.2 Study Root Q/R Information Model - FIND

10.1.2.1 Study Level

Table 41

Attribute Name	Tag	Type
Patient's Name	(0010,0010)	R
Patient ID	(0010,0020)	R
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Study ID	(0020,0010)	R
Study Instance UID	(0020,000D)	U

10.1.2.2 Series Level

Attributes for the Series Level of the Study Root Query/Retrieve Information Model are the same as the Attributes for the Series Level of the Patient Root Query/Retrieve Information Model described in Section 10.1.1.3.

10.1.2.3 Image Level

Attributes for the Image Level of the Study Root Query/Retrieve Information Model are the same as the Attributes for the Image Level of the Patient Root Query/Retrieve Information Model described in Section 10.1.1.4.

10.1.3 Patient/Study Only Information Model - FIND

10.1.3.1 Patient Level

Attributes for the Patient Level of the Patient/Study Only Query/Retrieve Information Model are the same as the Attributes for the Patient Level of the Patient Root Query/Retrieve Information Model described in Section 10.1.1.1.

10.1.3.2 Study Level

Attributes for the Study Level of the Patient/Study Only Query/Retrieve Information Model are the same as the Attributes for the Study Level of the Patient Root Query/Retrieve Information Model described in Section 10.1.1.2