

文档编号/Document No: XNDD-1109

项目编号/Project No: CT0605

项目名称/Project Name: CT Release 2.0 for New Dual/Single

产品线/Product Line:

CT

GXR

MR

HVG

CV

US

General

## DICOM Conformance Statement SpiralCT R2.0

	签字和日期/Sign&Date	部门/Department
编制/Author:	杨飞      2008.1.4	CT 研发
审核/Reviewed by:	闫刚      2008-1-7	CT 研发
批准/Approved by:	孙海宁    2008-1-7	CT 研发
实施日期/Implement date:	2008-1-9	

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东软飞利浦医疗设备系统有限责任公司

Philips and Neusoft medical systems co., Ltd

## 1. DICOM CONFORMANCE STATEMENT OVERVIEW

The SpiralCT system is a comprehensive range of hardware and software modules. The SpiralCT implements a worklist management function to communicate with a RIS/HIS, an export function to transfer image data from the local system to a remote system, a print function to print image data from the local system, a viewing function for images from the local system, images from the CD-ROM and MO. Viewed images can be written to CD-ROM and MO, And also can be Update in MO

Thus the SpiralCT provides the following DICOM data exchange features:

- | Export images from the local database to a remote system.
- | Automatically send a storage commitment request.
- | Query an information system for a modality worklist.
- | Send Modality Performed Procedure Step details to an information system.
- | Print images from the local database on a DICOM printer.
- | Read and write DICOM media.

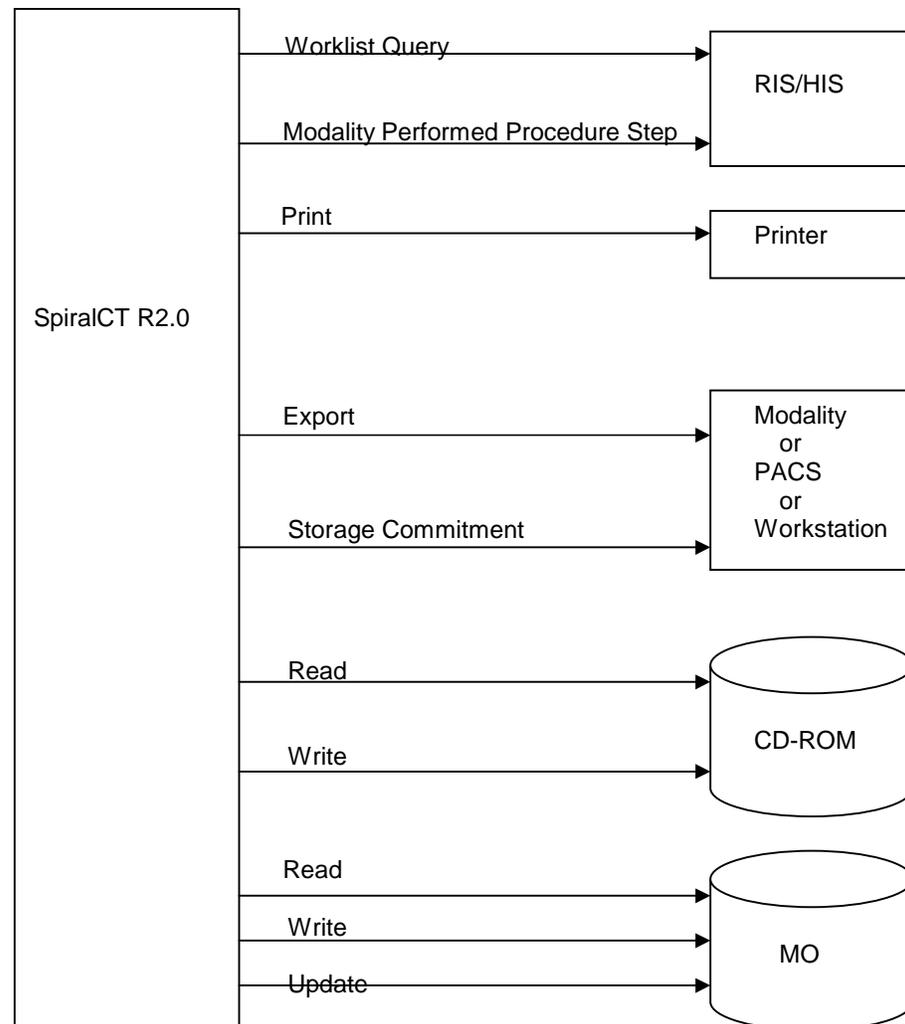


Figure 1: System Overview of the SpiralCT

Table 1 Provides an overview of all network services as provided by the SpiralCT

**Table 1: Network Services**

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
<b>Transfer</b>			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
<b>Workflow Management</b>			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
<b>Print Management</b>			
Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No
Printer	1.2.840.10008.5.1.1.16	Yes	No

*Note: Verification SCP (C-ECHO) is not included in the table above because it is required for any Acceptor of an Association. The Verification SCU details are covered in the details of the conformance statement.*

Table 2 provides an overview of all media services as provided by SpiralCT

**Table 2: Media Services**

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
<b>Compact Disk – Recordable</b>		
General Purpose CD-R Interchange	Yes	Yes

## 2. TABLE OF CONTENTS

1. DICOM Conformance Statement Overview .....	2
2. Table of Contents .....	4
3. Introduction .....	7
3.1. REVISION HISTORY .....	7
3.2. AUDIENCE.....	7
3.3. REMARKS .....	7
3.4. DEFINITIONS, TERMS AND ABBREVIATIONS .....	8
3.5. REFERENCES.....	9
4. Networking .....	10
4.1. IMPLEMENTATION MODEL.....	10
4.1.1. Application Data Flow .....	10
4.1.2. Functional Definition of AE's.....	11
4.1.2.1. Functional Definition of Storage Application Entity.....	11
4.1.2.2. Functional Definition of Workflow Application Entity.....	11
4.1.2.3. Functional Definition of Hardcopy Application Entity .....	11
4.1.3. Sequencing of Real World Activities.....	11
4.2. AE SPECIFICATIONS .....	13
4.2.1. Storage Application Entity Specification .....	13
4.2.1.1. SOP Classes .....	13
4.2.1.2. Association Policies .....	13
4.2.1.2.1. General.....	13
4.2.1.2.2. Number of Associations.....	13
4.2.1.2.3. Asynchronous Nature.....	13
4.2.1.2.4. Implementation Identifying Information .....	14
4.2.1.3. Association Initiation Policy .....	14
4.2.1.3.1. Activity- Send Images.....	14
4.2.1.3.1.1. Description and Sequencing of Activities.....	14
4.2.1.3.1.2. Proposed Presentation Contexts.....	16
4.2.1.3.1.3. SOP Specific Conformance for Storage SOP Classes.....	16
4.2.1.3.1.4. SOP Specific Conformance for Storage Commitment SOP Classes.....	17
4.2.1.4. Association Acceptance Policy .....	18
4.2.1.4.1. Activity- Receive Storage Commitment Response .....	18
4.2.1.4.1.1. Description and Sequencing of Activities.....	18
4.2.1.4.1.2. Accepted Presentation Contexts .....	19
4.2.1.4.1.3. SOP Specific Conformance for Storage Commitment SOP Class .....	19
4.2.2. Workflow Application Entity Specification .....	20
4.2.2.1. SOP Classes .....	20
4.2.2.2. Association Policies .....	20
4.2.2.2.1. General.....	20
4.2.2.2.2. Number of Associations.....	20
4.2.2.2.3. Asynchronous Nature.....	20
4.2.2.2.4. Implementation Identifying Information .....	20
4.2.2.3. Association Initiation Policy .....	21
4.2.2.3.1. Activity – Worklist Update .....	21
4.2.2.3.1.1. Description and Sequencing of Activities.....	21
4.2.2.3.1.2. Proposed Presentation Contexts.....	22
4.2.2.3.1.3. SOP Specific Conformance for Modality Worklist .....	22
4.2.2.3.2. Activity – Acquire Images .....	24
4.2.2.3.2.1. Description and Sequencing of Activities.....	24
4.2.2.3.2.2. Proposed Presentation Contexts.....	25
4.2.2.3.2.3. SOP Specific Conformance for MPPS.....	26
4.2.2.4. Association Acceptance Policy .....	28
4.2.3. Hardcopy Application Entity Specification.....	28
4.2.3.1. SOP Classes .....	28

4.2.3.2.	Association Policies .....	28
4.2.3.2.1.	General.....	28
4.2.3.2.2.	Number of Associations.....	28
4.2.3.2.3.	Asynchronous Nature.....	28
4.2.3.2.4.	Implementation Identifying Information.....	29
4.2.3.3.	Association Initiation Policy .....	29
4.2.3.3.1.	Activity – Film Images.....	29
4.2.3.3.1.1.	Description and Sequencing of Activities.....	29
4.2.3.3.1.2.	Proposed Presentation Contexts.....	31
4.2.3.3.1.3.	SOP Specific Conformance for the Printer SOP Class .....	31
4.2.3.3.1.4.	SOP Specific Conformance for the Film Session SOP Class.....	32
4.2.3.3.1.5.	SOP Specific Conformance for the Film Box SOP Class .....	33
4.2.3.3.1.6.	SOP Specific Conformance for the Image Box SOP Class.....	35
4.2.3.4.	Association Acceptance Policy .....	36
4.3.	NETWORK INTERFACES.....	36
4.3.1.	Physical Network Interface .....	36
4.3.2.	Additional Protocols .....	36
4.4.	CONFIGURATION.....	37
4.4.1.	AE Title/Presentation Address Mapping.....	37
4.4.1.1.	Local AE Titles .....	37
4.4.1.2.	Remote AE Title/Presentation Address Mapping .....	37
4.4.1.2.1.	Storage .....	37
4.4.1.2.2.	Workflow.....	37
4.4.1.2.3.	Hardcopy .....	37
4.4.2.	Parameters.....	37
5.	MEDIA INTERCHANGE .....	40
5.1.	IMPLEMENTATION MODEL.....	40
5.1.1.	Application Data Flow .....	40
5.1.2.	Functional Definition of AEs .....	40
5.1.2.1.	Functional Definition of Offline-Media Application Entity .....	40
5.1.3.	Sequencing of Real-World Activities.....	41
5.1.4.	File Meta Information Options.....	41
5.2.	AE SPECIFICATIONS.....	41
5.2.1.	Offline-Media Application Entity Specification .....	41
5.2.1.1.	File Meta Information for the Application Entity.....	42
5.2.1.2.	Real-World Activities .....	42
5.2.1.2.1.	Activity – Display Directory.....	42
5.2.1.2.1.1.	Media Storage Application Profiles.....	42
5.2.1.2.1.2.	Options .....	42
5.2.1.2.2.	Activity – Write Images.....	42
5.2.1.2.2.1.	Media Storage Application Profiles.....	42
5.2.1.2.2.2.	Options .....	43
5.2.1.2.3.	Activity – Read Images.....	43
5.2.1.2.3.1.	Media Storage Application Profiles.....	43
5.2.1.2.3.2.	Options .....	43
5.3.	AUGMENTED AND PRIVATE APPLICATION PROFILES .....	43
5.4.	MEDIA CONFIGURATION.....	43
6.	SUPPORT OF CHARACTER SETS.....	44
7.	SECURITY.....	45
8.	ANNEXES.....	46
8.1.	IOD CONTENTS.....	46
8.1.1.	Created SOP Instances .....	46
8.1.1.1.	CT Image IOD .....	46
8.1.2.	Usage of Attributes from Received IOD's .....	49
8.1.3.	Attribute Mapping.....	49
8.1.4.	Coerced/Modified fields .....	50

