

TOSHIBA

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**DICOM CONFORMANCE STATEMENT
FOR
TOSHIBA NUCLEAR MEDICINE EQUIPMENT
GCA-9300R V1.1 SP0100J
(WORKFLOW MANAGEMENT)**

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1. CONFORMANCE STATEMENT OVERVIEW

Table 1-1 provides an overview of the network services supported by GCA-9300R™.

**Table 1-1
NETWORK SERVICES**

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
NM Image Storage	Yes	No
Workflow Management		
Modality Worklist Information Model – Find	Yes	No

*

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3. INTRODUCTION

3.1 AUDIENCE

This document is written for the people that need to understand how GCA9300R will integrate into their healthcare facility.

This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product.

This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features.

However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.2 REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Toshiba Medical Systems and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Toshiba Medical Systems and non-Toshiba Medical Systems equipment.
- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements. Toshiba Medical Systems is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

3.3 DEFINITIONS, TERMS AND ABBREVIATIONS

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, Nuclear Medicine 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: NM Image IOD

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)

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: Nuclear Medicine Image Storage Service.

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].

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: 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.

3.4 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in *italics* below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two *Application Entities* (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network “handshake”. One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (*Negotiation*).

DICOM specifies a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted *Transfer Syntaxes*. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called *Presentation Contexts*. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* – which one is the *Service Class User* (SCU - client) and which is *the Service Class Provider* (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate *Information Object Definition*, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a *Response Status* indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a *Media Application Profile* that specifies “pre-negotiated” exchange media format, Abstract Syntax, and Transfer Syntax.

3.5 ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
DICOM	Digital Imaging and Communications in Medicine
HIS	Hospital Information System
IOD	Information Object Definition
ISO	International Organization for Standards
LUT	Look-up Table
MSPS	Modality Scheduled Procedure Step
MWL	Modality Worklist
NM	Nuclear Medicine
O	Optional (Key Attribute)
PDU	Protocol Data Unit
R	Required (Key Attribute)
RIS	Radiology Information System.
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)
VR Value Representation

3.6 REFERENCES

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at <http://medical.nema.org/> PS 3.1-18, 2011

GCA9300R Gamma Camera Image Acquisition System User's Manual

3.7 REVISION HISTORY

Table
REVISION HISTORY

Document Version	Date of Issue	Author	Description
*	December 2014	TMSC	V1.1 SP0100J

4. NETWORKING

4.1 IMPLEMENTATION MODEL

4.1.1 Application Data Flow

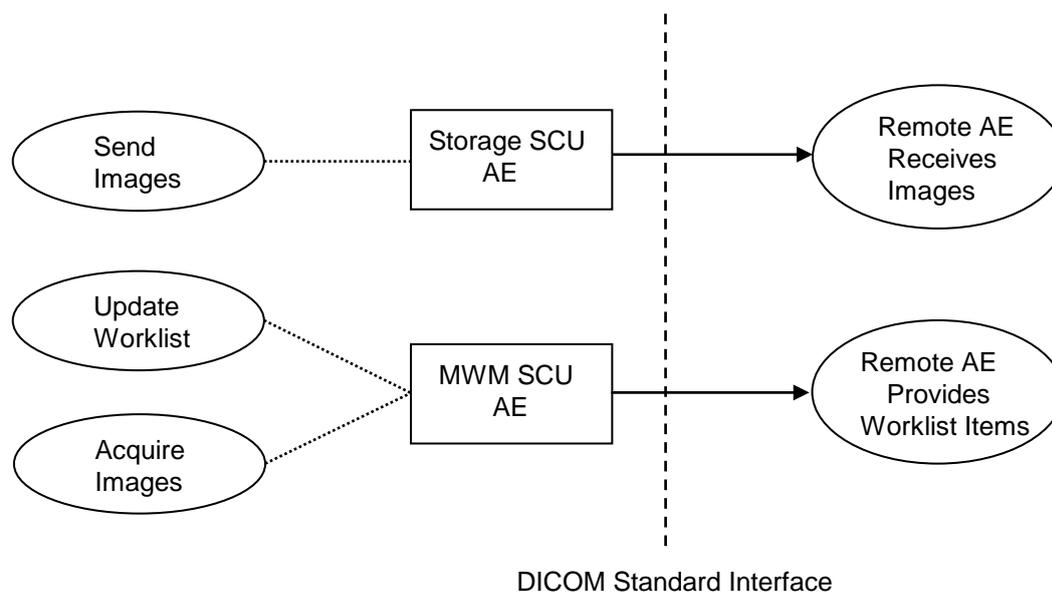


Figure 4.1-1
APPLICATION DATA FLOW DIAGRAM

- The Storage SCU AE sends images to a remote AE. It is associated with the local real-world activity “Send Images”. “Send Images” is performed upon user request for each study completed or for specific images selected. When activated by user’s settings (auto-send), each marked set of images can be immediately stored to a preferred destination.
- The MWM SCU AE receives Worklist information from a remote AE. It is associated with the local real-world activity “Update Worklist” and “Acquire Images”. When the “Update Worklist” is performed the MWM SCU AE queries a remote AE for worklist items and provides the set of worklist items matching the query request. “Update Worklist” is performed as a result of an operator request.

4.1.2 Functional Definition of AEs

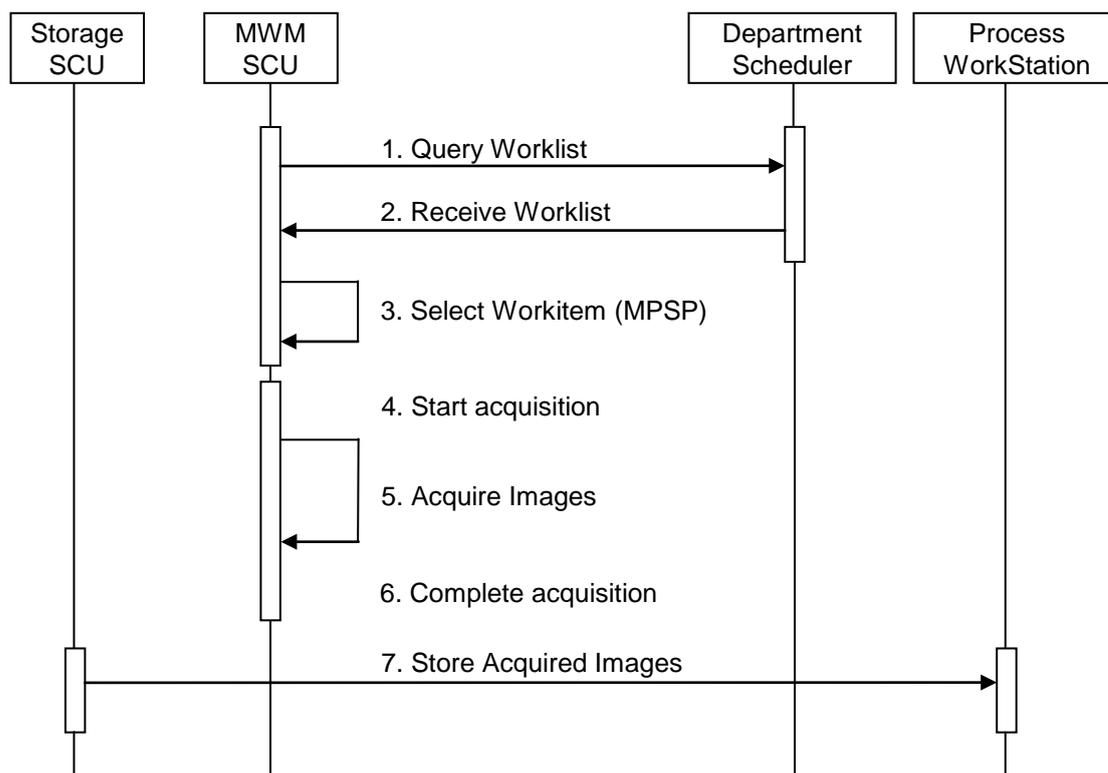
4.1.2.1 Functional Definition of Storage SCU AE

