DICOM
CONFORMANCE STATEMENT
FOR
MODEL TFS-7200
(MIIMS0014EA)

TOSHIBA MEDICAL SYSTEMS CORPORATION

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1 CONFORMANCE STATEMENT OVERVIEW

The TFS-7200 is a self-contained networked computer system used for archiving diagnostic medical images. It allows external systems to send images to it for permanent storage. The system conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

Table1-1
SUPPORTED NETWORKING DICOM SERVICE (SOP) CLASSES

SOP Classes	Initiator of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	Yes	Yes
Image Transfer		
CT Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
SC Image Storage	Yes	Yes
NM Image Storage	Yes	Yes
PET Image Storage	Yes	Yes
Query/Retrieve		
Study Root Information Model FIND	No	Yes
Study Root Information Model MOVE	No	Yes

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3   INTRODUCTION

3.1   AUDIENCE

This document is intended for hospital staff, health system integrators, software designers, service staff, and implementers. It is assumed that the reader has a working understanding of DICOM.

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 the intended information.

The scope of this Conformance Statement is to facilitate communication between the TFS-7200 and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself, this Conformance Statement does not guarantee the desired interoperability and successful interconnectivity.

The user should be aware of the following important issues:

— Comparison of the different conformance statements is the first step towards assessing the interconnectivity between the TFS-7200 and other equipment.
— Test procedures should be defined to validate the desired level of connectivity.
— The DICOM standard is evolving to meet the future requirements of users. Toshiba Medical Systems Corporation is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue them.

3.3   DEFINITIONS, TERMS, AND ABBREVIATIONS

AE	Application Entity
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
IE	Information Entity
IOD	Information Object Definition
ISO	International Standards Organization
MR	Magnetic Resonance
NM	Nuclear Medicine
PDU	Protocol Data Unit
PET	Positron Emission Tomography
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair

TCP/IP   Transmission Control Protocol/Internet Protocol

UID   Unique Identifier

VM   Value Multiplicity

VR   Value Representation

3.4   REFERENCES

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2004

4 NETWORKING

4.1 IMPLEMENTATION MODEL

4.1.1 Application Data Flow
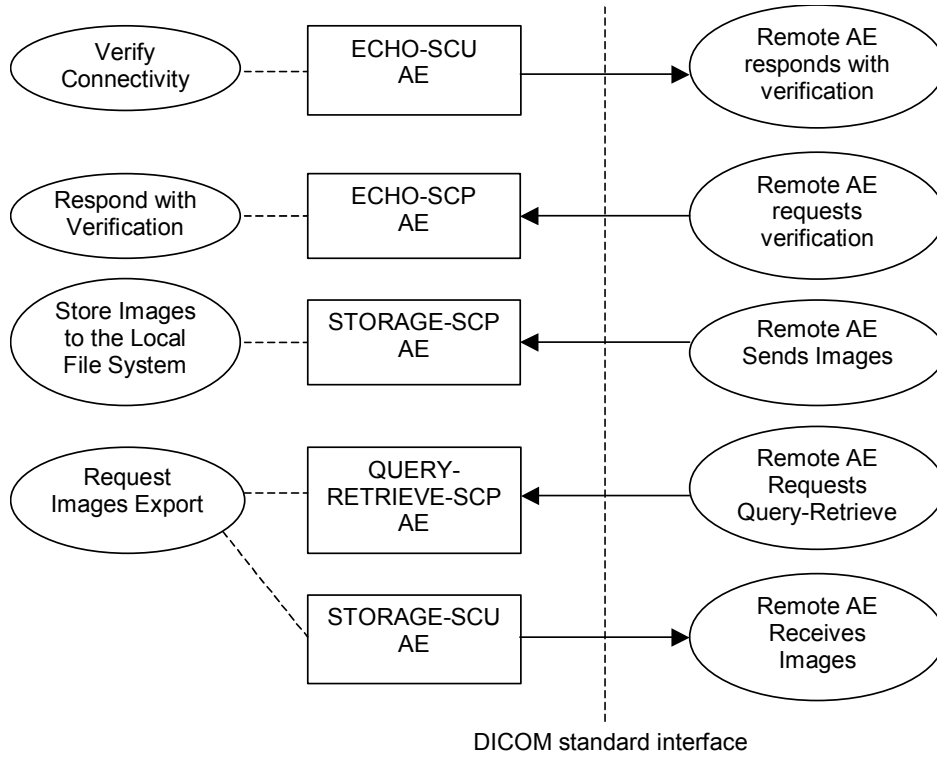

DICOM standard interface

Figure 4.1-1
TFS-7200 DICOM DATA FLOW DIAGRAM

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All application entities detailed in the application data flow diagram are Windows Server 2003 applications.

— The STORAGE-SCU AE can send Composite SOP Instances. It sends DICOM images to the specified DICOM destination.
— The ECHO-SCU AE can send verification requests to the specified DICOM destination.
— The STORAGE-SCP AE can receive incoming DICOM images and can add them to the TFS-7200 database. It can respond to external C-STORE archive requests as a Service Class Provider (SCP). The STORAGE-SCP AE currently only supports image type Composite SOP instances.
— The ECHO-SCP AE receives associations from Remote AE for verifyication, and automatically responds based on the success status.
— The QUERY-RETRIEVE-SCP AE functions as an SCP for C-FIND and C-MOVE requests.

4.1.2   **Function Definitions of AEs**

4.1.2.1   **Functional Definition of STORAGE-SCU Application Entity**

The manual operations 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.

4.1.2.2   **Functional Definition of STORAGE-SCP Application Entity**

The STORAGE-SCP AE waits for other applications to connect to the presentation address set for the application entity title. When an application connects, the STORAGE-SCP AE expects the application to be a DICOM application. The STORAGE-SCP AE accepts associations with Presentation Contents for Storage SOP Class. Any images received with this presentation context are added to the database.

4.1.2.3   **Functional Definition of QUERY-RETRIEVE-SCP Application Entity**

The QUERY-RETRIEVE-SCP AE waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the QUERY-RETRIEVE-SCP AE expects it to be a DICOM application. The QUERY-RETRIEVE-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the DICOM Query-Retrieve Service Class. For C-MOVE requests the destination for the image objects is determined from the Destination AE Title contained in the C-MOVE request. When a retrieval request is received, the QUERY-RETRIEVE-SCP AE issues a command to the STORAGE-SCU AE to send the specified images to the C-MOVE Destination AE.