8.2.	DATA DICTIONARY OF PRIVATE ATTRIBUTES .....	51
8.3.	CODED TERMINOLOGY AND TEMPLATES .....	51
8.4.	GRayscale IMAGE CONSISTENCY.....	51
8.5.	STANDARD EXTENDED/SPECIALIZED/PRIVATE SOPS .....	51
8.6.	PRIVATE TRANSFER SYNTAXES .....	51

## 3. INTRODUCTION

### 3.1. Revision History

Table 3: Revision History

Document Version	Date of Issue	Author	Description
1.0	17 Dec 2007	YangFei	Create

### 3.2. Audience

This Conformance Statement is intended for:

- Potential customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

### 3.3. Remarks

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

This DICOM Conformance Statement by itself does not guarantee successful interoperability of PNMS equipment with other vendors' equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**  
Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of PNMS equipment with other vendors' equipment.  
It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates PNMS equipment with other vendors' equipment.
- **Validation**  
PNMS equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.  
Where PNMS equipment is linked to other vendors' equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. PNMS (Philips and Neusoft) is actively involved in this evolution and plans to adapt to its equipment to future versions of the DICOM Standard. In order to do so, Philips and Neusoft reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any other provider linking to PNMS equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into PNMS equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

### 3.4. Definitions, Terms and Abbreviations

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

The following acronyms and abbreviations are used in this document.

AE	Application Entity
CD-R	CD-Recordable
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DIMSE-Composite
DIMSE-N	DIMSE-Normalized
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
GUI	Graphic User Interface
HIS	Hospital Information System
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
MOD	Magneto-Optical Disk
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PDU	Protocol Data Unit
PNMS	Philips and Neusoft Medical Systems Co., Ltd.
RF	X-Ray Radio fluoroscopic
RIS	Radiology Information System
RWA	Real-World Activity
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
WLM	Worklist Management

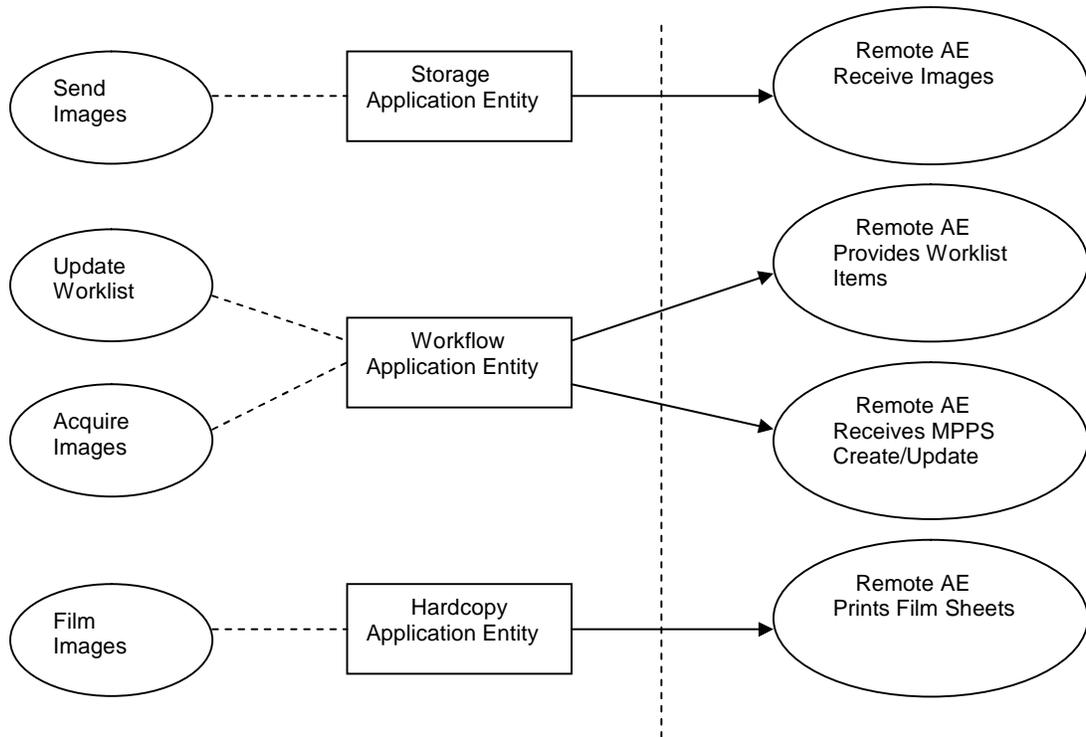
### 3.5. References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18  
(NEMA PS 3.1-XXXX – PS 3.18-XXXX),  
National Electrical Manufacturers Association (NEMA)  
Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847 Rosslyn, Virginia.  
22209, United States of America

## 4. NETWORKING

### 4.1. Implementation model

#### 4.1.1. Application Data Flow



**Figure 2: Application Data Flow Diagram**

The SpiralCT consists of three application entities: Storage AE, Workflow AE, and Hardcopy AE.

- The Storage Application Entity sends images to a remote AE. It is associated with the local RWA "Send Images" is performed upon user request for each study completed or specific images selected. If the remote AE is configured as an archive device the Storage AE will request Storage Commitment and if a commitment is successfully obtained will record this information in the local database and also give user mark in the UI.
- The Workflow Application Entity receives worklist information from and sends MPPS information to a remote AE. It is associated with local RWA "Update Worklist" and "Acquire Images". When the "Update Worklist" RWA is performed the Workflow Application Entity 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. When the “Acquire Images” local RWA is performed the Workflow Application Entity creates and updates Modality Performed Procedure Step instances managed by a remote AE. Acquisition of images will result in automated creation of an MPPS instance. Completion of the MPPS is performed as result of an operator action.

- The Hardcopy Application Entity prints images on a remote AE (printer). It is associated with the local RWA “Film Images”. “Film Images” creates one or more virtual film sheets composed from images and prints them to a remote AE.

## **4.1.2. Functional Definition of AE's**

### **4.1.2.1. Functional Definition of Storage Application Entity**

The existence of a send-job queue entry with associated network destination will activate the Storage 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. The Storage AE will automatically retry if the Error is not serious. All the information can be write down in a log file and local database.

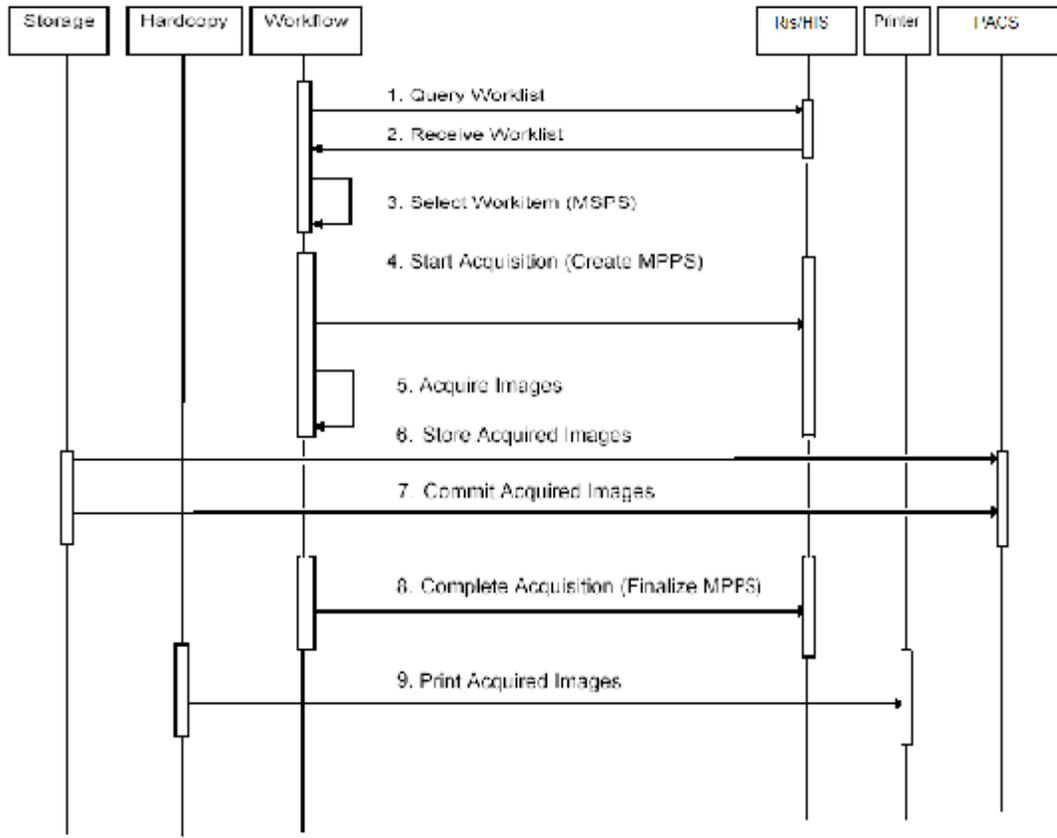
### **4.1.2.2. Functional Definition of Workflow Application Entity**

Worklist Update attempts to download a Worklist from a remote node. If the Workflow 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 cleared with the next Worklist Update. It will create a log file in this Association. The Workflow AE performs the creation of a MPPS Instance automatically whenever images are acquired. Further updates on the MPPS data can be performed interactively from the related MPPS user interface. The MPPS states can be set from the user interface and the error log will be store in the local database.

### **4.1.2.3. Functional Definition of Hardcopy Application Entity**

The existence of a print-job in the print queue will activate the Hardcopy AE. An association is established with the printer and the printer's status determined. If the printer is operating normally, the film sheets will be printed. If the printer is not operating normally, the print-job will set to an error state and can be restarted by the user.

## **4.1.3. Sequencing of Real World Activities**



**Figure 3: Typical Acquisition Sequencing Constraint**

Under normal scheduled workflow conditions the sequencing constraints illustrated in Figure 3 apply:

1. Query Worklist
2. Receive Worklist of Modality Scheduled Procedure Steps (MSPS)
3. Select Work item (MSPS) from Worklist
4. Start acquisition and create MPPS
5. Acquire Images
6. Store acquired images
7. If the Image Manager is configured as an archive device the Storage AE will request Storage Commitment for the images
8. Complete acquisition and finalize MPPS
9. Print acquired images (optional step)

Other workflow situations (e.g. unscheduled procedure steps) will have other sequencing constraints.

Printing could equally take place after the acquired images have been stored. Printing could be omitted completely if no printer is connected or hardcopies are not required.

## 4.2. AE Specifications

### 4.2.1. Storage Application Entity Specification

#### 4.2.1.1. SOP Classes

This SpiralCT provides Standard Conformance to the following SOP Classes.