The existence of a send-job queue entry with associated network destination will activate the Storage SCU AE. An Association request is sent to the destination AE and upon successful negotiation of a Presentation Context the image transfer is started. If the association cannot be opened, the related send-job is set to an error state and can be restarted by the user via job control interface. By default, the Storage AE will not try to initiate another association for this send-job automatically. However, an automatic retry (retry-timer, retry-count) can be configured by a CSE.

4.1.2.2 Functional Definition of MWM SCU AE

The MWM SCU AE attempts to download a worklist from a remote node. If the MWM SCU AE establishes an Association to a remote AE, it will transfer all worklist items via the open Association. During receiving the worklist response items are counted and the query processing is canceled if the configurable limit of items is reached. The results will be displayed in a separate list, which may be cleared by the operator.

4.1.3 Sequencing of Real-World Activities



**Figure 4.1-2
SEQUENCING CONSTRAINTS**

Under typical scheduled workflow conditions the sequencing constraints illustrated in Figure 4.1-2 apply:

1. Query Worklist
2. Receive Worklist of Modality Scheduled Procedure Steps (MSPS)
3. Select Workitem (MSPS) from Worklist
4. Start acquisition
5. Acquire Images
6. Complete acquisition
7. Store Acquire Images

Other workflow situations (e.g. unscheduled procedure steps) will have other sequencing constraints. Some activities may be omitted according to situations.

4.2 AE SPECIFICATIONS

4.2.1 Storage SCU AE Specification

4.2.1.1 SOP Classes

The Storage SCU AE provides Standard Conformance to the following SOP Classes:

**Table 4.2-1
SOP CLASSES FOR THE STORAGE SCU AE**

SOP Class Name	SOP Class UID	SCU	SCP
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 4.2-2
DICOM APPLICATION CONTEXT FOR THE STORAGE SCU AE**

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2.2 Number of Associations

The Storage SCU AE can initiate one Association at a time for each destination to which a transfer request is being processed in the active job queue list. Only one job will be active at a time, the other remains pending until the active job is completed or failed.

**Table 4.2-3
NUMBER OF ASSOCIATIONS INITIATED FOR THE STORAGE SCU AE**

Maximum number of simultaneous Associations	1
---	---

4.2.1.2.3 Asynchronous Nature

The Storage SCU AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 4.2-4
ASYNCHRONOUS NATURE FOR THE STORAGE SCU AE**

Maximum number of outstanding asynchronous transactions	1
---	---

4.2.1.2.4 Implementation Identifying Information

The implementation information for the Storage SCU AE is:

**Table 4.2-5
DICOM IMPLEMENTATION CLASS AND VERSION FOR THE STORAGE SCU AE**

Implementation Class UID	1.2.392.200036.9116.5.7.10
Implementation Version Name	TM_NM_DCM_V3.0

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Send Images

4.2.1.3.1.1 Description and Sequencing of Activities

A user can select previously acquired images and request them to be sent to multiple destinations. Each request is forwarded to the job queue and processed individually.

In addition, there exists an “auto-send” option that is triggered by the end of acquisition. When the “auto-send” option is active, each acquired instance or set of instances is stored in the local database as usual and it is also forwarded to the network job queue for a preconfigured auto-send target destination. It can be configured how many and which are the destinations where the instances are automatically sent to (see GCA9300R Gamma Camera Image Acquisition System User’s Manual).

The Storage AE is invoked by the job control interface that is responsible for processing network archival tasks. The job consists of data describing the instances marked for storage and the destination. An internal daemon process triggered by a job for a specific network destination initiates a C-STORE request to store images. If the process successfully establishes an Association to a remote Application Entity, it will transfer each marked instance one after another via the open Association. Status of the transfer is reported through the job control interface. Only one job will be active at a time. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state. It can be restarted, if configured, by automated retry.

The Storage SCU AE attempts to initiate a new Association in order to issue a Storage request (C-STORE). If the job contains multiple images then multiple C-STORE requests will be issued over the same Association.

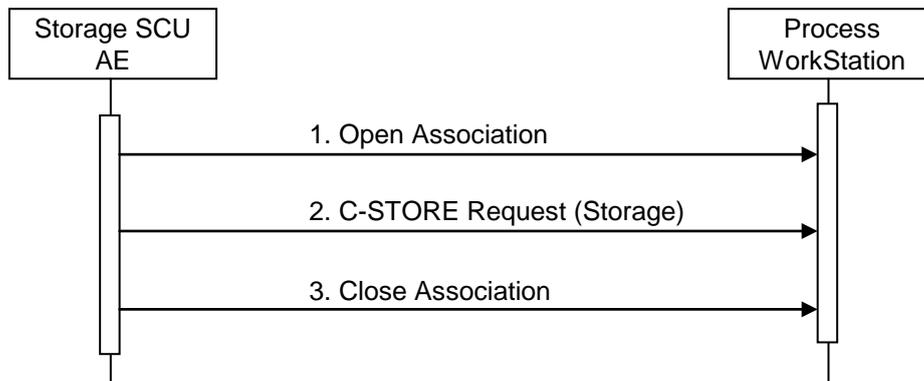


Figure 4.2-1
SEQUENCING OF ACTIVITY – SEND IMAGES

A possible sequence of interactions between the Storage SCU AE and Process Workstation is illustrated in the Figure above:

1. The Storage SCU AE opens an Association with the Process Workstation
2. Acquired images are transmitted to the Process Workstation using a Storage request (C-STORE) and the Process Workstation replies with a C-STORE response (status success).
3. The Storage SCU AE closes the Association with the Process Workstation.