4.1.3   Real World Operation Sequencing

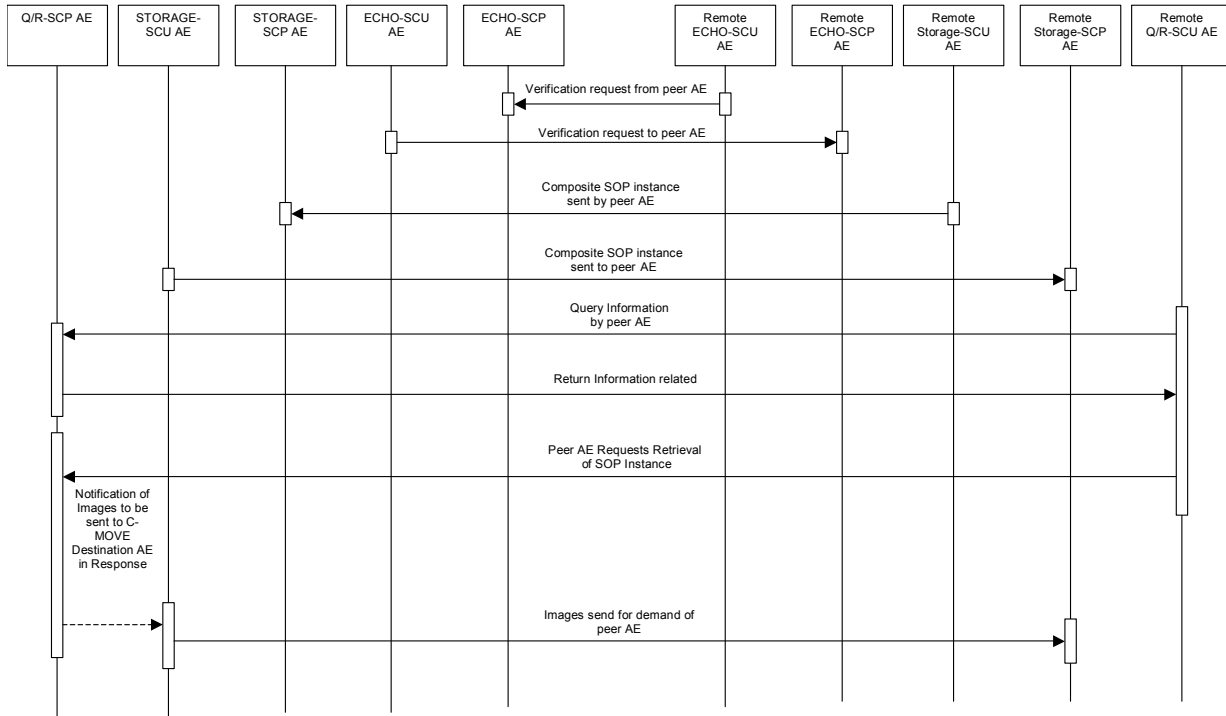There are no special restrictions on sequencing between application entities in the TFS-7200.

Figure 4.1-2
SEQUENCING CONSTRAINTS

4.2 AE SPECIFICATIONS

4.2.1 STORAGE-SCU Application Entity Specification

4.2.1.1 SOP Classes

The STORAGE-SCU AE provides Standard Conformance to the following DICOM SOP classes:

Table 4.2-1
SOP CLASSES FOR STORAGE-SCU AE

SOP Class	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No

4.2.1.2 Association Establishment Policies

4.2.1.2.1 General

The STORAGE-SCU AE can form associations via user control. The STORAGE-SCU AE can only request the starting of an association. It cannot accept association start requests from external application entities.

The DICOM Standard Application Context Name for DICOM is always proposed.

Table 4.2-2
DICOM APPLICATION CONTEXTS FOR STORAGE-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

The maximum number of simultaneous Associations cannot be changed.

Table 4.2-3
NUMBERS OF ASSOCIATIONS AS A SCU FOR STORAGE-SCU AE

Maximum Number of Simultaneous Associations	1

4.2.1.2.3 Asynchronous Nature

The STORAGE-SCU AE does not support asynchronous communications (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before new operation can be initiated.

Table 4.2-4
ASYNCHRONOUS NATURE AS A SCU FOR STORAGE-SCU AE

Maximum Number of outstanding Asynchronous Transactions	1

4.2.1.2.4   Implementation Identifying Information

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

Implementation Class UID	1.2.392.200036.9116.7.23.10
Implementation Version Name	TM_OT_TFS7K_1.0

4.2.1.3   Association Initiation Policy

4.2.1.3.1   Activity - Send Images

4.2.1.3.1.1   Destination and Sequencing of Activity

When the STORAGE-SCU AE is started in order to transmit an image, the STORAGE-SCU AE initiates a new association. The association request is sent to the specified AE, and when the requested presentation context negotiation has been completed, image transmission starts. Transmission of all specified images with one association can be attempted, but is not always possible. When all images are sent, the association is terminated. If there are errors during transmission for an association, image transmission will be halted. The STORAGE-SCU AE does not automatically reattempt image transmission. Note that the STORAGE-SCU AE uses the DICOM storage service class, and does not support sending of unrequested SOP instances.
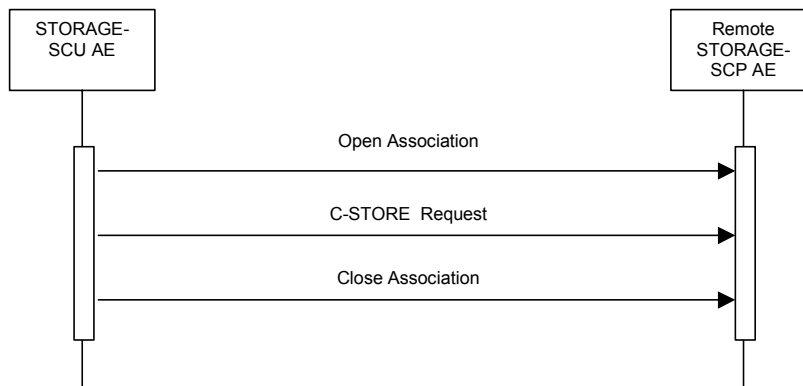
Figure. 4.2-1
SEQUENCING OF ACTIVITY – SEND IMAGES

The following sequencing restrictions, illustrated in figure 4.2-1, apply to the STORAGE-SCU AE:

1. The STORAGE-SCU AE opens a new Association with the specified destination AE.
2. The STORAGE-SCU AE sends the indicated Composite SOP instances.
3. The STORAGE-SCU AE closes the Association.