**Table 4: SOP Classes for SpiralCT AE**

SOP Class Name	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Verification	1.2.840.10008.1.1	Yes	Yes
MPPS	1.2.840.10008.3.1.2.3.3	Yes	No
MWL-FIND	1.2.840.10008.5.1.4.31	Yes	No
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No
> Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
> Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
> Printer	1.2.840.10008.5.1.1.16	Yes	No

#### 4.2.1.2. Association Policies

##### 4.2.1.2.1. General

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

**Table 5: DICOM Application Context**

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

##### 4.2.1.2.2. Number of Associations

The SpiralCT can initiate only one Association at a time for the Storage AE.

**Table 6: Number of Associations as an Association Initiator for Storage AE**

Maximum number of simultaneous associations	1
---	---

The SpiralCT accepts Associations to receive N-EVENT-REPORT notifications for the Storage Commitment Push Model SOP Class

**Table 7: Number of Associations Accepted for Storage AE**

Maximum number of simultaneous associations	No limited
---	------------

##### 4.2.1.2.3. Asynchronous Nature

The SpiralCT does not support asynchronous communication (multiple outstanding transactions over a single Association)

**Table 8: Asynchronous Nature as A SCU for Storage AE**

Maximum number of outstanding asynchronous transaction	1
--	---

**4.2.1.2.4. Implementation Identifying Information**

The implementation information for this AE is:

**Table 9: DICOM Implementation Class and Version for SpiralCT AE**

Implementation Class UID	1.2.840.113704.9.0.2
Implementation Version Name	SpiralCT R2.0

**4.2.1.3. Association Initiation Policy**

**SpiralCT** shall initiate associations as a result of the following events.

- u The operator requests to print selected images of the SpiralCT
- u The operator requests to get worklist from HIS/RIS
- u The operator requests to create MPPS in the HIS/RIS
- u The operator requests to set MPPS status in the HIS/RIS
- u The operator requests to verify a connection to a remote system
- u The operator requests to send some images to a remote system
- u The operator requests to send Storage Commitment to a remote system.

The behavior of the AE during DICOM communication failure is summarized in Table 10

**Table 10: DICOM Command Communication Failure Behavior**

Exception	Behavior
Association setup failure Network timeout	The Association is aborted using AP-ABORT and the command marked as failed. The reason is logged and reported to the user.

**4.2.1.3.1. Activity- Send Images**

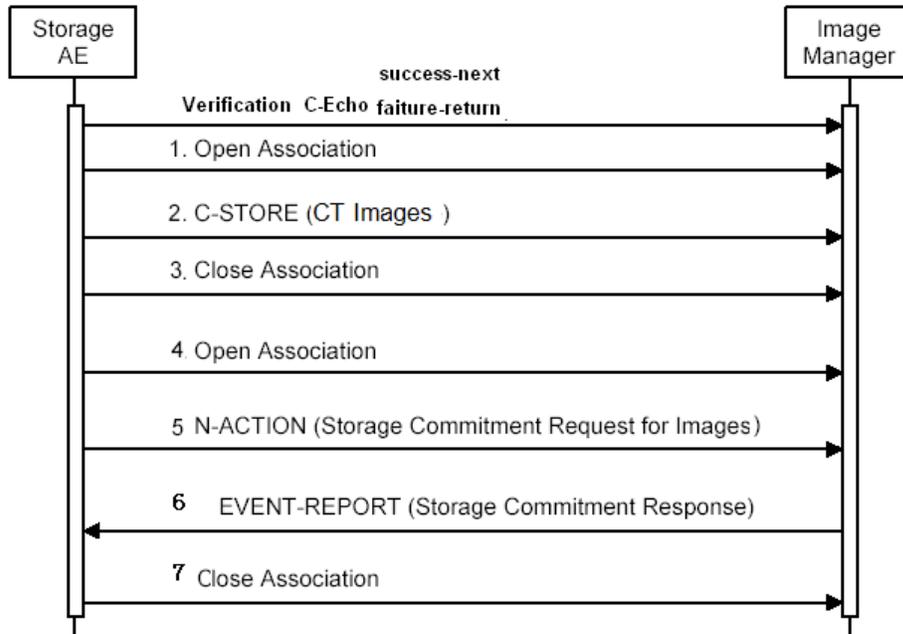
**4.2.1.3.1.1. Description and Sequencing of Activities**

User can select images and request them to be sent to a destination. 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 to the user. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Storage-Job is switched to a failed state. a error message will appear on the user interface or the system will write the error information in the log file .

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

If the Remote AE is configured as an archive device the Storage AE will, after all images have been sent, the Association will be immediately released, and transmit a single Storage Commitment request (N-ACTION) with a new Association. Upon receiving the N-ACTION response the Storage AE will delay releasing the Association for a configurable amount of time. If no N-EVENT-REPORT is received within this time

period the Association will be immediately released (i.e. notification of Storage Commitment success or failure will be received over a separate association). However, the Storage AE is capable of receiving an N-EVENT-REPORT request at any time during an association provided a Presentation Context for the Storage Commitment Push Model has been successfully negotiated (i.e. the N-ACTION is sent at the end of one association and the N-EVENT-REPORT is received during an association initiated for a subsequent send job or during an association initiated by the Remote AE for the specific purpose of sending the N-EVENT-REPORT).



**Figure 4 Sequencing of Storage**

A possible sequence of interactions between the Storage AE and an Image Manager (e.g. a storage or archive device supporting the Storage and Storage Commitment SOP Classes as an SCP) is illustrated in Figure 4

1. The Storage AE opens an association with the Image Manager
2. An acquired CT image is transmitted to the Image Manager using a C-STORE request and the Image Manager replies with a C-STORE response (status success).
3. An N-ACTION request is transmitted to the Image Manager to obtain storage commitment of previously transmitted CT images. The Image Manager replies with a NACTION response indicating the request has been received and is being processed.
4. The Image Manager immediately transmits an N-EVENT-REPORT request notifying the Storage AE of the status of the Storage Commitment Request (sent in step 3 using the N-ACTION message). The Storage AE replies with a N-EVENT-REPORT response confirming receipt. The Image Manager could send this message at any time or omit it entirely in favor of transmitting the N-EVENT-REPORT over a separate dedicated association (see note).
5. The Storage AE closes the association with the Image Manager.

*Note: Many other message sequences are possible depending on the number of images to be stored, support for Storage Commitment and when the SCP sends the N-EVENT-REPORT. The N-EVENT-REPORT can also be sent over a separate association initiated by the Image Manager (see Section 4.2.1.4.1 on Activity–Receive Storage Commitment Response).*

#### 4.2.1.3.1.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of presentation contexts to be used on that association. The following table shows the presentation contexts proposed by SpiralCT for Storage AE.

**Table 11: Proposed Presentation Contexts for Storage AE (C-Store)**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

**Table 12: Proposed Presentation Contexts for Storage AE (Commitment)**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

*Note: The Storage AE will prefer ELE Transfer Syntax if multiple transfers are supported by remote AE. A Presentation Context for the Storage Commitment Push Model will only be proposed if the Remote AE is configured as an archive device.*

#### 4.2.1.3.1.3. SOP Specific Conformance for Storage SOP Classes

If CT Image Storage SOP Instances are included in the Send Job and a corresponding Presentation Context is not accepted then the Association is aborted using AP-ABORT and the send job is marked as failed. The job failure is logged and reported to the user. The behavior of Storage AE when encountering status codes in a C-STORE response is summarized in the Table below:

**Table 12: DICOM C-STORE Command Response Status Handling Behavior**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	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

Service Status	Code	Further Meaning	Behavior
Refused	A7xx	Out of Resources	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application. This is a transient failure. After 30 sec, Our system will retry to storage these images again.
Error	A9xx	Data Set Does Not Match SOP Class	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application.
	Cxxx	Can't understand	
Warning	B000	Coercion of Data Elements	Image transmission is considered successful but the status meaning is logged.
	B007	Data Set does not match SOP Class	
	B006	Elements Discarded	
*	*	Any other status code	The Association is aborted using A-ABORT and the send job is marked as failed. The status code is logged and the job failure is reported to the user via the job control application.

A failed sending job can be restarted by user interaction. The system can be configured to automatically resend failed jobs if a transient status code is received. The delay between resending failed jobs and the number of retries is also configurable. The contents of CT Image Storage SOP Instances created by SpiralCT conform to the CT Image IOD definition and are described in section 8.1.

#### 4.2.1.3.1.4. SOP Specific Conformance for Storage Commitment SOP Classes

##### 4.2.1.3.1.4.1. Storage Commitment Operations (N-ACTION)

The Storage AE will request storage commitment for instances of the CT Image Storage SOP Class if the Remote AE is configured as an archive device and a presentation context for the Storage Commitment Push Model has been accepted. The Storage AE will consider Storage Commitment failed if no N-EVENT-REPORT is received for a Transaction UID within a configurable time period after receiving a successful N-ACTION response (duration of applicability for a Transaction UID). The behavior of Storage AE when encountering status codes in a N-ACTION response is summarized in the Table below:

**Table 13: Storage Commitment N-ACTION Command Response Status Handling Behavior**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The request for storage comment is considered successfully sent. A timer is started which will expire if no N-EVENT-REPORT for the Transaction UID is received within a configurable period.
*	*	Any other status code	The Association is aborted using A-ABORT and the request for storage comment is marked as failed. The status meaning is logged and reported to the user.

##### 4.2.1.3.1.4.2. Storage Commitment Notifications (N-EVENT-REPORT)

The Storage AE is capable of receiving an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push

Model (i.e. only associations established with archive devices). The behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT is summarized in the Table below.

**Table 14: Storage Commitment N-EVENT-REPORT Behavior**

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are marked within the local database.
Storage Commitment Request Complete Failures Exist	2	The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are treated in the same way as in the success case (Event Type 1). The Referenced SOP Instances under Failed SOP Sequence (0008,1198) are Given a failed reason and write down in log file.

The reasons for returning specific status codes in a N-EVENT-REPORT response are summarized in the Table below.

**Table 15: Storage Commitment N-EVENT-REPORT Response Status Reasons**

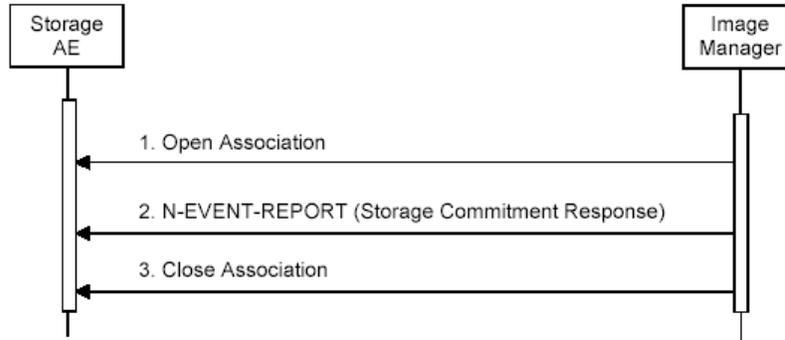
Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The storage commitment result has been successfully received.
Failure	0122	Referenced SOP Class not supported	The SCP doesn't support the Referenced sop class
	0213	Resource Limitation	The Transaction UID in the N-EVENT-REPORT request has expired (no N-EVENT-REPORT was received within a configurable time limit).
	0112	No such object instance	The SCP doesn't find such object instance
	0110	Processing Failure	An internal error occurred during processing of the N-EVENTREPORT. A short description of the error will be returned in Error Comment (0000,0902).
	0131	Duplicate transaction UID	The transaction UID send by storage commit has been send before
	0119	Class / Instance conflict	There is a Class / Instance conflict in SCP

#### 4.2.1.4. Association Acceptance Policy

##### 4.2.1.4.1. Activity- Receive Storage Commitment Response

###### 4.2.1.4.1.1. Description and Sequencing of Activities

The Storage AE will accept associations in order to receive responses to a Storage Commitment Request.