4.2.1.3.1.2 Proposed Presentation Contexts

The Storage SCU AE is capable of proposing the Presentation Contexts shown in the following table:

**Table 4.2-6
PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY SEND IMAGES**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3 SOP Specific Conformance for Storage SOP Classes

The Storage SCU AE provides standard conformance to the Storage Service Class as an SCU.

The behavior of Storage SCU AE when encountering status codes in a C-STORE response is summarized in the Table below:

**Table 4.2-7
STORAGE C-STORE RESPONSE STATUS HANDLING BEHAVIOR**

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The SCP has successfully stored the SOP Instance. If all SOP Instances in a send job have status success then the job is marked as complete.

The behavior of Storage SCU AE during communication failure is summarized in the Table below:

**Table 4.2-8
STORAGE COMMUNICATION FAILURE BEHAVIOR**

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.
Association aborted by the SCP or network layers	The send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.

The system can be configured to automatically resend failed jobs. The delay between resending failed jobs and the number of retries is also configurable.

If the image transfer fails, the Storage SCU AE will retry this send-job automatically. The delay between resending failed jobs and the number of retries is also configurable.

The contents of Nuclear Medicine Image Storage SOP Instances created by GCA9300R conform to the DICOM Nuclear Medicine Image IOD definition and are described in section 7.1.

4.2.2 MWM SCU AE Specification

4.2.2.1 SOP Classes

The MWM SCU AE provides Standard Conformance to the following SOP Classes:

**Table 4.2-9
SOP CLASSES FOR THE MWM SCU AE**

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

4.2.2.2 Association Policies

4.2.2.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 4.2-10
DICOM APPLICATION CONTEXT FOR THE MWM SCU AE**

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.2.2.2 Number of Associations

The MWM SCU AE initiates one Association at a time for a Worklist request.

**Table 4.2-11
NUMBER OF ASSOCIATIONS INITIATED FOR THE MWM SCU AE**

Maximum number of simultaneous Associations	1
---	---

4.2.2.2.3 Asynchronous Nature

The MWM SCU AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 4.2-12
ASYNCHRONOUS NATURE FOR THE MWM SCU AE**

Maximum number of outstanding asynchronous transactions	1
---	---

4.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

**Table 4.2-13
DICOM IMPLEMENTATION CLASS AND VERSION FOR THE MWM SCU AE**

Implementation Class UID	1.2.392.200036.9116.5.7.10
Implementation Version Name	TM_NM_DCM_V3.0

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity – Update Worklist

4.2.2.3.1.1 Description and Sequencing of Activities

The request for a Worklist Update is interactive. A brief description of the procedure is given here. See GCA9300R Gamma Camera Image Acquisition System User's Manual for details.

The user selects one of 2 options from a list box and then clicks on “Get Worklist” button.

- a. If “*Today* (default)” was selected, a default MWL server AE is queried immediately for procedures scheduled for the present day.
- b. If “*Other*” was selected, a form opens to enter search criteria, including the MWL server AE. The most recently used search criteria stay as default value till they are changed again in this form. Only the data from the dialog are inserted as matching keys into the query. Blank fields match any value. The query starts when clicking “OK” in the form.

In both cases, the operator waits while information arrives and fills in Scheduled list. The number of received and accepted entries is reported. Items without a Study Instance UID or with a Study Instance UID that is currently registered in the system are rejected. No duplicated entries are accepted. Clicking again on “Get Worklist” does not erase the previous list (it may be deleted by the operator).

Accepted entries are displayed in a separate table till the user send them individually to Current list for acquisition. Then, GCA9300R incorporates worklist items into the local database for future acquisition.

Upon initiation of the request, the MWM SCU AE builds an Identifier for the C-FIND request, initiates an Association to send the request and waits for Worklist responses.

To protect the system from overflow, GCA9300R will limit the number of processed worklist responses to a given maximum. During receiving the worklist response items are counted and the query processing is canceled by issuing a C-FIND-CANCEL if the limit of items is reached.

The MWM SCU AE will initiate an Association in order to issue a C-FIND request according to the Modality Worklist Information Model.

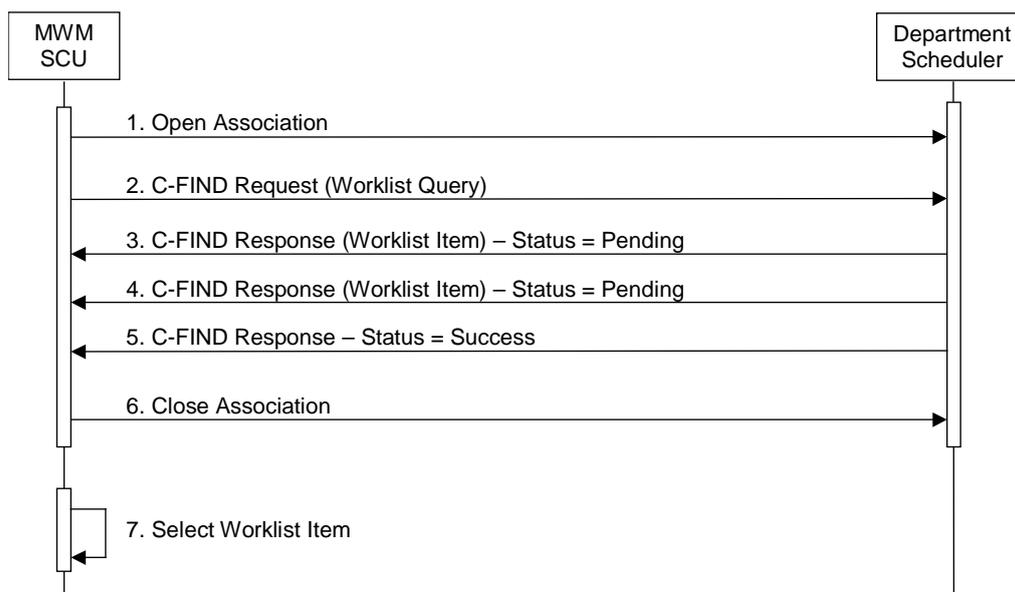


Figure 4.2-2
SEQUENCING OF ACTIVITY – UPDATE WORKLIST

A possible sequence of interactions between the MWM SCU AE and a Department Scheduler (e.g. a device such as a RIS or HIS which supports the Modality Worklist SOP Class as an SCP) is illustrated in the Figure 2.2-2 above:

1. The MWM SCU AE opens an association with the Department Scheduler
2. The MWM SCU AE sends a C-FIND request to the Department Scheduler containing the Worklist Query attributes.
3. The Department Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.
4. The Department Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.
5. The Department Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes that only 2 Worklist items match the Worklist Query.
6. The MWM SCU AE closes the association with the Department Scheduler.
7. The user selects a Worklist Item from the Worklist and prepares to acquire new images.

4.2.2.3.1.2 Proposed Presentation Contexts

The MWM SCU AE will propose Presentation Contexts as shown in the following table:

**Table 4.2-14
Proposed Presentation Contexts for Activity Update Worklist**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
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

4.2.2.3.1.3 SOP Specific Conformance for Modality Worklist SOP Class

The MWM SCU AE provides standard conformance to the Modality Worklist SOP Class as an SCU.