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 BY STORAGE-SCU AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
Name	**UID**	**Name**	**UID**		**Neg.**
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCU	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCU	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCU	None

Note: The chart above shows the default actions of The STORAGE-SCU AE submitted SOP classes and transfer syntax. The STORAGE-SCU AE can be configured to submit context subsets and additional presentation contexts.

4.2.1.3.1.3 SOP Specific Conformance for Storage SOP Classes

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-SCU AE C-STORE RESPONSE HANDLING BEHAVIOR

Service Status	Detailed Meaning	Error Code	Action
Success	Success	0000	Success indication message is output to the Service Logs. No message is posted to the User Interface.
Error	Failure	Status codes other than the above	Several retries are performed, but if errors continue to be detected, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.

4.2.1.4 Association Acceptance Policy

The STORAGE-SCU AE does not accept associations.

4.2.2   ECHO-SCU Application Entity Specifications

4.2.2.1   SOP Class

The ECHO-SCU AE provides Standard Conformance to the following DICOM SOP classes:

Table 4.2-8
SOP CLASSES FOR ECHO-SCU AE

SOP Class	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No

4.2.2.2   Association Establishment Policies

4.2.2.2.1   General

The ECHO-SCU AE can form associations via user control. The ECHO-SCU AE can only request the starting of an association. It cannot accept association start requests from external application entities. The DICOM Standard Application Context Names for DICOM is always accepted.

Table 4.2-9
DICOM APPLICATION CONTEXTS FOR ECHO-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2   Number of Associations

The maximum number of simultaneous associations cannot be changed.

Table 4.2-10
NUMBERS OF ASSOCIATIONS AS A SCU FOR ECHO-SCU AE

Maximum Number of Simultaneous Associations	1

4.2.2.2.3   Asynchronous Nature

The ECHO -SCU AE does not support asynchronous communication (multiple incomplete transactions on a single association). All association requests must be completed and confirmed before new actions can be performed.

Table 4.2-11
ASYNCHRONOUS NATURE AS A SCU FOR ECHO-SCU AE

Maximum Number of Outstanding Asynchronous Transactions	1

4.2.2.2.4   Implementation Identification Information

Table 4.2-12
DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO-SCU AE

Implementation Class UID	1.2.392.200036.9116.7.23.10
Implementation Version Name	TM_OT_TFS7K_1.0

4.2.2.3   Association Initiation Policy

4.2.2.3.1   Activity - Verify Connectivity

4.2.2.3.1.1   Destination and Sequencing of Activity

The ECHO-SCU AE initiates association through user control.
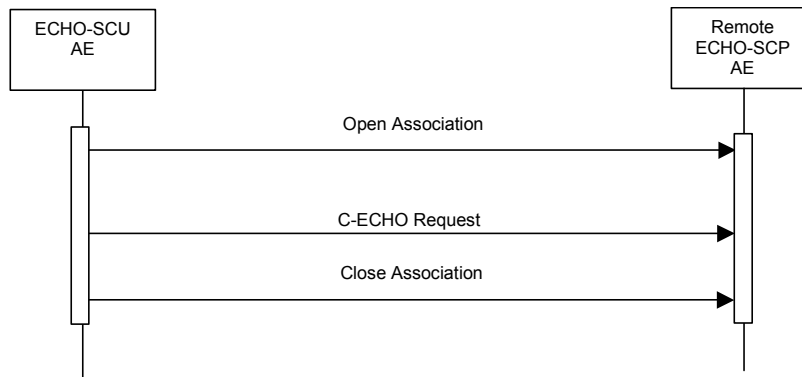
Figure. 4.2-2
SEQUENCING OF ACTIVITY – ECHO

The following sequencing restrictions, illustrated in figure 4.2-2, apply when the ECHO-SCU AE:

1. The ECHO-SCU AE opens a new association with the specified destination AE.
2. The ECHO -SCU AE sends C-ECHO requests.
3. The ECHO -SCU AE closes the Association.

4.2.2.3.1.2   Proposed Presentation Context

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

Table 4.2-13
PROPOSED PRESENTATION CONTEXTS BY THE ECHO-SCU AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.2.3.1.3   SOP Specific Conformance for Verification SOP Class

The TFS-7200 monitors the status, and service log files can be used to diagnose problems that may occur. If an error occurs in DICOM transmission, an appropriate message will be entered into the service log.

The ECHO-SCU AE performs the following actions based on the status code values in the C-ECHO responses from the destination C-ECHO SCP:

Table 4.2-14
ECHO-SCU AE C-ECHO RESPONSE STATUS ACTIONS

Service Status	Detailed Meaning	Error Code	Action
Success	Success	0000	No message is posted to the User Interface.
Error	Failure	Status codes other than the above	Several retries are performed, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.

4.2.2.4   Association Acceptance Policy

The ECHO-SCU AE does not accept associations.

4.2.3 STORAGE-SCP Application Entity Specifications

4.2.3.1 SOP Classes

The STORAGE-SCP AE provides Standard Comformance to the following DICOM SOP classes:

Table 4.2-15
SOP CLASSES FOR STORAGE-SCP AE

SOP Class	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes

4.2.3.2 Association Establishment Policies

4.2.3.2.1 General

The STORAGE-SCP AE can accept association requests. The STORAGE-SCP AE accepts association requests for the archive service.
The DICOM Standard Application Context Name for DICOM is always accepted.

Table 4.2-16
DICOM APPLICATION CONTEXTS FOR STORAGE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2 Number of Associations

The STORAGE-SCP AE can support multiple simultaneous associations requested by peer AEs. When accepting associations, the STORAGE-SCP AE starts a sub-process to handle archive service requests. The maximum number of sub-processes, that is, the maximum number of associations that can be processed simultaneously, is configurable. The default maximum value is 5. This maximum number of simultaneous associations can be the absolute value or the maximum value for each external application entity making requests. The flexibility of the second option stops a hang-up in transmission with an external AE with unstable connectivity from preventing association with the client AE.

Table 4.2-17
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR STORAGE-SCP AE

Maximum Number of Simultaneous Associations Requested by peer AEs.	15 (Configurable)

Note: This value is a thing of all SCP. When other SCP activates, this value decreases.

4.2.3.2.3 Asynchronous Nature

The TFS-7200 AE does not support asynchronous communications (multiple incomplete transactions on a single association).