**Figure 5 Sequencing of Event Report**

A possible sequence of interactions between the Storage AE and an Image Manager (e.g. a storage or archive device supporting Storage Commitment SOP Classes as an SCP) is illustrated in the Figure above:

1. The Image Manager opens a new association with the Storage AE.
2. The Image Manager sends an N-EVENT-REPORT request notifying the Storage AE of the status of a previous Storage Commitment Request. The Storage AE replies with a N-EVENT-REPORT response confirming receipt.
3. The Image Manager closes the association with the Storage AE.

**4.2.1.4.1.2. Accepted Presentation Contexts**

The Storage AE will accept Presentation Contexts as shown in the Table below.

**Table 16: Acceptable Presentation Contexts for Activity Receive Storage Commitment Response**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ELE	1.2.840.1.2.1	SCU	None
		EBE	1.2.840.1.2.2		
		ILE	1.2.840.1.2		
Verification	1.2.840.10008.1.1	ELE	1.2.840.1.2.1	SCP	None
		EBE	1.2.840.1.2.2		
		ILE	1.2.840.1.2		

*Note: The Storage AE will prefer to select the ILE Transfer Syntax if multiple transfer syntaxes are offered. The Storage AE will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Storage Commitment Push Model SOP Class.*

**4.2.1.4.1.3. SOP Specific Conformance for Storage Commitment SOP Class**

**4.2.1.4.1.3.1. Storage Commitment Notifications (N-EVENT-REPORT)**

The behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT is summarized in Table 14. The reasons for specific status codes in a N-EVENT-REPORT response are summarized in Table 15

4.2.1.4.1.3.2. SOP Specific Conformance for Verification SOP Class

The Storage AE provides standard conformance to the Verification SOP Class as an SCP. If the CECHO request was successfully received, a 0000 (Success) status code will be returned in the C-ECHO response. Otherwise, a C000 (Error – Cannot Understand) status code will be returned in the C-ECHO response.

**4.2.2. Workflow Application Entity Specification**

**4.2.2.1. SOP Classes**

The SpiralCT provides Standard Conformance to the following SOP Classes:

**Table 17: SOP Classes for Workflow AE**

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	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 21: DICOM Application Context For Workflow AE**

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

**4.2.2.2.2. Number of Associations**

SpiralCT initiates one Association at a time for a Worklist request.

**Table 18: Number of Associations Initiated For Workflow AE**

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

**4.2.2.2.3. Asynchronous Nature**

**Table 19: Asynchronous Nature As a SCU For Workflow AE**

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

**4.2.2.2.4. Implementation Identifying Information**

The implementation information for the Workflow AE is:

**Table 20: DICOM Implementation Class and Version for Workflow AE**

Implementation Class UID	1.2.840.113704.9.0.2
Implementation Version Name	SpiralCT R2.0

### 4.2.2.3. Association Initiation Policy

#### 4.2.2.3.1. Activity – Worklist Update

##### 4.2.2.3.1.1. Description and Sequencing of Activities

The request for a Worklist Update is initiated by user interaction, i.e. pressing the buttons “Seach”, then the interactive Patient Worklist Query will show a dialog for entering data and conditions as search criteria. When the Query is started on user request, only the data from the dialog will be inserted as matching keys into the query. With automated worklist queries (including “Worklist Update”) the SpiralCT always requests all items for Modality (CT) and Scheduled Station AE Title. Query for the Scheduled Station AE Title is configurable by a Service Engineer.

Upon initiation of the request, the SpiralCT will build an Identifier for the CFIND request, will initiate an Association to send the request and will wait for Worklist responses. After retrieval of all responses, SpiralCT will access the local database to add or update patient demographic data. To protect the system from overflow, the SpiralCT will limit the number of processed worklist responses to a maximum - 100. During receiving the worklist response items are counted and the query processing is canceled by issuing a CFIND-CANCEL if the configurable limit of items is reached. The results will be displayed in a separate list, which will be cleared with the next worklist update.

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

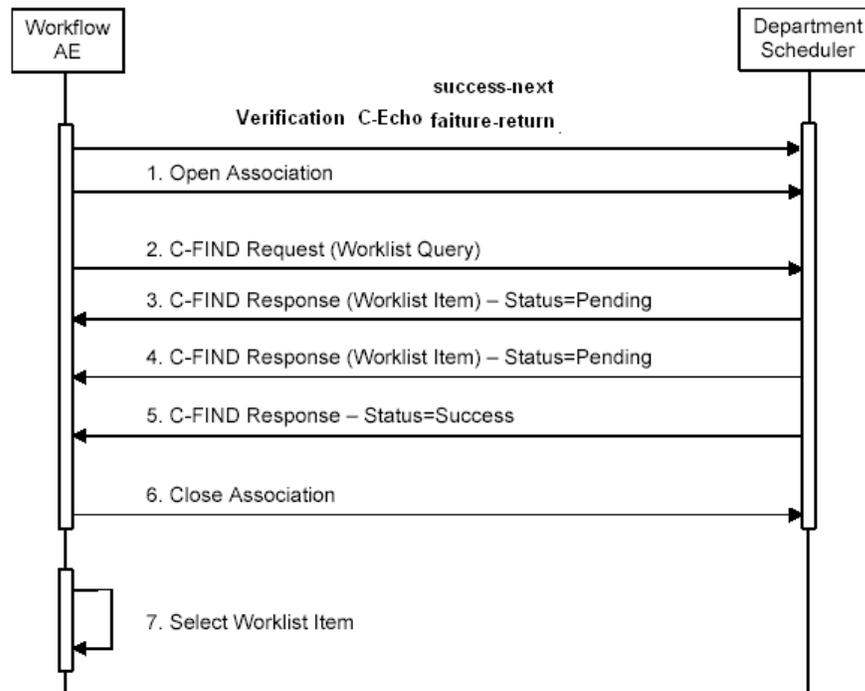


Figure 6 Sequencing of Worklist

A possible sequence of interactions between the Workflow AE and a Departmental 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 above:

1. The Worklist AE opens an association with the Departmental Scheduler
2. The Worklist AE sends a C-FIND request to the Departmental Scheduler containing the Worklist Query attributes.
3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.
4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.
5. The Departmental Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes only 2 Worklist items match the Worklist Query.
6. The Worklist AE closes the association with the Departmental 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

SpiralCT will propose Presentation Contexts as shown in the following table:

**Table 21: Proposed Presentation Contexts for Workflow AE**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – Find	1.2.840.10008.5.1.4.31	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

*Note: The Storage AE will prefer ILE Transfer Syntax if multiple transfers are supported by remote AE*

#### 4.2.2.3.1.3. SOP Specific Conformance for Modality Worklist

The behavior of SpiralCT when encountering status codes in a Modality Worklist C-FIND response is summarized in the Table below. If any SCP response status other than "Success" or "Pending" is received by SpiralCT, a error message will appear on the user interface or the system will write the error information in the log file.

**Table 22: Modality Worklist C-FIND Response Status Handling Behavior**

Service Status	Code	Further Meaning	Behavior
Success	0000	Matching is complete	The SCP has completed the matches. Worklist items are available for display or further processing.
Refused	A700	Out of Resources	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	Cxxx	Unable to process	
	A900	Identifier does not match SOP Class	
Cancel	FE00	Matching terminated due to Cancel request	If the query was cancelled due to too may 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.

Service Status	Code	Further Meaning	Behavior
Pending	FF00	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	The worklist item contained in the Identifier is collected for later display or further processing.
	FF01	Matches are continuing – Warning that one or more Optional Keys were not supported for existence for this Identifier.	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.

Acquired images will always use the Study Instance UID specified for the Scheduled Procedure Step (if available). If an acquisition is unscheduled, a Study Instance UID will be generated locally. The Table below provides a description of the SpiralCT 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 ignored. No attempt is made it filter out possible duplicate entries.

**Table 23: Worklist Returned Identifier from RIS/PACS**

Module Name & Attribute Name	Tag	VR	M	R	Q	D	IOD
<b>SOP Common</b>							
Specific Character Set	(0008, 0005)	CS	S	X	X		X
<b>Scheduled Procedure Step</b>							
Scheduled Procedure Step Sequence	(0040, 0100)	SQ					
>Scheduled Station AET	(0040, 0001)	AE	S	X	X		
>Scheduled Procedure Start Data	(0040, 0002)	DA	R	X	X		
>Scheduled Procedure Start Time	(0040, 0003)	TM		X	X		
>Modality	(0008, 0060)	CS	S				X
>Scheduled Performing Physician's Name	(0040, 0006)	PN		X	X		
>Scheduled Procedure Step Description	(0040, 0007)	LO		X	X		X
>Scheduled Procedure Step ID	(0040, 0009)	SH		X	X		X
<b>Requested Procedure</b>							
Requested Procedure ID	(0040, 1001)	SH		X	X		X
Requested Procedure Description	(0032, 1060)	LO		X	X		X
Study Instance UID	(0020, 000D)	UI			X		X
<b>Imaging Service Request</b>							
Accession Number	(0008, 1050)	SH	S	X	X		X
Requesting Physician	(0032, 1032)	PN		X	X		
Referring Physician's Name	(0008, 0090)	PN		X	X	X	
<b>Patient Identification</b>							
Patient Name	(0010, 0010)	PN			X	X	X

Module Name & Attribute Name	Tag	VR	M	R	Q	D	IOD
Patient ID	(0010, 0020)	LO			X	X	X
<b>Patient Identification</b>							
Patient's Birth Date	(0010, 0030)	DA		X	X	X	X
Patient's Sex	(0010, 0040)	CS		X	X	X	X
Patient's Weight	(0010, 1030)	DS		X	X	X	X
Patient's Size	(0010,1020)	DS		X	X	X	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 an SpiralCT Worklist Request Identifier.

Tag: DICOM tag for this attribute.

VR: DICOM VR for this attribute.

M: Matching keys for (automatic) Worklist Update. A "S" will indicate that SpiralCT will supply an attribute value for Single Value Matching, a "R" will indicate Range Matching and a "\*" will denote wildcard matching. It can be configured if "Scheduled Station AE Title" is additionally supplied "(S)" and if Modality is set to CT.

R: Return keys. An "x" will indicate that SpiralCT will supply this attribute as Return Key with zero length for Universal Matching. The SpiralCT will not support retired date format (yyyy.mm.dd) for "Patient's Birth Date" and "Scheduled Procedure Step Start Date" in the response identifiers. For "Scheduled Procedure Step Start Time" also retired time format as well as unspecified time components are not supported.

Q: Interactive Query Key. An "x" will indicate that SpiralCT 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.

D: Displayed keys. An "x" indicates that this worklist attribute is displayed to the user during a patient registration dialog. For example, Patient Name will be displayed when registering the patient prior to an examination.