In a Modality Worklist C-FIND, if response status codes received by GCA9300R are any other than "Success" or "Pending", a message "Error in MWL query" will appear on the user interface.

The behavior of the MWM SCU when encountering status codes in a Modality Worklist C-FIND response is summarized in the Table below.

**Table 4.2-15
Modality Worklist C-FIND Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
Success	Matching is complete	0000	The SCP has completed the matches. Worklist items are available for display or further processing.

Refused	Out of Resources	A700	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Identifier does not match SOP Class	A900	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Unable to Process	Cxxx	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Cancel	Matching terminated due to Cancel request	FE00	If the query was cancelled due to too many worklist items then the SCP has completed the matches. Worklist items are available for display or further processing. Otherwise, the Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query.
Pending	Matches are continuing	FF00	The worklist item contained in the Identifier is collected for later display or further processing.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported	FF01	The worklist item contained in the Identifier is collected for later display or further processing. The status meaning is logged only once for each C-FIND operation.
*	*	Any other status code.	The Association is aborted using A-ABORT and the worklist is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.

The behavior of the MWM SCU AE during communication failure is summarized in the Table below.

Table 4.2-16
MODALITY WORKLIST COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the worklist query is marked as failed. The reason is logged and reported to the user if an interactive query.
Association aborted by the SCP or network layers	The worklist query is marked as failed. The reason is logged and reported to the user if an interactive query.

Acquired images will always use the Study Instance UID specified for the Scheduled Procedure Step (if available). Scheduled Procedure Steps without a Study Instance UID or with a Study Instance UID that is already registered in GCA9300R data base are not accepted. If an acquisition is unscheduled, a Study Instance UID will be generated locally.

The Table below provides a description of the MWM SCU AE Worklist Request Identifier and specifies the attributes that are copied into the images. Unexpected attributes returned in a C-FIND response are ignored. Requested return attributes not supported by the SCP are set to have no value. Non-matching responses returned by the SCP due to unsupported optional matching keys are ignored. No duplicate entries are accepted.

Table 4.2-17
WORKLIST REQUEST IDENTIFIER

Module Name Attribute Name	Tag	VR	M	R	D	IOD
Scheduled Procedure Step						
Scheduled Procedure Step Sequence	(0040,0100)	SQ		x		
> Scheduled Station AE Title	(0040,0001)	AE	x	x		
> Scheduled Station Name	(0040,0010)	LO		x		
> Scheduled Procedure Step Location	(0040,0011)	SH		x		
> Scheduled Procedure Step Start Date	(0040,0002)	DA	x/r	x	x	
> Scheduled Procedure Step Start Time	(0040,0003)	TM		x	x	
> Scheduled Performing Physician's Name	(0040,0006)	PN		x	x	x
> Scheduled Procedure Step Description	(0040,0007)	SH		x	x	x
> Scheduled Protocol Code Sequence	(0040,0008)	SQ		x	x	
> Scheduled Procedure Step ID	(0040,0009)	SH		x		x
> Comments on Scheduled Procedure Step	(0040,0400)	LT		x	x	x
> Modality	(0008,0060)	CS	x	x		x
> Requested Contrast Agent	(0032,1070)	LO		x		
> Pre-Medication	(0040,0012)	LO		x		
Requested Procedure						
Requested Procedure ID	(0040,1001)	SH	x	x	x	x
Requested Procedure Description	(0032,1060)	LO		x	x	
Study Instance UID	(0020,000D)	UI		x		x
Requested Procedure Priority	(0040,1003)	SH		x		
Patient Transport Arrangements	(0040,1004)	LO		x		
Imaging Service Request						
Requesting Physician	(0032,1032)	PN		x	x	x
Referring Physician's Name	(0008,0090)	PN		x	x	x
Accession Number	(0008,0050)	SH	x	x	x	x
Visit Identification						
Admission ID	(0038,0010)	LO		x		
Visit Status						
Current Patient Location	(0038,0300)	LO		x		

Patient Identification						
Patient's Name	(0010,0010)	PN	x	x	x	x
Patient ID	(0010,0020)	LO	x	x	x	x
Patient Demographic						
Patient Data Confidentiality Constraint Description	(0040,3001)	LO		x		
Patient's Birth Date	(0010,0030)	DA		x	x	x
Patient's Sex	(0010,0040)	CS		x	x	x
Patient's Size	(0010,1020)	DS		x	x	x
Patient's Weight	(0010,1030)	DS		x	x	x
Patient Comment	(0010,4000)	LT		x	x	x
Patient Medical						
Medical Alerts	(0010,2000)	LO		x		
Contrast Allergies	(0010,2110)	LO		x		
Pregnancy Status	(0010,21C0)	US		x		
Last Menstrual Date	(0010,21D0)	DA		x		
Special Needs	(0038,0050)	LO		x		
Patient State	(0038,0500)	LO		x		

The above table should be read as follows:

- Module Name: The name of the associated module for supported worklist attributes.
- Attribute Name: Attributes supported to build the MWM SCU AE Worklist Request Identifier.
- Tag: DICOM tag for this attribute.
- VR: DICOM VR for this attribute.
- M: Matching keys for Worklist Update. An "S" will indicate that the MWM SCU AE will supply an attribute value for Single Value Matching. An "x" indicates that GCA9300R will supply this attribute as matching key, if entered in the Query Patient Worklist dialog (for example, the Patient Name can be entered thereby restricting Worklist responses to Procedure Steps scheduled for the patient). "x/r" means that the matching key may be a single value or a range.
- R: Return keys. An "x" will indicate that the MWM SCU AE will supply this attribute as Return Key with zero length for Universal Matching.
- D: Displayed keys. An "x" indicates that this worklist attribute is displayed to the user in Scheduled list or in its detail forms.
- IOD: An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

4.2.2.3.2 Activity – Acquire Images

Acquisition cannot proceed directly from Scheduled procedures list received from MWL server. The operator has to send them individually into Current list. Optionally, an entry may be created from scratch interactively in Current list.

To acquire images, the operator selects an entry from Current list, assigns it to an acquisition protocol and acquires one or more images depending on the selected acquisition protocol.

When finished, images are always automatically saved into the acquisition system hard disk. They may be sent also to one or more storage devices (configurable).

See GCA9300R Gamma Camera Image Acquisition System User's Manual for details

4.2.2.4 Association Acceptance Policy

The MWM SCU AE does not accept Associations.

4.3 NETWORK INTERFACES

4.3.1.1 Physical Network Interface

This Product supports a single network interface. One of the following physical network interfaces will be available depending on installed hardware options:

**Table 4.3-1
SUPPORTED PHYSICAL NETWORK INTERFACES**

Ethernet 100baseT
Ethernet 10baseT

4.3.2 Additional Protocols

None.