Table 4.2-18
ASYNCHRONOUS NATURE A SCP FOR STORAGE-SCP

Maximum Number of Outstanding Asynchronous Transactions	1

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4.2.3.2.4 Implementation Identification Information

The implementation information for the Application Entity is:

Table 4.2-19
DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.23.10
Implementation Version Name	TM_OT_TFS7K_1.0

4.2.3.3 Association Initiation Policy

The STORAGE-SCP AE does not initiate association.

4.2.3.4 Association Acceptance Policy

4.2.3.4.1 Activity - Store Images to the Local File System

4.2.3.4.1.1 Description and Sequencing of Activity

The STORAGE-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or Application Entity Titles.
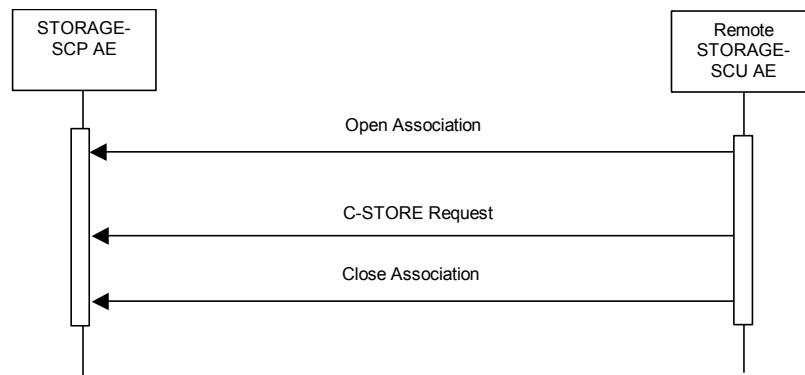
Figure. 4.2-3
SEQUENCING OF ACTIVITY – RECEIVE IMAGE REQUEST

The following sequencing constraints illustrated in Figure 4.2-3 apply to the STORAGE-SCP AE:

1. The Remote AE opens an Association with the STORAGE-SCP AE.
2. The Remote AE requests Storege of Composite SOP Instance(s).
3. The Remote AE closes the Association.

4.2.3.4.1.2   Accepted Presentation Contexts

The default Behavior of the STORAGE-SCP AE supports the Implicit VR Little Endian, Explicit VR Little Endian, Explicit VR Big Endian and JPEG Lossless compression Transfer Syntaxes for all Associations.

Table 4.2-20
ACCEPTED PRESENTATION CONTEXTS BY STORAGE-SCP AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		

4.2.3.4.1.3 **SOP Specific Conformance for Storege SOP Classes**

The associated Activity with the Storage service is the storage of medical image data received over the network on a designated hard disk. The Storage SCP AE will return a failure status if it is unable to store the images on to the hard disk.

The Storage SCP AE is Level 0 conformant as a Storage SCP.

Table 4.2-21
STORAGE-SCP AE C-STORE RESPONSE STATUS RETURN REASONS

Service Status	Detailed Meaning	Error Code	Reason
Success	Success	0000	The composite SOP instances were successfully received, confirmed, and saved in the system database.
Error	Data Set Does Not Match SOP Class	A900	The data set was not encoded with a valid specified SOP instance. For example, "Abstract Syntax Unsupported", "Transfer Syntax Unsupported". An error message is written to the service log.
	Unclear	C000	The STORAGE-SCP AE could not translate the data set into element syntax. For example, "No Disk Space", "No Management Key Space", "Management Key Error". An error message is written to the service log.

4.2.4 ECHO-SCP Application Entity Specifications

4.2.4.1 SOP Class

The ECHO-SCP AE provides Standard Comformance to the following DICOM SOP classes:

Table 4.2-22
SOP CLASSES FOR ECHO-SCP AE

SOP Class	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes

4.2.4.2 Association Establishment Policies

4.2.4.2.1 General

The ECHO-SCP AE can accept association requests.
DICOM Standard Application Context Names for DICOM are always accepted.

Table 4.2-23
DICOM APPLICATION CONTEXTS FOR ECHO-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.4.2.2 Number of Associations

The maximum number of simultaneous associations can be configured.

Table 4.2-24
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR ECHO-SCP AE

Maximum Number of Simultaneous Associations	15 (Configurable)

Note: This value is a thing of all SCP. When other SCP activates, this value decreases.

4.2.4.2.3 Asynchronous Nature

The ECHO-SCP AE does not support asynchronous communications (multiple incomplete transactions on a single association). All association requests must be completed and confirmed before new actions can be performed.

Table 4.2-25
ASYNCHRONOUS NATURE FOR ECHO-SCP

Maximum Number of Outstanding Asynchronous Transactions	1

4.2.4.2.4 Implementation Identification Information

The implementation information for the Application Entity is:

Table 4.2-26
DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.23.10
Implementation Version Name	TM_OT_TFS7K_1.0

4.2.4.3 Association Initiation Policy

The ECHO-SCP AE does not initiate association.

4.2.4.4 Association Acceptance Policy

4.2.4.4.1 Activity - Respond with Verification

4.2.4.4.1.1 Description and Sequencing of Activity

The ECHO-SCP AE accepts Associations. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or Application Entity Titles.
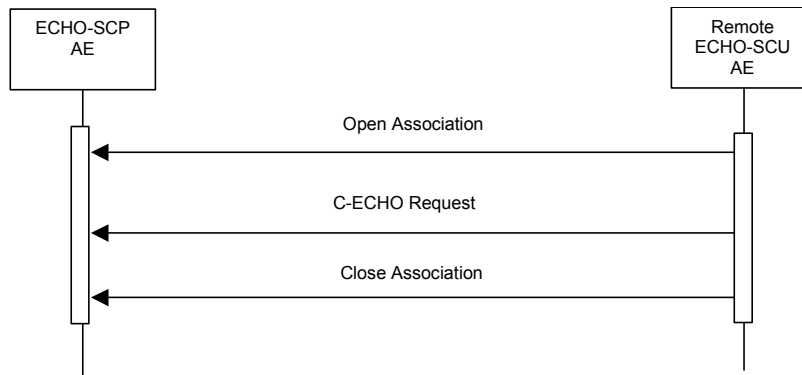
Figure. 4.2-4
SEQUENCING OF ACTIVITY – RECEIVE ECHO REQUEST

 The following sequencing constraints illustrated in Figure 4.2-4, apply to the ECHO-SCP AE:

1. The Remote AE opens an Association with the ECHO-SCP AE.
2. The Remote AE requests Echo.
3. The Remote AE closes the Association.