IOD: An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

The default Query Configuration is set to "Modality" (CT) and "Date" (date of today). Optionally, additional matching for the own AET is configurable.

#### 4.2.2.3.2. Activity – Acquire Images

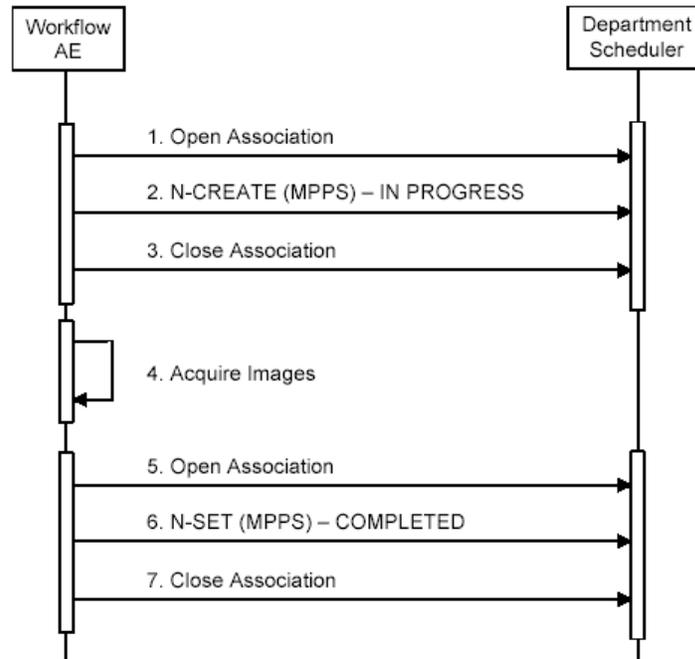
##### 4.2.2.3.2.1. Description and Sequencing of Activities

After Patient registration, the SpiralCT creates a MPPS SOP Instance. An Association to the configured MPPS SCP system is established immediately and the related MPPS SOP Instance will be created.

A manual update can be performed with the MPPS user interface where it is possible to set the final state of the MPPS to "COMPLETED". A MPPS Instance that has been sent with a state of "COMPLETED" can no longer be updated.

The SpiralCT will support creation of "unscheduled cases" by allowing MPPS Instances to be communicated for locally registered Patients.

- N-CREATE request according to the CREATE Modality Performed Procedure Step SOP Instance operation or a
- N-SET request to update the contents and state of the MPPS according to the SET Modality Performed Procedure Step Information operation.



**Figure7 Sequencing of MPPS**

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the MPPS SOP Class as an SCP) is illustrated in Figure B.4.2-4:

1. The Worklist AE opens an association with the Departmental Scheduler
2. The Worklist AE sends an N-CREATE request to the Departmental Scheduler to create an MPPS instance with status of "IN PROGRESS" and create all necessary attributes. The Departmental Scheduler acknowledges the MPPS creation with an N-CREATE response (status success).
3. The Worklist AE closes the association with the Departmental Scheduler.
4. All images are acquired and stored in the local database.
5. The Worklist AE opens an association with the Departmental Scheduler.
6. The Worklist AE sends an N-SET request to the Departmental Scheduler to update the MPPS instance with status of "COMPLETED" and set all necessary attributes. The Departmental Scheduler acknowledges the MPPS update with an N-SET response (status success).
7. The Worklist AE closes the association with the Departmental Scheduler.

#### **4.2.2.3.2.2. Proposed Presentation Contexts**

SpiralCT will propose Presentation Contexts as shown in the following table:

**Table 24**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

Note: The Storage AE will prefer ELE Transfer Syntax if multiple transfers are supported by remote AE

#### 4.2.2.3.2.3. SOP Specific Conformance for MPPS

The behavior of SpiralCT when encountering status codes in an MPPS NCREATE or N-SET response is summarized in Table 24. If any other SCP response status than "Success" or "Warning" is received by EXAMPLEINTEGRATED-MODALITY, a message "MPPS update failed" will appear on the user interface and it will also be saved in system logs.

**Table 25**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP completed the operation successful
Failure	0110	MPPS may no longer be updated	MPPS setting stopped after error-code
Warning	0116	Attribute Value Out Of Range	The association should either be released or aborted
Failure	0x0106	Invalid attribute value	The association should either be released or aborted
Failure	0x0105	No such Attribute	MPPS creation stopped after error-code
Warning	0x0107	Attribute List error	MPPS continues after warning code
*	Any other status code	*	

The behavior of SpiralCT during communication failure is summarized in the Table below:

**Table 26: MPPS Communication Failure Behavior**

Exception	Behavior
Timeout	The Association is aborted using AP-ABORT and MPPS marked as failed. The reason is logged and reported to the user.
Association aborted by SCP or network layers	The MPPS is marked as failed. The reason is logged and reported to the user.

The below table provides a description of the MPPS N-CREATE and N-SET request identifiers sent by SpiralCT. Empty cells in the N-CREATE and N-SET columns indicate that the attribute is not sent. An "x" indicates that an appropriate value will be sent. A "Zero length" attribute will be sent with zero length.

**Table 27**

Attribute Name	Tag	VR	N-CREAE	N-SET
SOP Common Module				
Specific Character Set	0008,0005	CS	USER/WLM	USER/WLM
Image Acquisition Results Module				

Attribute Name	Tag	VR	N-CREAE	N-SET
Modality	0008,0060	CS	"CT"	"CT"
Performed Protocol Code Sequence	0040,0260	SQ	-	EMPTY
Performed Series Sequence	0040,0340	SQ	-	EMPTY
>Operators Name	0008,1070	PN	-	USER
>Performing Physicians Name	0008,1050	PN	-	USER
> Protocol Name	0018,1030	LO	-	USER
> Series Instance UID	0020,000e	UI	-	USER
> Series Description	0008,103e	LO	-	EMPTY
> Retrieve AE Title	0008,0054	AE	-	EMPTY
Referenced Image Sequence	0008,1140	SQ	-	EMPTY
Referenced Non Image Composite SOP Instance Sequence	0040,0220	SQ	-	EMPTY
Performed Procedure Step Information Module				
Performed Station AE Title	0040,0241	AE	USER/WML	-
Performed Station Name	0040,0242	SH	EMPTY	-
Performed Location	0040,0243	SH	EMPTY	-
Performed Procedure Step Start Date	0040,0244	DA	Exam date	-
Performed Procedure Step Start Time	0040,0245	TM	Exam time	-
Performed Procedure Step End Date	0040,0250	DA	EMPTY	Exam date
Performed Procedure Step End Time	0040,0251	TM	EMPTY	Exam time
Performed Procedure Step Status	0040,0252	CS	"IN PROGRESS"	"COMPLETED"
Procedure Code Sequence	0008,1032	SQ	EMPTY	-
Performed Procedure Step ID	0040,0253	SH	USER	-
Performed Procedure Step Description	0040,0254	LO	USER	-
Performed Procedure Type Description	0040,0255	LO	USER	-
Performed Procedure Step Relationship Module				
Referenced Patient Sequence	0008,1120		EMPTY	-
Patient Name	0010,0010	PN	USER/WML	-
Patient ID	0010,0020	LO	USER/WML	-
Patient Birth Date	0010,0030	DA	USER/WML	-
Patient's Sex	0010,0040	CS	USER/WML	-
Study ID	0020,0010	SH	USER/WML	-
Scheduled Step Attributes Sequence	0040,0270	SQ	EMPTY	-
>Study Instance UID	0020,000d	UI	USER/WML	-
>Accession Number	0008,0050	SH	USER/WML	-
>Requested Procedure ID	0040,1001	SH	USER/WML	-
>Requested Procedure Description	0032,1060	LO	USER/WML	-

Attribute Name	Tag	VR	N-CREAE	N-SET
>Scheduled Procedure Step ID	0040,0009	SH	USER/WML	-
>Scheduled Procedure Step Description	0040,0007	LO	USER/WML	-
>Referenced Study Sequence	0008,1110	SQ	EMPTY	-
>Scheduled Protocol Code Sequence	0040,0008	SQ	EMPTY	-
SOP Class UID	0008,0016	UI	USER	
SOP Instance UID	0008,0018	UI	USER	

#### 4.2.2.4. Association Acceptance Policy

The Workflow Application Entity does not accept Associations.

### 4.2.3. Hardcopy Application Entity Specification

#### 4.2.3.1. SOP Classes

SpiralCT provides Standard Conformance to the following SOP Classes:

**Table 28: SOP Classes for Hardcopy AE**

SOP Class Name	SOP Class UID	SCU	SCP
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Yes	No

#### 4.2.3.2. Association Policies

##### 4.2.3.2.1. General

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

**Table 29: DICOM Application Context For Workflow AE**

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

##### 4.2.3.2.2. Number of Associations

SpiralCT initiates one Association at a time for only one selected hardcopy device.

**Table 30: Number of Associations as an Association Initiator for Hardcopy AE**

Maximum number of simultaneous associations	1
---	---

##### 4.2.3.2.3. Asynchronous Nature

The SpiralCT does not support asynchronous communication (multiple outstanding transactions over a single Association)

**Table 31: Asynchronous Nature as A SCU for Hardcopy AE**

Maximum number of outstanding asynchronous transaction	1
--	---

#### 4.2.3.2.4. Implementation Identifying Information

The implementation information for this AE is:

**Table 32: DICOM Implementation Class and Version for Hardcopy AE**

Implementation Class UID	1.2.840.113704.9.0.2
Implementation Version Name	SpiralCT R2.0

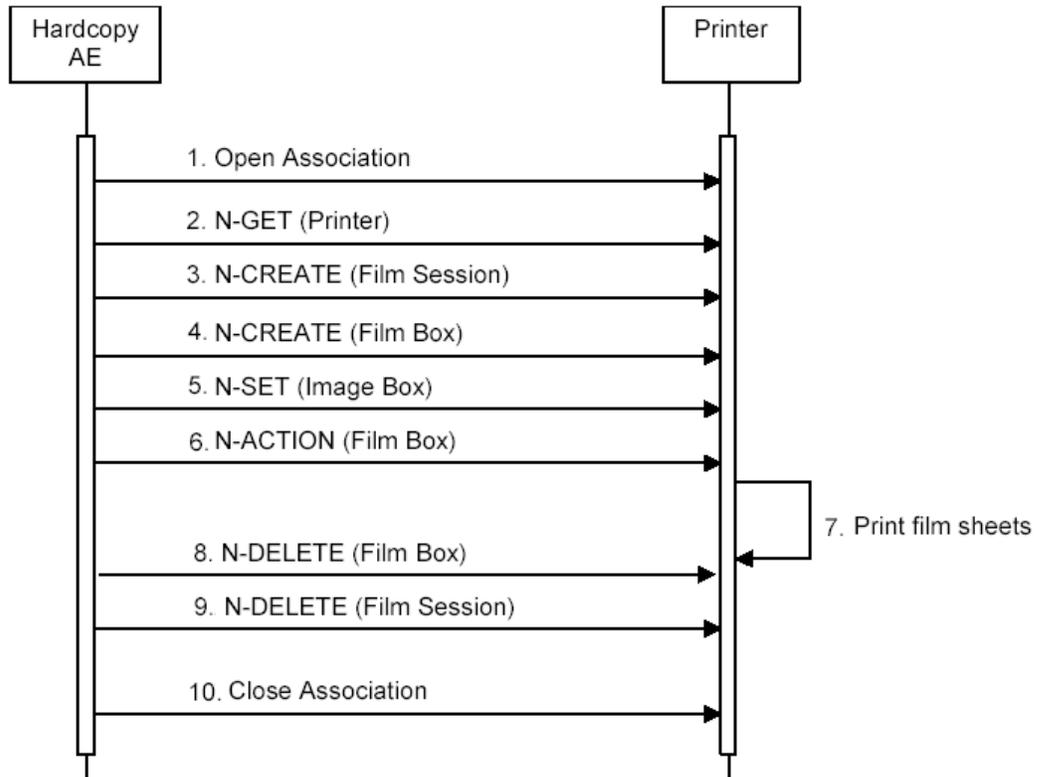
#### 4.2.3.3. Association Initiation Policy

##### 4.2.3.3.1. Activity – Film Images

###### 4.2.3.3.1.1. Description and Sequencing of Activities

A user composes images onto film sheets and requests them to be sent to a specific hardcopy device. The user can select the desired film format and number of copies. The Hardcopy AE is invoked by the job control interface that is responsible for processing network tasks.