4.4 CONFIGURATION

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

All local applications use the AE Titles and TCP/IP Ports configured via the Service/Installation Tool. The Field Service Engineer can configure the TCP Port via the Service/Installation Tool.

**Table 4.4-1
AE TITLE CONFIGURATION TABLE**

Application Entity	Default AE Title	Default TCP/IP Port
MWM SCU	GCA9300R	Not Applicable
Storage SCU		

4.4.1.2 Remote AE Title/Presentation Address Mapping

The AE Titles, host names and port numbers of remote applications are configured using the Configuration file.

5. SUPPORT OF CHARACTER SETS

This product supports the following character sets:

- ISO-IR 100 (Latin alphabet No.1) Supplementary set of ISO 8859

6. SECURITY

This product does not support any specific security measures.

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

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

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

7. ANNEXES

7.1 IOD CONTENTS

7.1.1 Created SOP Instances

Table 7.1-1 specifies the attributes of a NM Image transmitted by the Storage SCU AE.

The following tables use a number of abbreviations. The abbreviations used in the “Presence of ...” column are:

VNAP	Value Not Always Present (attribute sent zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present
EMPTY	Attribute is sent without a value

The abbreviations used in the “Source” column:

MWL	the attribute value source is from Modality Worklist
USER	the attribute value source is from User input
AUTO	the attribute value is generated automatically
MPPS	the attribute value is the same as that use for Modality Performed Procedure Step
CONFIG	the attribute value source is a configurable parameter

7.1.1.1 NM Image IOD

**Table 7.1-1
IOD OF CREATED NM IMAGE SOP INSTANCES**

IE	Module	Reference	Presence of Module
Patient	Patient	Table 7.1-2	ALWAYS
Study	General Study	Table 7.1-3	ALWAYS
	Patient Study	Table 7.1-4	ALWAYS
Series	General Series	Table 7.1-5	ALWAYS
	NM/PET Patient Orientation	Table 7.1-6	ALWAYS
Equipment	General Equipment	Table 7.1-7	ALWAYS
Image	General Image	Table 7.1-8	ALWAYS
	Image Pixel	Table 7.1-9	ALWAYS
	NM Image Pixel	Table 7.1-10	ALWAYS
	Multi-frame	Table 7.1-11	ALWAYS
	NM Multi-frame	Table 7.1-12	ALWAYS
	NM Image	Table 7.1-13	ALWAYS
	NM Isotope	Table 7.1-14	ALWAYS
	NM Detector	Table 7.1-15	ALWAYS
NM TOMO Acquisition	Table 7.1-16	ANAP (Required if Image Type (0008,0008) Value 3 is TOMO, GATED TOMO.)	

NM Multi-gated Acquisition	Table 7.1-17	ANAP (Required if Image Type (0008,0008) Value 3 is GATED, GATED TOMO.)
NM Phase	Table 7.1-18	ANAP (Required if Image Type (0008,0008) Value 3 is DYNAMIC.)
General Anatomy Optional	Table 7.1-19	ANAP (If Organ is "None" this module dose not Present)
VOI LUT	Table 7.1-20	ALWAYS
SOP Common	Table 7.1-21	ALWAYS
Private Application	Table 7.1-22	ALWAYS

7.1.1.2 Common Modules

**Table 7.1-2
PATIENT MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN	From Modality Worklist or user input. Values supplied via Modality Worklist will be entered as received. Maximum 64 characters.	ALWAYS	MWL/ USER
Patient ID	(0010,0020)	LO	From Modality Worklist or user input. Maximum 64 characters.	ALWAYS	MWL/ USER
Patient's Birth Date	(0010,0030)	DA	From Modality Worklist or user input	ALWAYS	MWL/ USER
Patient's Sex	(0010,0040)	CS	From Modality Worklist or user input	ALWAYS	MWL/ USER
Patient Comments	(0010,4000)	LT	From User Input. Maximum 1024 characters.	VNAP	MWL/ USER

**Table 7.1-3
GENERAL STUDY MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	(0020,000D)	UI	From Modality Worklist or generated by device	ALWAYS	MWL/ AUTO
Study Date	(0008,0020)	DA	<yyyymmdd>	ALWAYS	AUTO
Study Time	(0008,0030)	TM	<hhmmss.frac>	ALWAYS	AUTO
Referring Physician's Name	(0008,0090)	PN	From Modality Worklist or User Input	VNAP	MWL/ USER
Study ID	(0020,0010)	SH	Requested Procedure ID from Worklist or generated by device	VNAP	MWL/ AUTO
Accession Number	(0008,0050)	SH	From Modality Worklist or user input	VNAP	MWL/ USER
Study Description	(0008,1030)	LO	Comment text box in study list.	ALWAYS	USER
Physician(s) of Record	(0008,1048)	PN	Set to NULL	EMPTY	AUTO
Name of Physician(s) Reading Study	(0008,1060)	PN	Set to NULL	EMPTY	AUTO

**Table 7.1-4
PATIENT STUDY MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Admitting Diagnosis Description	(0008,1080)	LO	Set to NULL	EMPTY	AUTO
Patient's Age	(0010,1010)	AS	Calculated from DoB input on base of Study Date	ALWAYS	AUTO
Patient's Size	(0010,1020)	DS	From Modality Worklist or user input	VNAP	MWL/ USER
Patient's Weight	(0010,1030)	DS	From Modality Worklist or user input	VNAP	MWL/ USER

**Table 7.1-5
GENERAL SERIES MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	"NM"	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Generated by device	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by device	ALWAYS	AUTO
Series Date	(0008,0021)	DA	<yyyymmdd>	ALWAYS	AUTO
Series Time	(0008,0031)	TM	<hhmmss.frac>	ALWAYS	AUTO
Performing Physician's Name	(0008,1050)	PN	From Modality Worklist or User Input	VNAP	MWL/ USER
Protocol Name	(0018,1030)	LO	Taken from acquisition	ALWAYS	USER
Series Description	(0008,103E)	LO	user input	VNAP	USER
Operator's Name	(0008,1070)	PN	From Modality Worklist or User Input	VNAP	MWL/ USER
Patient Position	(0018,5100)	CS	Taken from acquisition	ALWAYS	AUTO
Largest Pixel Value in Series	(0028,0109)	CS	Taken from acquisition	ALWAYS	AUTO

**Table 7.1-6
NM/PET PATIENT ORIENTATION MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient Orientation Code	(0054,0410)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>Code Value	(0008,0100)	SH	Baseline CID 19.	VNAP	AUTO
>Coding Scheme Designator	(0008,0102)	SH	"99SDM"	VNAP	AUTO
>Code Meaning	(0008,0104)	LO	Baseline CID 19.	VNAP	AUTO
>Patient Orientation Modifier Code	(0054,0412)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>>Code Value	(0008,0100)	SH	Baseline CID 20.	VNAP	AUTO
>>Coding Scheme Designator	(0008,0102)	SH	"99SDM"	VNAP	AUTO
>>Code Meaning	(0008,0104)	LO	Baseline CID 20.	VNAP	AUTO
Patient Gantry Relationship Code	(0054,0414)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO

