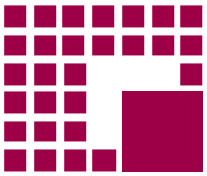
DICOM CONFORMANCE STATEMENT



NewPORT

DICOM Capture Station

ALI New**PORT** Version 3.0

A.L.I. Technologies Inc.

A.L.I. Imaging Systems Corp.

Revision History

Document Version	Date	Author	Description
1.0	Feb.28, 1997	Edmond Lau	Created
2.0	Sep.15, 1997	David Heaney	Revised
3.0	Jun.22, 1999	Wayne Hoy	Revised for IHE Year 1
4.0	Jun. 26, 2000	Howard Fung	Revised for IHE Year 2
5.0	June 27, 2001	Howard Fung	Revised for IHE Year 3

1 Introduction

This document is the DICOM 3.0 Conformance Statement for ALI NewPORT, a portable image acquisition workstation for video modalities.

ALI NewPORT is a compact computer that acquires images from sources having a video signal output and sends them to either a medical imager or a PACS for image review and archive. The system conforms to the DICOM 3.0 standard to allow the retrieval of worklists and to share medical information with other digital imaging systems.

ALI NewPORT is also capable of creating DICOM-compliant media. It is capable of handling, but not limited to, 90 mm (3.5 inch) MB Magneto-Optical Disk (MOD) media with capacities of 128 MB, 230 MB, 540 MB, and 640 MB. Other types of media can be handled based on how the ALI NewPORT is configured. ALI NewPORT is capable of creating images which conform to the Composite Ultrasound Image IOD, Retired Composite Ultrasound Image IOD, and Secondary Capture Image IOD. In addition, a DICOMDIR can be created on removable media.

The following table lists the SOP Classes for which ALI NewPORT conforms as an SCU.

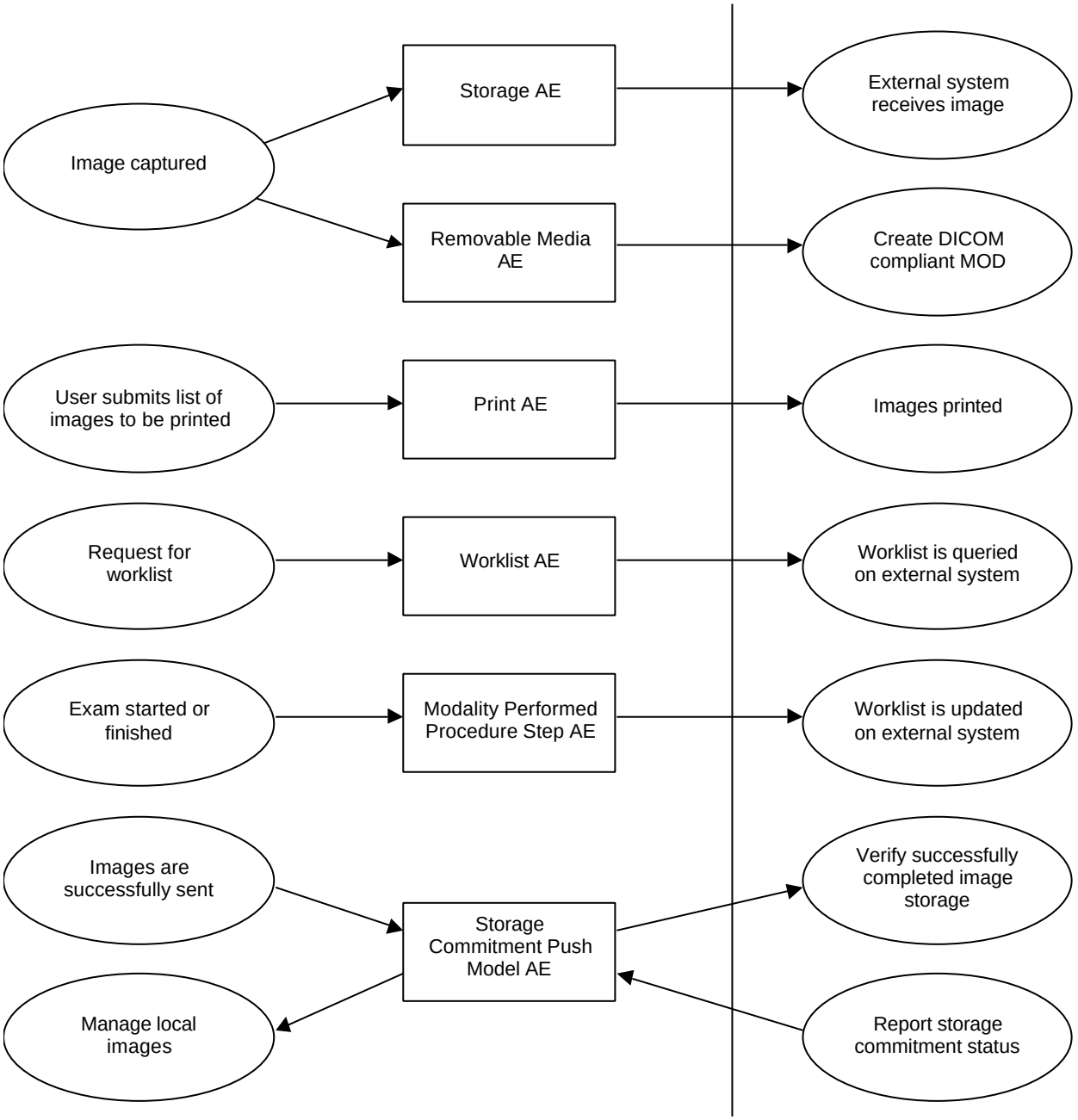
Table 1: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Basic Greyscale Print Management	1.2.840.10008.5.1.1.9
Basic Color Print Management	1.2.840.10008.5.1.1.18
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Basic Color Image Box	1.2.840.10008.5.1.1.4.1
Modality Worklist	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Storage Commitment Push Model	1.2.840.10008.1.20.1