The job consists of data describing the images and graphics to be printed as well as the requested layout and other parameters. If no association to the printer can be established, the print-job is switched to a failed state and the user informed.



**Figure 8 Sequencing of Print**

A typical sequence of DIMSE messages sent over an association between Hardcopy AE and a Printer is illustrated in above Figure:

1. Hardcopy AE opens an association with the Printer
2. N-GET on the Printer SOP Class is used to obtain current printer status information. If the Printer reports a status of FAILURE, the print-job is switched to a failed state and the user informed.
3. N-CREATE on the Film Session SOP Class creates a Film Session.
4. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation (Hardcopy AE only uses the format STANDARD\1,1)
5. N-SET on the Image Box SOP Class transfers the contents of the film sheet to the printer.
6. N-ACTION on the Film Box SOP Class instructs the printer to print the Film Box
7. The printer prints the requested number of film sheets
8. N-DELETE on the Film Box SOP Class deletes the Film Box SOP Instance
9. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.
10. Hardcopy AE closes the association with the Printer

Status of the print-job is reported through the job control interface. Only one job will be active at a time. If any 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 any time by user interaction or, if configured, by automated retry.

#### 4.2.3.3.1.2. Proposed Presentation Contexts

SpiralCT will propose Presentation Contexts as shown in the following table:

**Table 33: Proposed Presentation Contexts for Hardcopy AE**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale	1.2.840.10008.5.	ELE	1.2.840.10008.1.2.1	SCU	None
Print Management	1.1.9	EBE	1.2.840.10008.1.2.2		
Meta		ILE	1.2.840.10008.1.2		

*Note: The Storage AE will prefer ILE Transfer Syntax if multiple transfers are supported by remote AE*

#### 4.2.3.3.1.3. SOP Specific Conformance for the Printer SOP Class

Hardcopy AE supports the following DIMSE operations for the Printer SOP Class:

— N-GET

Details of the supported attributes and status handling behavior are described in the following subsections.

Hardcopy AE uses the Printer SOP Class N-GET operation to obtain information about the current printer status. The attributes obtained via N-GET are listed in the Table below:

**Table 34: Printer SOP Class N-GET Request Attributes**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Printer Status	(2110,0010)	CS	Provided by Printer	ALWAYS	Printer
Printer Status Info	(2110,0020)	CS	Provided by Printer	ALWAYS	Printer

The Printer Status information is evaluated as follows:

1. If Printer status (2110,0010) is NORMAL, the print-job continues to be printed.
2. If Printer status (2110,0010) is FAILURE, the print-job is marked as failed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job control application.
3. If Printer status (2110,0010) is WARNING, the print-job continues to be printed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job control application. The behavior of Hardcopy AE when encountering status codes in a N-GET response is summarized in the Table below:

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The request to get printer status information was success.
Warning	Any warning status code	Warning	Continue to print process and status meaning is logged and reported to the user.
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.4. SOP Specific Conformance for the Film Session SOP Class

Hardcopy AE supports the following DIMSE operations for the Film Session SOP Class:

- N-CREATE
- N-DELETE

Details of the supported attributes and status handling behavior are described in the following subsections.

##### 4.2.3.3.1.4.1. Film Session SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

**Table 35: Film Session SOP Class N-CREATE Request Attributes**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number of Copies	(2000, 0010)	IS	>= 1 integer	ALWAYS	User
Print Priority	(2000, 0020)	CS	HIGH, MED or LOW	ALWAYS	User
Medium Type	(2000, 0030)	CS	BLUE FILM, CLEAR FILM or PAPER	ALWAYS	User
Film Destination	(2000, 0040)	CS	MAGAZINE or PROCESSOR	ALWAYS	User
Film Session Label	(2000, 0050)	LO	1	ALWAYS	AUTO

The behavior of Hardcopy AE when encountering status codes in a N-CREATE response is summarized in the Table below:

**Table 36**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Warning	B600	Memory allocation not supported	The N-CREATE operation is considered successful but the status meaning is logged.
	0105	No such attribute	
	0106	Invalid attribute value	
	0107	Attribute list error	
	0116	Attribute out of range	
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.4.2. Film Session SOP Class Operations (N-DELETE)

The behavior of Hardcopy AE when encountering status codes in a N-DELETE response is summarized in the Table below:

**Table 37**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.5. SOP Specific Conformance for the Film Box SOP Class

Hardcopy AE supports the following DIMSE operations for the Presentation LUT SOP Class:

- N-CREATE
- N-ACTION
- N-DELETE

Details of the supported attributes and status handling behavior are described in the following subsections.

#### 4.2.3.3.1.5.1. Film Box SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

**Table 38**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Display Format	(2010, 0010)	CS	STANDARD\C, R C and R no limited	ALWAYS	USER
Referenced Film Session Sequence	(2010, 0500)	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	(0008, 1150)	UI	1.2.840.10008.5.1.1.1	ALWAYS	AUTO
>Referenced SOP Instance UID	(0008, 1155)	UI	From created Film Session SOP Instance	ALWAYS	AUTO
Film Orientation	(2010, 0040)	CS	PORTRAIT or LANDSCAPE	ALWAYS	USER
Film Size ID	(2010, 0050)	CS	14INX17IN, 14INX14IN, 11INX14IN, 10INX14IN, 10INX12IN, 8INX10IN	ALWAYS	USER
Magnification Type	(2010, 0060)	CS	REPLICATE, BILINEAR, CUBIC or NONE	ALWAYS	USER
Border Density	(2010, 0100)	CS	BLACK or WHITE	ALWAYS	USER
Max Density	(2010, 0130)	US	0...300	ALWAYS	USER
Min Density	(2010, 0120)	US	0...50	ALWAYS	USER
Illumination					
Reflective Ambient Light					

The behavior of Hardcopy AE when encountering status codes in a N-CREATE response is summarized in the Table below:

**Table 39**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Failure	C616	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	0106	Invalid attribute value	
	0119	Class instance conflict	
Warning	B605	Requested Min density or Max density out of printer's operating range, the printer will use its respective Min or Max density value instead.	The N-CREATE operation is considered successful but the status meaning is logged.
	0105	No such attribute	
	0107	Attribute list error	
	0116	Attribute out of range	
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.5.2. Film Box SOP Class Operations (N-ACTION)

An N-ACTION Request is issued to instruct the Print SCP to print the contents of the Film Box. The Action Reply argument in an N-ACTION response is not evaluated. The behavior of Hardcopy AE when encountering status codes in a N-ACTION response is summarized in the Table below:

**Table 40**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Warning	B603	Film Box SOP Instance hierarchy doesn't contain Image Box SOP Instance (empty page)	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	B604	Image size is larger than the Image Box size, the image has been demagnified.	
	B609	Image size is larger than the Image Box size, The image has been cropped to fit	
	B60A	Image size or Combined Print Image size is larger than the Image Box size, The image or combined Print Image size has been decimated to fit.	
Failure	C602	Unable to create print job, print queue is full	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	C603	Image size is larger than Image Box Size	
	C613	Combined image size is larger than the Image Box size	
	0119	Class instance conflict	

Service Status	Code	Further Meaning	Behavior
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.5.3. Film Box SOP Class Operations (N-DELETE)

The behavior of Hardcopy AE when encountering status codes in a N-DELETE response is summarized in the Table below:

**Table 41**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.3.1.6. SOP Specific Conformance for the Image Box SOP Class

Hardcopy AE supports the following DIMSE operations for the Image Box SOP Class:  
 — N-SET

Details of the supported attributes and status handling behavior are described in the following subsections.

#### 4.2.3.3.1.6.1. Image Box SOP Class Operations (N-SET)

The attributes supplied in an N-SET Request are listed in the Table below:

**Table 42**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Position	(2020, 0010)	US	>= 1 integer	ALWAYS	AUTO
Basic Grayscale Image Sequence	(2020, 0110)	SQ		ALWAYS	AUTO
>Samples per Pixel	(0028, 0002)	US	1	ALWAYS	AUTO
>Photometric Interpretation	(0028, 0004)	CS	MONOCHROME2	ALWAYS	AUTO
>Rows	(0028, 0010)	US	Depends on film size	ALWAYS	AUTO
>Columns	(0028, 0011)	US	Depends on film size	ALWAYS	AUTO
>Pixel Aspect Ratio	(0028, 0034)	IS	1\1	ALWAYS	AUTO
>Bit Allocated	(0028, 0100)	US	Depends on image	ALWAYS	AUTO
>Bit Stored	(0028, 0101)	US	Depends on image	ALWAYS	AUTO
>High Bit	(0028, 0102)	US	Depends on image	ALWAYS	AUTO
>Pixel Representation	(0028, 0103)	US	0	ALWAYS	AUTO
>Pixel Data	(7FE0, 0010)	OB	Pixel of render film sheet	ALWAYS	AUTO

The behavior of Hardcopy AE when encountering status codes in a N-SET response is summarized in the Table below:

**Table 43**

Service Status	Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Warning	B604	Image size is larger than the Image Box size, the image has been demagnified.	The N-SET operation is considered successful but the status meaning is logged.
	B605	Requested Min or Max density outside of printer's operating range	
	B609	Image size is larger than the Image Box size, The image has been cropped to fit	
	B60A	Image size or Combined Print Image size is larger than the Image Box size, The image or combined Print Image size has been decimated to fit.	
	0105	No such attribute	
	0107	Attribute list error	
	0116	Attribute out of range	
Failure	C603	Image size is larger than Image Box Size	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	C605	Insufficient memory in printer to store the image	
	C613	Combined image size is larger than the Image Box size	
	0106	Invalid attribute value	
*	Any other status code	*	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

#### 4.2.3.4. Association Acceptance Policy

The Hardcopy Application Entity does not accept Associations.

## 4.3. NETWORK INTERFACES

### 4.3.1. Physical Network Interface

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

**Table 44**

Physical Network Interface
Ethernet 10baseT
Ethernet 100baseT

### 4.3.2. Additional Protocols

N/A

## 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/Setting panel. The Field Service Engineer can configure the TCP Port via the Service/Setting panel. The local AE Title used by each individual application can be configured independently of the AE Title used by other local applications. If so configured, all local AEs are capable of using the same AE Title.