>Code Value	(0008,0100)	SH	Baseline CID 21.	VNAP	AUTO
>Coding Scheme Designator	(0008,0102)	SH	"99SDM"	VNAP	AUTO
>Code Meaning	(0008,0104)	LO	Baseline CID 21.	VNAP	AUTO

**Table 7.1-7
GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	"TOSHIBA_MEC"	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	From Configuration	VNAP	CONFIG AUTO
Institution Address	(0008,0081)	ST	From Configuration	VNAP	CONFIG AUTO
Station Name	(0008,1010)	SH	From Configuration	ALWAYS	CONFIG
Institution Department Name	(0008,1040)	LO	From Configuration	VNAP	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	GCA9300R	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	From Configuration	VNAP	CONFIG
Software Version	(0018,1020)	LO	V1.00JR000 or later	ALWAYS	AUTO
Date of Last Calibration	(0018,1200)	DA	Taken from system last calibration	ALWAYS	AUTO
Time of Last Calibration	(0018,1201)	TM	Taken from system last calibration	ALWAYS	AUTO

**Table 7.1-8
GENERAL IMAGE MODULE OF CREATED SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by device	ALWAYS	AUTO
Content Date	(0008,0023)	DA	Generated by device	ALWAYS	AUTO
Content Time	(0008,0033)	TM	Generated by device	ALWAYS	AUTO
Image Type	(0008,0008)	CS	Generated by device	ALWAYS	AUTO
Acquisition Date	(0008,0022)	DA	Generated by device	ALWAYS	AUTO
Acquisition Time	(0008,0032)	TM	Generated by device	ALWAYS	AUTO
Image Comments	(0020,4000)	LT	Set to NULL	EMPTY	AUTO

7.1.1.3 NM Image Modules

**Table 7.1-9
IMAGE PIXEL MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Sample per Pixel	(0028,0002)	US	1	ALWAYS	AUTO
Photometric interpretation	(0028,0004)	CS	"MONOCHROME2"	ALWAYS	AUTO
Rows	(0028,0010)	US		ALWAYS	AUTO
Columns	(0028,0011)	US		ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	16	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	16	ALWAYS	AUTO

High Bit	(0028,0102)	US	15	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	0	ALWAYS	AUTO
Smallest Image Pixel Value	(0028,0106)	US	Generated by device	ALWAYS	AUTO
Largest Image Pixel Value	(0028,0107)	US	Generated by device	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OW	Generated by device	ALWAYS	AUTO

**Table 7.1-10
NM IMAGE PIXEL MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Sample per Pixel	(0028,0002)	US	1	ALWAYS	AUTO
Photometric interpretation	(0028,0004)	CS	"MONOCHROME2"	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	16	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	16	ALWAYS	AUTO
High Bit	(0028,0102)	US	15	ALWAYS	AUTO
Pixel Spacing	(0028,0030)	DS	Generated by device	ALWAYS	AUTO

**Table 7.1-11
MULTI-FRAME MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number of Frames	(0028,0008)	IS	Taken from acquisition	ALWAYS	AUTO/ USER
Frame Increment Pointer	(0028,0009)	AT	Generated by device	ALWAYS	AUTO

**Table 7.1-12
NM MULTI-FRAME MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Increment Pointer	(0028,0009)	AT	Generated by device	ALWAYS	AUTO
Energy Window Vector	(0054,0010)	US	Generated by device	ALWAYS	AUTO
Number of Energy Windows	(0054,0011)	US	Taken from acquisition	ALWAYS	USER
Detector Vector	(0054,0020)	US	Generated by device	ALWAYS	USER
Number of Detectors	(0054,0021)	US	Taken from acquisition	ALWAYS	USER
Phase Vector	(0054,0030)	US	Generated by device	ANAP	AUTO
Number of Phases	(0054,0031)	US	Taken from acquisition	ANAP	USER
Rotation Vector	(0054,0050)	US	Generated by device	ANAP	AUTO
Number of Rotations	(0054,0051)	US	Taken from acquisition	ANAP	USER
R-R Interval Vector	(0054,0060)	US	Generated by device	ANAP	AUTO
Number of R-R Intervals	(0054,0061)	US	Taken from acquisition	ANAP	AUTO
Time Slot Vector	(0054,0070)	US	Generated by device	ANAP	AUTO
Number of Time Slots	(0054,0071)	US	Taken from acquisition	ANAP	AUTO
Angular View Vector	(0054,0090)	US	Generated by device	ANAP	AUTO
Time Slice Vector	(0054,0100)	US	Generated by device	ANAP	AUTO

**Table 7.1-13
NM IMAGE MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	(0008,0008)	CS	“ORIGINAL¥PRIMARY¥[VALUE3]”, Where “VALUE3” is one of STATIC,DYNAMIC,GATED,TOMO, GATED TOMO.	ALWAYS	AUTO
Counts Accumulated	(0018,0070)	IS	Taken from acquisition	ALWAYS	AUTO/ USER
Acquisition Termination Condition	(0018,0071)	CS	“CTNS”, “MANU”, “TIME”, “TRIG”	ALWAYS	USER
Trigger Source or Type	(0018,1061)	LO	EKG (only gated and gated-tomo)	ANAP	AUTO
Actual Frame Duration	(0018,1242)	IS	Taken from acquisition	ANAP	AUTO/ USER
Corrected Image	(0028,0051)	CS	“UNIF”	ALWAYS	AUTO

**Table 7.1-14
NM ISOTOPE MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Energy Window Information	(0054,0012)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>Energy Window Name	(0054,0018)	SH	Taken from acquisition	ALWAYS	AUTO
>Energy Window Range	(0054,0013)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>>Energy Window Lower Limit	(0054,0014)	DS	Taken from acquisition	ALWAYS	USER
>>Energy Window Upper Limit	(0054,0015)	DS	Taken from acquisition	ALWAYS	USER
Radiopharmaceutical Information	(0054,0016)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>Radiopharmaceutical	(0018,0031)	LO	Taken from acquisition	ALWAYS	USER
>Radionuclide Total Dose	(0018,1074)	DS	Taken from acquisition	ALWAYS	USER
> Radionuclide Code	(0054,0300)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>>Code Value	(0008,0100)	SH	Baseline CID 18.	ALWAYS	AUTO
>>Coding Scheme Designator	(0008,0102)	SH	“99SDM”	ALWAYS	AUTO
>>Code Meaning	(0008,0104)	LO	Baseline CID 18.	ALWAYS	AUTO
Intervention Drug Information	(0018,0026)	SQ	Zero or one item shall be included in this sequence.	VNAP	AUTO
>Intervention Drug Name	(0018,0034)	LO	Taken from acquisition	VNAP	USER
>Intervention Drug Start Time	(0018,0035)	TM	Taken from acquisition	VNAP	USER
> Intervention Drug Dose	(0018,0028)	DS	Taken from acquisition	VNAP	USER