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4.2.4.4.2   Accepted Presentation Contexts

The default Behavior of the ECHO-SCP AE supports the Implicit VR Little Endian Transfer Syntaxes for all Associations. The ECHO-SCP AE accepts the presentation contexts listed below:

Table 4.2-27
ACCEPTED PRESENTATION CONTEXTS BY ECHO-SCP AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.4.4.3   SOP Specific Conformance for Verification SOP Classes

The TFS-7200 monitors the status, and service log files can be used to diagnose problems that may occur. If an error occurs in DICOM transmission, an appropriate message will be entered into the service log. In some cases, an error message may be displayed on the user interface.
The ECHO-SCP AE performs the following actions based on the status code values in the C-ECHO responses from the peer ECHO SCU:

Table 4.2-28
ECHO-SCP AE C-ECHO RESPONSE STATUS RETURN REASONS

Service Status	Detailed Meaning	Error Code	Reason
Success	Success	0000	
Error	Does Not Match SOP Class	A900	An error message is written to the Service Log.

4.2.5 QUERY-RETRIEVE-SCP Application Entity Specification

4.2.5.1 SOP Classes

The QUERY-RETRIEVE-SCP AE provides Standard Conformance to the following DICOM SOP Classes:

Table 4.2-29
SOP CLASSES FOR QUERY-RETRIEVE-SCP AE

SOP Class	SOP Class UID	SCU	SCP
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

4.2.5.2 Association Policies

4.2.5.2.1 General

The QUERY-RETRIEVE-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM AEs. The QUERY-RETRIEVE-SCP AE will accept Associations for C-FIND and C-MOVE requests. In the case of a C-MOVE request, the QUERY-RETRIEVE-SCP AE will issue a command to the STORAGE-SCU AE to initiate an Association with the Destination DICOM AE to send images as specified by the originator of the C-MOVE Request.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Table 4.2-30
DICOM APPLICATION CONTEXT FOR QUERY-RETRIEVE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.5.2.2 Number of Associations

The maximum number of simultaneous associations can be configured.

Table F.4.2-31
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR QUERY-RETRIEVE-SCP AE

Maximum number of simultaneous Associations	15 (Configurable)

Note: This value is a thing of all SCP. When other SCP activates, this value decreases.

4.2.5.2.3 Asynchronous Nature

The QUERY-RETRIEVE-SCP AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.2-32
ASYNCHRONOUS NATURE FOR QUERY-RETRIEVE-SCP

Maximum number of outstanding asynchronous transactions	1

4.2.5.2.4 Implementation Identifying Information

The implementation information for the Application Entity is:

Table 4.2-33
DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-RETRIEVE-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.23.10
Implementation Version Name	TM_OT_TFS7K_1.0

4.2.5.3 Association Initiation Policy

The QUERY-RETRIEVE-SCP AE does not initiate association.

4.2.5.4 Association Acceptance Policy

4.2.5.4.1 Activity – Request Images Export

4.2.5.4.1.1 Description and Sequencing of Activity

The QUERY-RETRIEVE-SCP AE accepts Associations only if they have valid Presentation Contexts. The QUERY-RETRIEVE-SCP AE will notify the STORAGE-SCU to send the requested SOP Instances to the C-MOVE Destination. The STORAGE-SCU AE notifies the QUERY-RETRIEVE-SCP AE of the success or failure of each attempt to send a Composite SOP Instance to the peer C-MOVE Destination AE. The QUERY-RETRIEVE-SCP AE then sends a C-MOVE Response indicating this status after each attempt. Once the STORAGE-SCU AE has finished attempting to transfer all the requested SOP Instances, the QUERY-RETRIEVE-SCP AE sends a final C-MOVE Response indicating the overall status of the attempted retrieval.
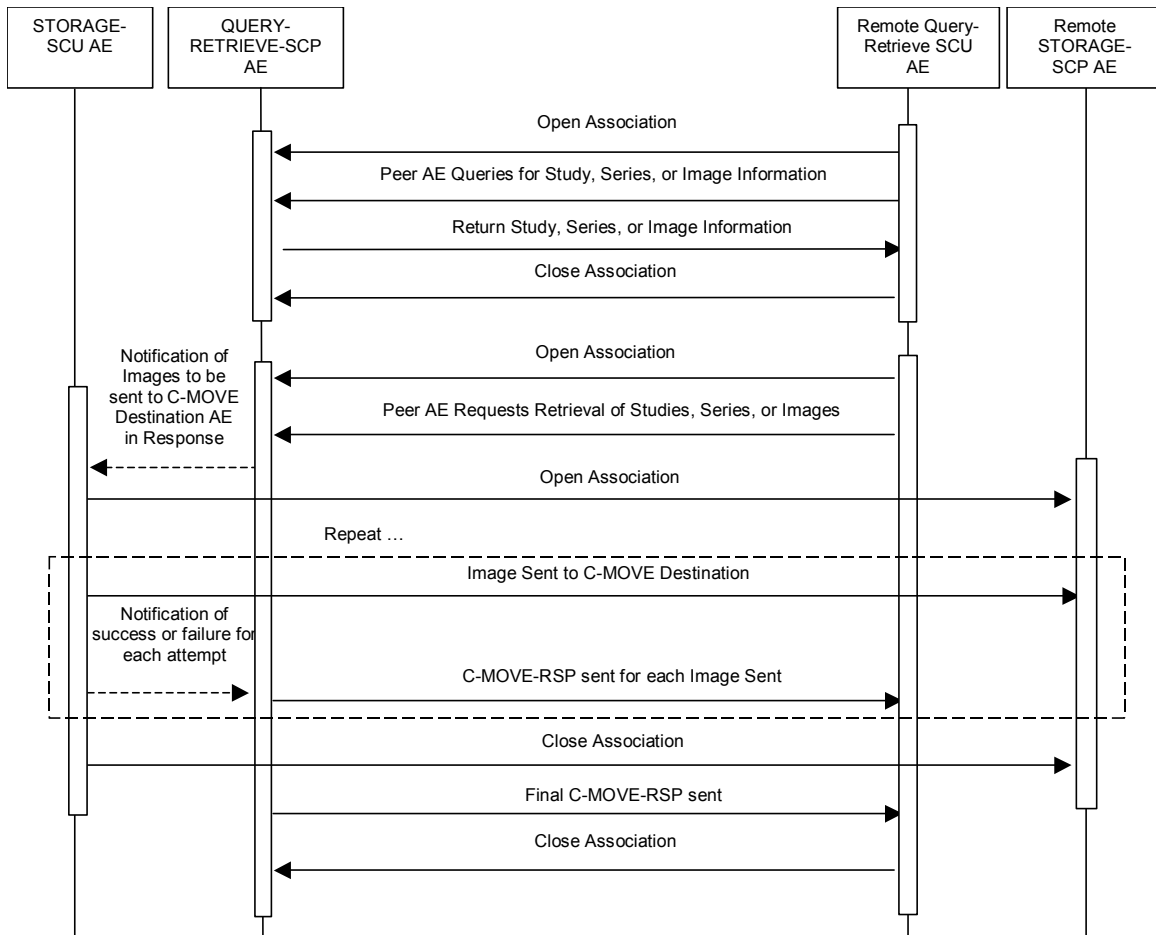
Figure 4.2-5
SEQUENCING OF ACTIVITY – REQUEST IMAGE EXPORT