**Table 45**

Application Entity	Default AE Title	Default TCP/IP Port
Storage	SpiralCT	6104
Workflow	SpiralCT	104
Hardcopy	SpiralCT	104

#### 4.4.1.2. Remote AE Title/Presentation Address Mapping

The AE Title, host names and port numbers of remote applications are configured using the SpiralCT Service/Setting panel.

##### 4.4.1.2.1. Storage

The SpiralCT Service/Setting panel must be used to set the AE Titles, port-numbers, host-names and capabilities for the remote Storage SCPs. Associations will only be accepted from known AE Titles and associations from unknown AE Titles will be rejected (an AE Title is known if it can be selected within the Service/Setting panel). Multiple remote Storage SCPs can be defined. Any Storage SCP can be configured to be an "Archive" device causing storage commitment to be requested for images or presentation states transmitted to the device.

##### 4.4.1.2.2. Workflow

The SpiralCT Service/Installation Tool must be used to set the AE Title, port-number, host-name and capabilities of the remote Modality Worklist SCP. Only a single remote Modality Worklist SCP can be defined. Remote AEs will only be available for selection if they support the Modality Worklist SOP Class as an SCP.

The SpiralCT Service/Setting panel must be used to set the AE Title, port-number, host-name and capabilities of the remote MPPS SCP. Only a single remote MPPS SCP can be defined. Remote AEs will only be available for selection if they support the MPPS SOP Class as an SCP.

##### 4.4.1.2.3. Hardcopy

The SpiralCT Service/Setting Tool must be used to set the AE Titles, port-numbers, host-names, IP addresses and capabilities for the remote Print SCPs. Multiple remote Print SCPs can be defined. Remote AEs will only be available for selection if they support the Basic Grayscale Print Management Meta SOP Class as an SCP.

### 4.4.2. Parameters

A large number of parameters related to acquisition and general operation can be configured using the Service/Setting panel. The Table below only shows those configuration parameters relevant to DICOM communication. See the SpiralCT Service Manual for details on general configuration capabilities.

**Table 46**

Parameter	Configurable (Yes / No)	Default Value
<b>General Parameter</b>		
Max PDU Receive Size	No	64K
Max PDU Send Size	No	64K
Time-out waiting for a acceptance or rejection response to an Association Request (Application Level Timeout)	No	
Time-out waiting for completion of a TCP/IP connect request (Low Level Timeout)	Yes	
Time-out awaiting for a response to a DIMSE Request (Low Level Timeout)	Yes	
<b>Storage Parameter</b>		
Storage SCU time-out waiting for a response to a STORE-RQ	Yes	120s
Number of times a failed send job may be retried.	Yes	0 (Failed send jobs are not retried)
Delay between retrying failed send jobs	Yes	60s
Maximum number of simultaneously initiated Associations by the Storage AE	No	1
Supported Transfer Syntaxes		
<b>Storage Commitment Parameter</b>		
Time-out waiting for a Storage Commitment Notification (maximum duration of applicability for a Storage Commitment Transaction UID)	Yes	
Maximum number of simultaneously accepted Associations by the Storage AE	No	No limited
Delay association release after sending a Storage Commitment Request (wait for Storage Commitment Notification over the same association)	Yes	120s
<b>Modality Worklist Parameter</b>		
Modality Worklist SCU time-out waiting for the final response to a C-FIND-RQ	Yes	30s
Maximum number of Worklist Items	Yes	100
Supported Transfer Syntaxes	No	ILE (prefer) ELE EBE
Delay between automatic Worklist Updates	Yes	10 minutes
Query for specific Modality Value	Yes	CT
<b>MPPS Parameter</b>		
MPPS SCU time-out waiting for a response to a N-CREATE-RQ	Yes	60s
MPPS SCU time-out waiting for a response to a N-SET-RQ	Yes	60s
Supported Transfer Syntaxes	No	ILE (prefer) ELE EBE

Parameter	Configurable (Yes / No)	Default Value
<b>Print Parameter</b>		
Print SCU time-out waiting for a response to a N-CREATE-RQ	Yes	60s
Print SCU time-out waiting for a response to a N-SET-RQ	Yes	30s
Print SCU time-out waiting for a response to a N-ACTION-RQ	Yes	360s
Supported Transfer Syntaxes	No	ILE (prefer) ELE EBE

## 5. MEDIA INTERCHANGE

### 5.1. IMPLEMENTATION MODEL

#### 5.1.1. Application Data Flow

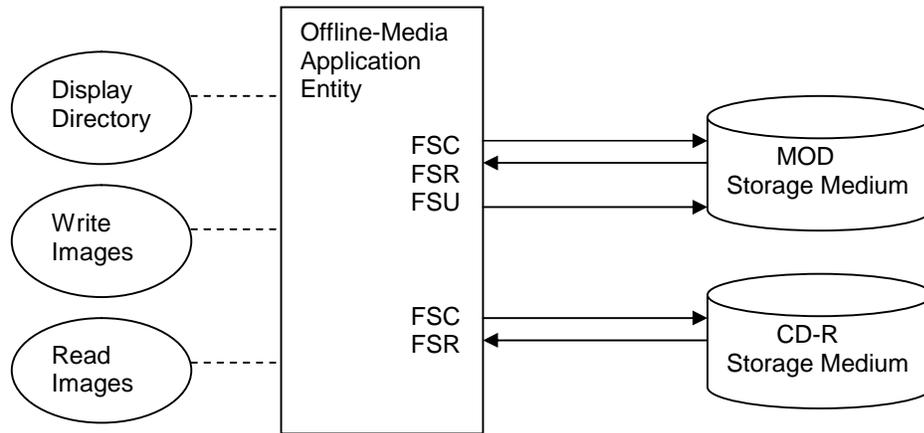


Figure 9 Application Data Flow Diagram

#### 5.1.2. Functional Definition of AEs

##### 5.1.2.1. Functional Definition of Offline-Media Application Entity

The Offline-Media AE can perform the CD-R Media Storage Service with capabilities for:

- RWA Display Directory (as FSR)
- RWA Write Images (as FSC)
- RWA Read Images (as FSR)

The Offline-Media AE can perform the MOD Media Storage Service with capabilities for:

- RWA Display Directory (as FSR)
- RWA Write Images (as FSC/FSU)
- RWA Read Images (as FSR)

### 5.1.3. Sequencing of Real-World Activities

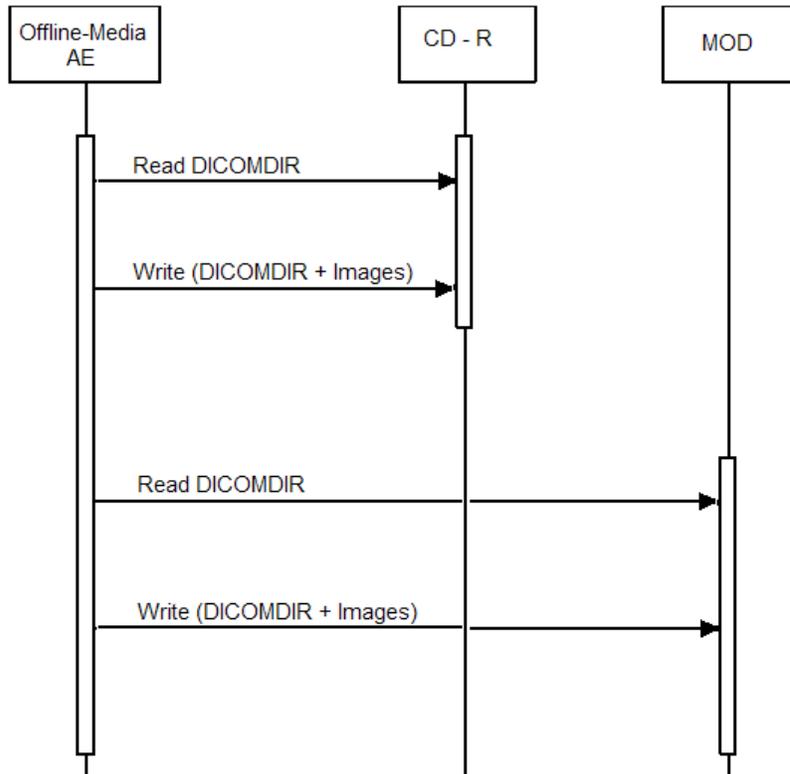


Figure 10: Sequencing of RWA Write/Read Image

### 5.1.4. File Meta Information Options

The implementation information written to the File Meta Header in each file is:

Table 47: DICOM Implementation Class and Version for Media Storage

File Meta Information Version	00\01
Implementation Class UID	1.2.840.113704.9.0.2
Implementation Version Name	SpiralCT R2.0

## 5.2. AE SPECIFICATIONS

### 5.2.1. Offline-Media Application Entity Specification

The Offline-Media Application Entity provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed below:

Table 48

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-GEN-CD	Display Directory	FSR	Interchange
	Write Images	FSC	Interchange
	Read Images	FSR	Interchange
STD-CTMR-MOD650.	Display Directory	FSR	Interchange
	Write Images	FSC, FSU	Interchange
	Read Images	FSR	Interchange
STD-CTMR-MOD12	Display Directory	FSR	Interchange
	Write Images	FSC, FSU	Interchange
	Read Images	FSR	Interchange

### 5.2.1.1. File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is configurable (see section 5.4).

### 5.2.1.2. Real-World Activities

#### 5.2.1.2.1. Activity – Display Directory

The Offline-Media Application Entity acts as an FSR using the interchange option when requested to display directory (DICOMDIR) from the local database, CD-R medium or MOD.

##### 5.2.1.2.1.1. Media Storage Application Profiles

The Offline-Media Application Entity supports the STD-GEN-CD, STD-CTMR-MOD650, STD-CTMR-MOD12 Application Profiles.

##### 5.2.1.2.1.2. Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

**Table 49**

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	ELE	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2
		ELE	1.2.840.10008.1.2.1
		EBE	1.2.840.10008.1.2.2

#### 5.2.1.2.2. Activity – Write Images

The Offline-Media Application Entity acts as FSC and FSU using the interchange option when requested to export SOP Instances from the local database to a CD-R medium or MOD medium.

The user will be prompted to insert an empty CD-R or MOD for each export job. The contents of the export job will be written together with a corresponding DICOMDIR to a single-session CDR or MOD. Writing in multi-session mode is not supported.

##### 5.2.1.2.2.1. Media Storage Application Profiles

The Offline-Media Application Entity supports the STD-GEN-CD, STD-CTMR-MOD650, STD-CTMR-MOD12 Application Profiles.

#### 5.2.1.2.2.2. Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

**Table 50**

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	ELE	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2
		ELE	1.2.840.10008.1.2.1
		EBE	1.2.840.10008.1.2.2

#### 5.2.1.2.3. Activity – Read Images

The Offline-Media Application Entity acts as an FSR using the interchange option when requested to read image from CD-R or MOD medium by a corresponding DICOMDIR.

##### 5.2.1.2.3.1. Media Storage Application Profiles

The Offline-Media Application Entity supports the STD-GEN-CD, STD-CTMR-MOD650, STD-CTMR-MOD12 Application Profiles.