**Table 7.1-15
NM DETECTOR MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Detector Information	(0054,0022)	SQ	Zero or one item shall be included in this sequence.	ANAP	AUTO
>Collimator/Grid Name	(0018,1180)	SH	Taken from gantry	ALWAYS	AUTO
>Collimator Type	(0018,1181)	CS	"PARA","FANB"	ALWAYS	AUTO
>Field of View Shape	(0018,1147)	CS	"RECTANGLE"	ALWAYS	AUTO
>Field of View Dimension(s)	(0018,1149)	IS	Generated by device	ALWAYS	AUTO
>Focal Distance	(0018,1182)	IS	"0"	ALWAYS	AUTO
>X Focus Center	(0018,1183)	DS	"0"	ALWAYS	AUTO
>Y Focus Center	(0018,1184)	DS	"0"	ALWAYS	AUTO
>Zoom Factor	(0028,0031)	DS	Taken from acquisition	ALWAYS	USER
>Center of Rotation Offset	(0018,1145)	DS	0	ALWAYS	AUTO
>Start Angle	(0054,0200)	DS	Generated by device	ALWAYS	USER
>Radial Position	(0018,1142)	DS	Taken from gantry	ALWAYS	USER
>Image Orientation (Patient)	(0020,0037)	DS	Generated by device	VNAP	AUTO
>Image Position (Patient)	(0020,0032)	DS	Generated by device	VNAP	AUTO
>View Code	(0054,0220)	SQ	Zero or one item shall be included in this sequence.	ANAP	AUTO
>>Code Value	(0008,0100)	SH	User input.	ALWAYS	USER
>>Coding Scheme Designator	(0008,0102)	SH	"99SDM"	ALWAYS	AUTO
>>Code Meaning	(0008,0104)	LO	user input.	ALWAYS	USER

**Table 7.1-16
NM TOMO ACQUISITION MODULE OF CREATED NM IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Rotation Information	(0054,0052)	SQ	Zero or one item shall be included in this sequence.	VNAP	AUTO
>Start Angle	(0054,0200)	DS	Generated by device	ALWAYS	USER
>Angular Step	(0018,1144)	DS	Taken from acquisition	ALWAYS	USER
>Rotation Direction	(0018,1140)	CS	"CW","CCW"	ALWAYS	USER
>Scan Arc	(0018,1143)	DS	180,360	ALWAYS	USER
>Actual Frame Duration	(0018,1242)	IS	Taken from acquisition	ALWAYS	AUTO/ USER
>Radial Position	(0018,1142)	DS	Taken from gantry	ALWAYS	USER
>Number of Frame in Rotation	(0054,0053)	US	Taken from acquisition	ALWAYS	USER
>Table Traverse	(0018,1131)	DS	Taken from gantry	ALWAYS	USER
Type of Detector Motion	(0054,0202)	CS	"STEP AND SHOOT", "CONTINUOUS"	ALWAYS	USER

Table 7.1-17
NM MULTI-GATED ACQUISITION MODULE OF CREATED NM IMAGE SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Beat Rejection Flag	(0018,1080)	CS	Y or N	ALWAYS	USER
Skip Beats	(0018,1086)	IS	1	ALWAYS	AUTO
Heart Rate	(0018,1088)	IS	Taken from acquisition	ALWAYS	AUTO
Gated Information Sequence	(0054,0062)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>Trigger Timer	(0018,1060)	DS	0	ALWAYS	AUTO
>Cardiac Framing Type	(0018,1064)	LO	FORWARD or FORWARD/BACKWARD	ALWAYS	AUTO
>Data Information	(0054,0063)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>>Frame Time	(0018,1063)	DS	Taken from acquisition	ALWAYS	AUTO
>>Nominal Interval	(0018,1062)	IS	Taken from acquisition	ALWAYS	AUTO
>>Low R-R Value	(0018,1081)	IS	Taken from acquisition	ALWAYS	AUTO
>>High R-R Value	(0018,1082)	IS	Taken from acquisition	ALWAYS	AUTO
>>Intervals Acquired	(0018,1183)	IS	Taken from acquisition	ALWAYS	AUTO
>>Intervals Rejected	(0018,1184)	IS	Taken from acquisition	ALWAYS	AUTO
>>Time Slot Information	(0054,0072)	SQ	Zero or one item shall be included in this sequence.	ALWAYS	AUTO
>>>Time Slot Time	(0054,0073)	DS	Generation by device	ALWAYS	AUTO

Table 7.1-18
NM PHASE ACQUISITION MODULE OF CREATED NM IMAGE SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Phase Information	(0054,0032)	CS	Generation by device	ALWAYS	AUTO
>Phase Delay	(0054,0036)	IS	0	ALWAYS	AUTO
>Actual Frame Duration	(0018,1242)	IS	Taken from acquisition	ALWAYS	USER
>Phase Between Frames	(0054,0038)	IS	0	ALWAYS	AUTO
>Number of Frames in Phase	(0054,0033)	US	Taken from acquisition	ALWAYS	USER

Table 7.1-19
GENERAL ANATOMY OPTIONAL MODULE OF CREATED NM IMAGE SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Anatomic region	(0008,2218)	SQ	Zero or one item shall be included in this sequence.	ANAP	AUTO
>Code Value	(0008,0100)	SH	Refer to Table 7.2-20.	ALWAYS	AUTO
>Coding Scheme Designator	(0008,0102)	SH	"99SDM"	ALWAYS	AUTO
>Code Meaning	(0008,0104)	LO	Refer to Table 7.2-20.	ALWAYS	AUTO

Table 7.1-20
Code Value and Code Meaning

Organ Name	Code Value	Code Meaning
Brain	T-A0100	Brain
Heart	T-32000	Heart
Adrenal Gland	T-B3000	Adrenal Gland
Stomach	T-57000	Stomach
Liver	T-62000	Liver
Parathyroid	T-B7000	Parathyroid
Kidney	T-71000	Kidney
Salivary Gland	T-61000	Salivary Gland
Thyroid	T-B6000	Thyroid
Cerebrospinal fluid	T-A1000	Cerebrospinal fluid
Gall Bladder	T-63000	Gall Bladder
Esophagus	T-56000	Esophagus
Lymphatic	T-AA920	Lymphatic
Breast	T-C6010	Breast
Lung	T-04000	Lung
Bone	T-28000	Bone
Spleen	T-11000	Spleen
Testis	T-C3000	Testis
Ureter	T-94000	Ureter
Bladder	T-73000	Bladder
Entire body	T-74000	Entire body

Table 7.1-21
VOI/LUT MODULE OF CREATED NM IMAGE SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	(0028,1050)	DS	Generation by device	ALWAYS	AUTO
Window Width	(0028,1051)	DS	Generation by device	ALWAYS	AUTO