The following sequencing constraints illustrated in Figure 4.2-5 apply to the QUERY-RETRIEVE-SCP AE for handling queries (C-FIND-Requests):

1. Remote AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Remote AE sends a C-FIND-RQ Message
3. The QUERY-RETRIEVE-SCP AE returns a C-FIND-RSP Message to the remote AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete.
4. Remote AE closes the Association.

The following sequencing constraints illustrated in Figure 4.2-5 apply to the QUERY-RETRIEVE-SCP AE for handling retrievals (C-MOVE-Requests):

1. Remote AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Remote AE sends a C-MOVE-RQ Message
3. The QUERY-RETRIEVE-SCP AE notifies the STORAGE-SCU AE to send the Composite SOP Instances to the peer C-MOVE Destination AE as indicated in the C-MOVE-RQ.

4. After attempting to send a SOP Instance, the STORAGE-SCU AE indicates to the QUERY-RETRIEVE-SCP AE whether the transfer succeeded or failed. The QUERY-RETRIEVE-SCP AE then returns a C-MOVE-RSP indicating this success or failure.

5. Once the STORAGE-SCU AE has completed all attempts to transfer the SOP Instances to the C-MOVE Destination AE, or the first failure occurred, the QUERY-RETRIEVE-SCP AE sends a final C-MOVE-RSP indicating the overall success or failure of the retrieval.

6. Remote AE closes the Association.

The QUERY-RETRIEVE-SCP AE may reject Association attempts as shown in the table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a. 1 – DICOM UL service-user

b. 2 – DICOM UL service-provider (ASCE related function)

c. 3 – DICOM UL service-provider (Presentation related function)

Table 4.2-34
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached.
2 – rejected-transient	c	1 – temporary-congestion	Out of System resources.
1 – rejected-permanent	a	3 – calling-AE-title-not-recognized	The Association request contained an unrecognized Calling AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed.

4.2.5.4.1.2 Accepted Presentation Contexts

The QUERY-RETRIEVE-SCP AE will accept Presentation Contexts as shown in the following table:

Table 4.2-35
ACCEPTED PRESENTATION CONTEXTS BY THE QUERY-RETRIEVE-SCP AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
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
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

4.2.5.4.1.3 SOP Specific Conformance for Query SOP Classes

The QUERY-RETRIEVE-SCP AE supports hierarchical queries and not relational queries. Those attributes requested in the query identifier are returned.

Study Root Information Model

All the required search keys on each of the three levels (Study, Series, and Image) are supported.

Table 4.2-36
STUDY ROOT C-FIND SCP SUPPORTED ELEMENTS

Level Name / Attribute Name	Tag	VR	Types of Matching
SOP Common			
Specific Character Set	0008,0005	CS	NONE
Study Level			
Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Patient's Birth Date	0010,0030	DA	S,U
Patient's Sex	0010,0040	CS	S,U
Patient Comments	0010,4000	LT	NONE
Study Date	0008,0020	DA	S,R,*,U
Study Time	0008,0030	TM	R,*,U
Accession Number	0008,0050	SH	S,*,U
Modalities in Study	0008,0061	CS	S,U,L
Study ID	0020,0010	SH	S,*,U
Study Instance UID	0020,000D	UI	S,U,L
Series Level			

Modality	0008,0060	CS	S,U
Series Number	0020,0011	IS	S,*,U
Series Instance UID	0020,000E	UI	S,U,L
Series Date	0008,0021	DA	S,R,U
Series Time	0008,0031	TM	S,R,U
Station Name	0008,1010	SH	NONE
Series Description	0008,103E	LO	NONE
Manufacturer's Model Name	0008,1090	SH	NONE
Body Part Examined	0018,0015	CS	NONE
Image Level			
Instance Number	0020,0013	IS	S,*,U
SOP Instance UID	0008,0018	UI	S,U,L
Content Date	0008,0023	DA	S,R,U
Content Time	0008,0033	TM	S,R,U
Image Comments	0020,4000	LT	NONE

The tables should be read as follows:

Attribute Name:	Attributes supported for returned C-FIND Responses.
Tag:	Appropriate DICOM tag for this attribute.
VR:	Appropriate DICOM VR for this attribute.
Types of Matching:	The types of Matching supported by the C-FIND SCP. A "S" indicates the identifier attribute can specify Single Value Matching, a "R" will indicate Range Matching, a "*" will denote wildcard matching, an 'U' will indicate universal matching, and 'L' will indicate that UID or Modality lists are supported for matching. "NONE" indicates that no matching is supported, but that values for this Element in the database can be returned.

Table 4.2-37
QUERY-RETRIEVE-SCP AE C-FIND RESPONSE STATUS RETURN REASONS

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Matching is complete.
Refused	Out of Resources	A700	Out of System resources.
Failed	Identifier does not match SOP Class	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is output to the Service Log.
	Unable to process	C001	The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database. Error message is output to the Service Log.

| Pending | Matches are continuing and current match is supplied. | FF00 | Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported. |

4.2.5.4.1.4   SOP Specific Conformance for Retrieval SOP Classes

The QUERY-RETRIEVE-SCP AE will convey to the STORAGE-SCU AE that an Association with a DICOM Application Entity named by the external C-MOVE SCU (through a MOVE Destination AE Title) should be established. It will also convey to the STORAGE-SCU AE to perform C-STORE operations on specific images requested by the external C-MOVE SCU. One or more of the Image Storage Presentation Contexts listed in table 4.2-6 will be negotiated.

An initial C-MOVE Response is always sent after confirming that the C-MOVE Request itself can be processed. After this, the QUERY-RETRIEVE-SCP AE will return a response to the C-MOVE SCU after the STORAGE-SCU AE has attempted to send each image.