##### 5.2.1.2.3.2. Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

**Table 51**

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	ELE	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2
		ELE	1.2.840.10008.1.2.1
		EBE	1.2.840.10008.1.2.2

### 5.3. AUGMENTED AND PRIVATE APPLICATION PROFILES

SpiralCT doesn't support any augmented for private application profiles.

### 5.4. MEDIA CONFIGURATION

All local applications use the AE Titles configured via the Service/Setting Panel. The Application Entity Titles configurable for Media Services are listed in the Table below:

**Table 52**

Application Entity	Default AE Title
Offline-Media	SpiralCTMedia

## 6. SUPPORT OF CHARACTER SETS

In the Chinese version, the SpiralCT Supports the extended character set GB18030, which is the Chinese ideograms coded character set for information interchange -- Extension for the basic set. And in the English Version it Supports the extended character set ISO\_IR 100.

When the SprialCT receives strings with unsupported character set then it will not display the string attribute properly.

## 7. SECURITY

SpiralCT does not support any specific security measures.

## 8. ANNEXES

### 8.1. IOD CONTENTS

#### 8.1.1. Created SOP Instances

Table 8.1-1 specifies the attributes of an CT Image transmitted by the SpiralCT storage application.

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

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

The abbreviations used in the “Source” column:

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

Examples of CT images created by SpiralCT can be downloaded from:  
<http://medical.neusoft.com>

#### 8.1.1.1. CT Image IOD

**Table 53 IOD of Created CT image storage SOP Instances**

IE	Module	Reference	Presence of Module
Patient	Patient	Table 54	
Study	General Study	Table 55	
	Patient Study	Table 56	
Series	General Series	Table 57	
	Frame of Reference	Table 58	
Equipment Image	General Equipment	Table 59	
	General Image	Table 60	
	Image Pixel	Table 61	
	Image Plane	Table 62	
	CT Image	Table 63	
	VOI LUT Module	Table 64	
	SOP Common	Table 65	
Contrast/Bolus	Table 66		

**Table 54 CT Image Storage SOP Class - Patient Module**

Attribute name	Tag	Source
Patient's Name	0010,0010	USER/MWL
Patient ID	0010,0020	USER/MWL

Patient's Birth Date	0010,0030	USER/MWL
Patient's Sex	0010,0040	USER/MWL

**Table 55 CT Image Storage SOP Class - General Study Module**

Attribute name	Tag	Source
Study Date	0008,0020	AUTO
Study Time	0008,0030	AUTO
Accession number	0008,0050	USER/MWL
Referring Physician's Name	0008,0090	MWL
Study Instance UID	0020,000d	AUTO/MWL
Study ID	0020,0010	AUTO

**Table 56 CT Image Storage SOP Class – Patient Study Module**

Attribute name	Tag	Source
Patient's Age	0010,1010	USER/MWL
Patient's Size	0010,1020	USER/MWL
Patient's Weight	0010,1030	USER/MWL
Patient Comments	0010,4000	USER

**Table 57 CT Image Storage SOP Class - General Series Module**

Attribute name	Tag	Source
Modality	0008,0060	AUTO
Performing physician's Name	0008,1050	USER
Series Instance UID	0020,000E	AUTO/MWL
Series Number	0020,0011	USER
Patient Position	0018,5100	USER
Operators' Name	0008,1070	MPPS
Protocol name	0018,1030	USER
Referenced Study Component Sequence	0008,1111	
>Referenced SOP Class UID	0008,1150	USER
>Referenced SOP Instance UID	0008,1155	USER

**Table 58. CT Image Storage SOP Class - Frame of Reference Module**

Attribute name	Tag	Source
Frame of Reference UID	0020:0052	AUTO
Position Reference Indicator	0020:1040 -	USER

**Table 59. CT Image Storage SOP Class - General Equipment Module**

Attribute name	Tag	Note	Source
Manufacturer	0008,0070	Philips and Neusoft medic system	AUTO
Institution Name	0008,0080	the name of the hospital	CONF
Manufacturer's Model Name	0008,1090	Spiral CT	AUTO
Pixel Padding Value	0028,0120		AUTO
Spatial Resolution	0018,1050		AUTO
Software Version(s)	0018,1020		AUTO

**Table 60. CT Image Storage SOP Class - General Image Module**

Attribute name	Tag	Source
Instance Number	0020:0013	AUTO
Patient Orientation	0020:0020	USER
Image Date	0008:0023	AUTO
Image Time	0008:0033	AUTO
Image Type	0008:0008	USER
Acquisition Number	0020:0012	AUTO

**Table 61. CT Image Storage SOP Class - Image Pixel Module**

Attribute name	Tag	Source
Samples per Pixel	0x0028 0002	AUTO
Photometric Interpretation	0x0028 0004	AUTO
Rows	0x0028 0010	AUTO
Columns	0x0028 0011	AUTO
Bits Allocated	0x0028 0100	AUTO
Bits Stored	0x0028 0101	AUTO
High Bit	0x0028 0102	AUTO
Pixel Representation	0x0028 0103	AUTO
Pixel Data	0x7FE0 0010	AUTO

**Table 62. CT Image Storage SOP Class - Image Plane Module**

Attribute name	Tag	Source
Image Orientation (Patient)	0x0020 0037	AUTO
Image Position (Patient)	0x0020 0032	AUTO
Slice Thickness	0x0018 0050	USER
Slice Location	0x0020 1041	USER
Pixel Spacing	0x0028 0030	AUTO

**Table 63 CT Image Storage SOP Class -CT Image Module**

Attribute name	Tag	Source
Image Type	0008,0008	AUTO
Rescale Intercept	0028,1052	USER
Rescale Slope	0028,1053	USER
KVP	0018,0060	USER
Acquisition Number	0020,0012	AUTO
Data Collection Diameter	0018,0090	USER

Reconstruction Diameter	0018,1100	USER
Distance Source to Detector	0018,1110	USER
Distance Source to Patient	0018,1111	USER
Gantry/Detector Tilt	0018,1120	USER
Table Height	0018,1130	USER
Rotation Direction	0018,1140	USER
Exposure Time	0018,1150	USER
X-ray Tube Current	0018,1151	USER
Filter Type	0018,1160	USER
Scan Angle	0018,1143	USER
CTDI	0018,9345	USER

**Table 64 CT Image Storage SOP Class - VOI LUT Module**

Attribute name	Tag	Source
Window Center	0028,1050	USER
Window Width	0028,1051	USER

**Table 65 CT Image Storage SOP Class - Sop Common Module**

Attribute name	Tag	Source
SOP Class UID	0008,0016	USER
SOP Instance UID	0008,0018	AUTO
Specific Character Set	0008,0005	USER/WLM

**Table 66 CT Image Storage SOP Class - Contrast/Bolus Module**

Attribute name	Tag	Source
Contrast/Bolus Agent	0018:0010	USER

### 8.1.2. Usage of Attributes from Received IOD's

The SpiralCT storage application doesn't receive SOP Instances. The usage of attributes receive via Modality Worklist is described in Section 4.2.2.3.1.3

### 8.1.3. Attribute Mapping

The relationships between attributes received via Modality Worklist, stored in acquired images and communicated via MPPS are summarized in below table.

**Table 67: Attribute Mapping between Modality Worklist, Image and MPPS**

MWL	CT Image	MPPS
----	---	Scheduled Step Attributes Sequence

MWL	CT Image	MPPS
Study Instance UID	Study Instance UID (IHE-1)	>Study Instance UID (IHE-2)
Referenced Study Sequence (IHE-23)	Referenced Study Sequence (IHE-18) (IHE-22)	>Referenced Study Sequence (IHE-3) (IHE-22)
Accession Number (IHE-13)	Accession Number (IHE-7)	>Accession Number (IHE-4)
---	Request Attributers Sequence (IHE-11)	---
Requested Procedure ID (IHE-13)	>Requested Procedure ID (IHE-22)	>Requested Procedure ID(IHE-22)
Requested Procedure Description (IHE-16)	>Requested Procedure Description (IHE-22)	>Requested Procedure Description (IHE-22)
Scheduled Procedure Step ID (IHE-14)	> Scheduled Procedure Step ID	> Scheduled Procedure Step ID
Scheduled Procedure Step Description (IHE-15)	> Scheduled Procedure Step Description	>Scheduled Procedure Step Description
Scheduled Procedure Code Sequence (IHE-15)	> Scheduled Procedure Code Sequence	---
---	Performed Protocol Code Sequence (IHE-10)(IHE-19)	Performed Protocol Code Sequence (IHE-10)
---	Study ID (IHE-5)	Study ID
---	Performed Procedure Step ID (IHE-21)	Performed Procedure Step ID (IHE-21)
---	Performed Procedure Step Start Date (IHE-8)	Performed Procedure Step Start Date
---	Performed Procedure Step Start Time (IHE-8)	Performed Procedure Step Start Time
---	Performed Procedure Step Description (IHE-8)	Performed Procedure Step Description
Requested Procedure Code Sequence (IHE-16)	Requested Procedure Code Sequence (IHE-6)(IHE-22)	Requested Procedure Code Sequence (IHE-6)(IHE-22)
---	Referenced Study Component Sequence (IHE-12)	---
---	Referenced Performed Procedure Step Sequence	---
---	>Referenced SOP Class UID	SOP Class UID
---	>Referenced SOP Instance UID	SOP Instance UID
---	Protocol Name(IHE-17)	Protocol Name

### 8.1.4. Coerced/Modified fields

N/A

## 8.2. Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the Table below. SpiralCT reserves blocks of private attributes in groups XXXX. Further details on usage of these private attributes are contained in Section 8.1.

**Table 8-16: Data Dictionary of Private Attributes**

Tag	Attribute Name	VR	VM
270F, 0010	SpiralCT	LO	1
270F, 1001	Table Speed	DS	1
270F, 1002	Rotation time	DS	1
270F, 1003	Pitch	DS	1
270F, 1004	Slice Width	DS	1
270F, 1005	Resolution	LO	1
270F, 1006	CTDI	DS	1
270F, 1007	Bed Speed	DS	1
270F, 1008	DLP	DS	1
270F, 1009	Rec Increment	DS	1
01F1, 0010	SpiralCT R2.0	LO	1
01F1,1026	Pitch	DS	1
01F1,0040	Scan Type	LO	1
01F1,104D	Adaptive Filter	LO	1
01F1,100A	Recon Enhancement	DS	1
01F1,004D	SP Filter	LO	1
01F1,004A	DoseRight DOM	LO	1
01F1,1007	Bed Speed	DS	1
01F1,2002	Rotation Speed	DS	1
01F1,2004	Slice Thickness	DS	1
01F1,1002	Resolution	LO	1
01F1,2007	ABS Bed_Pos	DS	1
01F1,2008	DLP	DS	1
01F1,2009	Rec Increment	DS	1
07A1, 0010	SpiralCT R2.0	LO	1
07A1, 1019	Image Enhancement	DS	1

## 8.3. Coded Terminology and Templates

N/A

## 8.4. Grayscale Image consistency

N/A

## 8.5. Standard Extended/Specialized/Private SOPs

N/A

## 8.6. Private Transfer Syntaxes

N/A