Table 7.1-22
SOP COMMON MODULE OF CREATED NM IMAGE SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character set	(0008,0005)	CS	Refer to Section 5	ANAP	AUTO
SOP Class UID	(0008,0016)	UI	"1.2.840.10008.5.1.4.1.1.20"	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Generated by device	ALWAYS	AUTO

**Table 7.1-23
PRIVATE APPLICATION MODULE OF CREATED CT IMAGE SOP INSTANCES**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Private Creator Code	(7011,00xx)	LO	"TOSHIBA_MEC_NM3A"	ALWAYS	AUTO
Number of Phases	(7011,xx01)	SS	Taken from dynamic tomo acquisition	ANAP	USER
Number of Repeats per Phases	(7011,xx02)	SS	Taken from dynamic tomo acquisition	ANAP	USER
Number of Cycles per Repeat	(7011,xx03)	SS	Taken from dynamic tomo acquisition	ANAP	USER
Cycle Start Time	(7011,xx04)	SL	Taken from dynamic tomo acquisition	ANAP	AUTO
Cycle End Time	(7011,xx05)	SL	Taken from dynamic tomo acquisition	ANAP	AUTO
Effective Repeat Acquisition Time	(7011,xx06)	SL	Taken from dynamic tomo acquisition	ANAP	AUTO
OM Line Angle	(7011,xx07)	SL	Taken from gantry in cerebral tomo and dynamic tomo acquisition (NULL if not cerebral)	ANAP	USER
Collimator Name	(7011,xx08)	CS	Taken from gantry	ALWAYS	AUTO
Collimator Type	(7011,xx09)	CS	Taken from gantry	ALWAYS	AUTO
Field of View Dimensions	(7011,xx0A)	IS	Taken from acquisition	ALWAYS	AUTO
Focal Distance	(7011,xx0B)	IS	0≠0≠0	ALWAYS	AUTO
X Focus Center	(7011,xx0C)	DS	0≠0≠0	ALWAYS	AUTO
Y Focus Center	(7011,xx0D)	DS	0≠0≠0	ALWAYS	AUTO
Start Angle	(7011,xx0E)	DS	Generated by device	ALWAYS	USER
Acquisition Type	(7011,xx0F)	LO	Taken from acquisition protocol Required if Image Type (0008,0008) Value 3 is TOMO, GATED TOMO and DYNAMIC TOMO.	ANAP	USER
OM Line Position	(7011,xx10)	SL	Taken from gantry in tomo and dynamic tomo acquisition	ALWAYS	AUTO
Useful Field of View	(7011,xx11)	SS	Generated by device	ALWAYS	AUTO
Energy Window Type	(7011,xx20)	LO	Taken from acquisition	ALWAYS	USER
Preset Name used for Acquisition	(7011,xx21)	LO	Taken from acquisition	ALWAYS	USER

7.1.2 USED FIELDS IN RECEIVED IOD BY APPLICATION

The GCA9300R storage application does not receive SOP Instances. The usage of attributes received via Modality Worklist is described in section 4.2.2.3.1.3.

7.1.3 Attribute Mapping

The relationships between attributes received via Modality Worklist, stored in acquired images are summarized in Table 7.1-24.

Copy: The value will be copied from a corresponding source attribute of another DICOM object, as defined by the table column.

Copy from :<DICOM attribute>: The source as specified in the referenced DICOM attribute will be used instead of using the DICOM attribute of the same row as the source.

Table 7.1-24
ATTRIBUTE MAPPING BETWEEN MODALITY WORKLIST, IMAGE

Attribute Name	Tag	Modality Worklist	Image IOD
Patient ID	(0010,0020)	Source	Copy
Patient Name	(0010,0010)	Source	Copy
Patient's Birth date	(0010,0030)	Source	Copy
Patient's Sex	(0010,0040)	Source	Copy
Patient Size	(0010,1020)	Source	Copy
Patient Weight	(0010,1030)	Source	Copy
Patient Comments	(0010,4000)	Source	Copy
Study Instance UID	(0020,000D)	Source	Copy
Accession Number	(0008,0050)	Source	Copy
Study ID	(0020,0010)	-	Copy from: Request Procedure ID(0040,1001)
Referring Physician's Name	(0008,0090)	Source	Copy
Requesting Physician	(0032,1032)	Source	Copy
Performing Physician's Name	(0008,1050)	-	Copy from: Scheduled Performing Physician's Name (0040,0006)
Performed Procedure Step Description	(0040,0254)	-	Copy from: Scheduled Procedure Step Description (0040,0007)
Performed Procedure Step ID	(0040,0253)	-	Copy from: Scheduled Procedure Step ID (0040,0009)
Comments on Scheduled Procedure Step	(0040,0280)	-	Copy from: Comments on Scheduled Procedure Step(0040,0400)

7.1.4 Coerced/Modified Fields

The Modality Worklist AE will truncate attribute values received in the response to a Modality Worklist Query if the value length is longer than the maximum length permitted by the attribute's VR

7.2 DATA DICTIONARY OF PRIVATE ATTRIBUTES

This product reserves private attribute values in the group 7011.

The private attributes added to created SOP instances or directory records are listed in the following table;

Table 7.2-1
DATA DICTIONARY OF PRIVATE ATTRIBUTES

Tag	Attribute Name	VR	VM
(7011,00xx)	Private Creator Code	LO	1
(7011,xx01)	Number of Phases	SS	1-n
(7011,xx02)	Number of Repeats per Phases	SS	1-n
(7011,xx03)	Number of Cycles per Repeat	SS	1-n
(7011,xx04)	Cycle Start Time	SL	1-n
(7011,xx05)	Cycle End Time	SL	1-n
(7011,xx06)	Effective Repeat Acquisition Time	SL	1-n
(7011,xx07)	OM Line Angle	SL	1
(7011,xx08)	Collimator Name	CS	1-n
(7011,xx09)	Collimator Type	CS	1-n
(7011,xx0A)	Field of View Dimensions	IS	1-n
(7011,xx0B)	Focal Distance	IS	1-n
(7011,xx0C)	X Focus Center	DS	1-n
(7011,xx0D)	Y Focus Center	DS	1-n
(7011,xx0E)	Start Angle	DS	1-n
(7011,xx0F)	Acquisition Type	LO	1
(7011,xx10)	OM Line Position	SL	1
(7011,xx11)	Useful Field of View	SS	2-n
(7011,xx20)	Energy Window Type	LO	1-n
(7011,xx21)	Preset Name used for Acquisition	LO	1

7.3 CONTROLLED TERMINOLOGY AND TEMPLATES

Not applicable to this product

7.4 GRAYSCALE IMAGE CONSISTENCY

Not applicable to this product

7.5 STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

Not applicable to this product

7.6 PRIVATE TRANSFER SYNTAXES

Not applicable to this product