Table 4.2-38
QUERY-RETRIEVE-SCP AE C-MOVE RESPONSE STATUS RETURN REASONS

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No Failures	0000	All the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Refused	Out of Resources – Unable to calculate number of matches	A701	Number of matches cannot be determined due to system failure. Error message is output to the Service Log.
	Out of Resources – Unable to perform sub-operations	A702	C-STORE sub-operations cannot be performed due to failure to access Composite SOP Instances in archive, or failure of a C-STORE Request. Error message is output to the Service Log.
	Move destination unknown	A801	The Destination Application Entity named in the C-MOVE Request is unknown to Query-Retrieve SCP AE. Error message is output to the Service Log.
Failed	Identifier does not match SOP Class	A900	The C-MOVE identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class or retrieval level. Error message is output to the Service Log.
	Unable to process	C001	The C-MOVE query identifier is valid for the specified SOP Class but cannot be used to query the database. Error message is output to the Service Log.
Warning	Sub-operations Complete – One or more Failuires	B000	Image transmission is considered successful. It will send the appropriate PENDING or SUCCESS Status in the C-MOVE Response. Warning message is output to the Service Log.

Pending	Sub-operations are continuing	FF00	A Response with this Status Code is sent every time a Composite SOP Instance has been successfully sent to the C-MOVE Destination AE.

4.3 NETWORK INTERFACES

4.3.1 Physical Network Interface

The TFS-7200 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 1000baseT
Ethernet 100baseT
Ethernet 10baseT

4.3.2 Additional Protocols

The TFS-7200 conforms to the System Management Profiles listed in Table 4.3-2. All requested transactions for the listed profiles and actors are supported. It does not support any optional transactions.

Table 4.3-2
SUPPORTED SYSTEM MANAGEMENT PROFILES

Profile Name	Actor	Protocol Used	Additional Transactions	Security Support
Network Address Management	DHCP Client	DHCP	N/A	
	DNS Client	DNS	N/A	

4.3.2.1 DHCP

DHCP can be used to obtain TCP/IP network configuration information. The network parameters obtainable via DHCP are shown in Table 4.3-3. The Default Value column of the table shows the default used if the DHCP server does not provide a value. Values for network parameters set in the Service/Installation tool take precedence over values obtained from the DHCP server. Support for DHCP can be configured via the Service/Installation Tool. The Service/Installation tool can be used to configure the machine name. If DHCP is not in use, TCP/IP network configuration information can be manually configured via the Service/Installation Tool.

Table 4.3-3
SUPPORTED DHCP PARAMETERS

DHCP Parameters	Default Value
IP Address	None
Hostname	Requested machine name
List of NTP servers	Empty list
List of DNS servers	Empty list
Routers	Empty list
Static routes	None
Domain name	None

Subnet mask	Derived from IP address (see service manual)
Broadcast address	Derived from IP address (see service manual)
Default router	None
Time offset	Site configureable (from Time zone)
MTU	Network Hardware Dependent
Auto-IP permission	Not permitted

If the DHCP server refuses to renew a lease on the assigned IP address all active DICOM Associations will be aborted.

4.3.2.2   DNS

DNS can be used for address resolution. If DHCP is not in use or the DHCP server does not return any DNS server addresses, the identity of a DNS server can be configured via the Service/Installation Tool. If a DNS server is not in use, local mapping between hostname and IP address can be manually configured via the Service/Installation Tool.

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 Tool. The Field Service Engineer can configure the TCP Port via the Service Tool.

Table 4.4-1
DEFAULT APPLICATION ENTITY CHARACTERISTICS

Application Entity	Role	Default AE Title	Default TCP/IP Port
STORAGE-SCU	SCU		Not Applicatable
ECHO-SCU	SCU	TM_OT_TFS_7001	
STORAGE-SCP	SCP		
ECHO-SCP	SCP		104
QUERY-RETRIEVE-SCP	SCP		

STORAGE-SCU, ECHO-SCU, STORAGE-SCP, ECHO-SCP and QUERY-RETRIEVE-SCP application entities are configured to use the same AE title.

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 Service Tool.

4.4.2   **Parameters**

Table 4.4-2
CONFIGURATION PARAMETERS

Parameters	Configurable	Default Value
General Parameters		
Max PDU Receive Size	Yes	129 Kbytes
Max PDU Send Size	[1-999999]	
Time-out waiting for a acceptance or rejection response to an Association Request (Application Level Timeout)	Yes [1-999999]	30 Sec
Time-out waiting for a response to an Association release request (Application Level Timeout)	Yes [1-999999]	15 sec
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)	Yes [1-999999]	15 sec
Time-out awaiting a Response to a DIMSE Request (Low-Level Timeout)	Yes [1-999999]	15 sec
Time-out for waiting for data between TCP/IP-packets (Low Level Timeout)	Yes [1-999999]	15 sec
STORAGE-SCU AE Parameters		
Maximum number of simultaneously initiated Associations by the Storage SCU AE	No	2
Supported Transfer Syntaxes (separately configurable for each remote AE)	No	-
STORAGE-SCP AE Parameters		
Maximum number of simultaneously accepted Associations by the Storage SCP AE (Can be configured to be a maximum total number or a maximum per external SCU AE)	Yes	15
Max PDU Receive Size	Yes	129Kbytes
Supported Transfer Syntaxes (separately configurable for each remote AE)	Yes	Cf. Table4.2-20
QUERY-RETRIEVE-SCP AE Parameters		
Maximum number of simultaneously accepted Associations by the Query – Retrieve SCP AE (Can be configured to be a maximum total number or a maximum per external SCU AE)	Yes	15
Max PDU Receive Size	Yes	129Kbytes

5 MEDIA INTERCHANGE

The TFS-7200 does not support Media Storage.

6 SUPPORT OF EXTENDED CHARACTER SETS

ALL TFS-7200 applications support the following:

ISO_IR 6 (Basic G0 set)
ISO_IR 13 (Japanese katakana)
ISO_IR 14 (Japanese romaji)
ISO_IR 87 (Japanese kanji, hiragana, and katakana)

The TFS-7200 can also receive and transmit images containing character sets other than those listed above, but the image viewer bundled with TFS-7200 can correctly display only the character sets listed above.

7 SECURITY

7.1 SECURITY PROFILE

Not compliant.

7.2 ASSOCIATION LEVEL SECURITY

The STORAGE-SCP AE and the ECHO-SCP can both be configured to check the following DICOM values when determining whether to accept Association Open Requests:

Calling AE Title

Called AE Title

Application Contexts

The Each SCP AE can be configured to accept Association Requests from only a limited list of Calling AE Titles. The SCP AEs can have different lists. The Each SCP AE can be configured to check that the Association requestor specifies the correct Called AE Title for the SCP.

In addition the IP address of the requestor can be checked. The SCP AEs can be constrained to only accept Association Requests from a configured list of IP addresses.

8   ANNEXES

8.1   COERCED/MODIFIED FIELDS

8.1.1   STORAGE-SCP AE Element Use

SOP Instances conforming to the following Composite Image SOP Classes are fully supported for display on the system workstations.

Table 8.1-1
SUPPORTED COMPOSITE IMAGE SOP CLASSES FOR DISPLAY

CT Image Storage
MR Image Storage
SC Image Storage
NM Image Storage
PET Image Storage

Table 8.1-2
SIGNIFICANT ELEMENTS IN RECEIVED COMPOSITE SOP INSTANCES

Module	Attribute Name	Tag ID	Type	Significance
Patient	Patient ID	(0010,0020)	Mand	The received Patient ID is confirmed. The value is stored in the database.
General Study	Study Instance UID	(0020,000D)	Mand	Must be supplied. The value is stored in the database.
General Series	Series Instance UID	(0020,000E)	Mand	Must be supplied. The value is stored in the database.
SOP Common	SOP Instance UID	(0008,0018)	Mand	Must be supplied. If a duplicate SOP Instance UID is received, the Patient ID, Study Instance UID, and Series Instance UID are checked for duplication. If they are the same, the existing image is overwritten by the received image. If they are not the same, the UID of the received image is modified and the image is saved.

8.1.2 STORAGE-SCU AE Element Modification

The following table contains a list of all elements that can have a value modified by the STORAGE-SCU at the time of export using the Storage Services depending on the capabilities of the receiver:

Table 8.1-3
SIGNIFICANT ELEMENTS IN EXPORTED COMPOSITE SOP INSTANCES

Module	Attribute Name	Tag ID	Value
General Image Module	Derivation Description	(0008,2111)	Set the compression algorithm and its parameters.
	Lossy Image Compression	(0028,2110)	Set '01'.
	Lossy Image Compression Ratio	(0028,2112)	Set the compression ratio.
Image Module	Image Type	(0008,0008)	Values 1 and 2 are modified. (Need Only at Lossy Data) Value1: DERIVED Value2: SECONDARY

8.1.3 Elements Modifiable by Field Mapping

The Field Mapping function can change values of received image elements.

The following table contains a list of all elements that can have a value modified by the Field Mapping function:

Table 8.1-4
IMPORTANT ELEMENTS OF SOP INSTANCES THAT CAN BE CHANGED BY FIELD MAPPING

Module	Attribute Name	Tag ID	Comments
Patient Module	Patient's Name	(0010,0010)	
	Patient ID	(0010,0020)	
	Patient's Birth Date	(0010,0030)	
	Patient's Sex	(0010,0040)	
	Other Patient IDs	(0010,1000)	
Patient Demographic Module	Military Rank	(0010,1080)	
	Branch of Service	(0010,1081)	
General Study Module	Study Date	(0008,0020)	
	Study Time	(0008,0030)	
	Accession Number	(0008,0050)	
	Referring Physician Name	(0008,0090)	
	Study Description	(0008,1030)	
	Name of Physicians Reading Study	(0008,1060)	
	Study Instance UID	(0020,000D)	
	Study ID	(0020,0010)	
Patient Study Module	Admitting Diagnosis Description	(0008,1080)	
	Patient's Age	(0010,1010)	
	Additional Patient History	(0010,21B0)	
Study Classification Module	Study Status ID	(0032,000A)	
	Study Priority ID	(0032,000C)	
	Study Comments	(0032,4000)	

Requested Procedure Module	Confidentiality Code	(0040,1008)	
General Series Module	Modality	(0008,0060)	
	Series Date	(0008,0021)	
	Series Time	(0008,0031)	
	Series Description	(0008,103E)	
	Performing Physician Name	(0008,1050)	
	Operator's Name	(0008,1070)	
	Body Part Examined	(0018,0015)	
	Series Instance UID	(0020,000E)	
	Series Number	(0020,0011)	
	Requested Procedure ID	(0040,1001)	
General Equipment Module	Manufacturer	(0008,0070)	
	Institution Name	(0008,0080)	
	Station Name	(0008,1010)	
	Institutional Department Name	(0008,1040)	
	Manufacturer Model Name	(0008,1090)	
General Image Module	Image Type	(0008,0008)	
	Instance Number	(0020,0013)	
Visit Status Module	Current Patient Location	(0038,0300)	
Study Scheduling Module	Reason for Study	(0032,1030)	
	Requesting Physician	(0032,1032)	
	Requesting Service	(0032,1033)	
SOP Common Module	Specific Character Set	(0008,0005)	
	SOP Class UID	(0008,0016)	
	SOP Instance UID	(0008,0018)	
General Image Module	Acquisition Date	(0008,0022)	

Module	Acquisition Time	(0008,0032)	
	Acquisition Number	(0020,0012)	
CR Image Module	KVP	(0018,0060)	
	Distance Source to Patient	(0018,1111)	
	Exposure	(0018,1152)	
CT Image Module	KVP	(0018,0060)	
	Distance Source to Patient	(0018,1111)	
	Exposure	(0018,1152)	
MR Image Module	Echo Time	(0018,0081)	
	Echo Numbers	(0018,0086)	
	Slice Spacing	(0018,0088)	
XA Position Module	Distance Source to Patient	(0018,1111)	
X-Ray Acquisition Module	KVP	(0018,0060)	
	Exposure	(0018,1152)	
X-Ray Acquisition Dose Module	KVP	(0018,0060)	
	Distance Source to Patient	(0018,1111)	
	Exposure	(0018,1152)	
X-Ray Generation Dose Module	KVP	(0018,0060)	
	Exposure	(0018,1152)	
Frame of Reference Module	Frame of Reference UID	(0020,0052)	
Multi-Frame Module	Number of Frames	(0028,0008)	
Image Plan Module	Slice Thickness	(0018,0050)	
	Image Position Patient	(0020,0032)	
	Image Orientation Patient	(0020,0037)	
	Slice Location	(0020,1041)	
	Pixel Spacing	(0028,0030)	
Image Pixel Macro Module	Photometric Interpretation	(0028,0004)	
	Rows	(0028,0010	

	Columns	(0028,0011)	
	Bits Allocated	(0028,0100)	
	Bits Stored	(0028,0101)	

E