2 Implementation Model

2.1 Application Data Flow Diagram

Figure 1: ALI NewPORT DICOM Data Flow Diagram



The ALI NewPORT Application Entity polls an external Worklist server for an updated list of scheduled examinations.

When an image is captured, ALI NewPORT can be configured to automatically route a captured image to an external system for image review and archive. Users can also manually request that all the images of an examination or a list of selected images of an examination be sent to the external system.

ALI NewPORT can automatically route captured images to a DICOM-compliant printer. Users can also manually request that all the images of an examination or a list of selected images be printed. Note: some models of ALI NewPORT may support either DICOM printing or the Storage Service Class while other models support both services.

ALI NewPORT can act as a File Set Creator (FSC), to initialize MOD media and create a DICOM File-set on the media.

ALI NewPORT can automatically issues Modality Performed Procedure Step requests to an external MPPS server updating the worklist whenever an Exam has started or finished.

ALI NewPORT can automatically issues Storage Commitment Push Model requests to an external Storage Commitment SCP when a set of images is sent. Then ALI NewPORT will wait for the Storage Commitment response from the SCP, and manage its own local images according to the N-EVENT-REPORT status.

2.2 Functional Definitions of Application Entities

The ALI NewPORT AE implements the Storage, Modality Worklist, Modality Performed Procedure Step, Storage Commitment, and Print Management Service Classes as a Service Class User (SCU). It also implements the File-set Creator, File-set Updater, and File-set Reader.

2.3 Sequencing of Real-World Events

ALI NewPORT does not impose any formal restrictions on a sequence of real-world events. However, it is expected that a Modality Worklist query is issued before any Modality Performed Procedure Step operations.

3 AE Specifications

3.1 Modality Worklist AE

The Modality Worklist AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU.

Table 2: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
Modality Worklist	1.2.840.10008.5.1.4.31

3.1.1 Association Policies

3.1.1.1 General

The maximum PDU size is configurable. The default PDU size which will be offered is 16,386 bytes.

3.1.1.2 Number of Associations

ALI NewPORT will always have at most one Association active to perform Modality Worklist service.

3.1.1.3 Asynchronous Nature

The Modality Worklist AE does not provide asynchronous behavior.

3.1.1.4 Implementation Identifying Information

An implementation class UID and version name is configured at the time of installation. The default implementation class UID is 1.2.840.113711.1.2 and the default version name is V3.0.0.

3.1.2 Association Initiation by Real-World Activity

3.1.2.1 Real-World Activity – Poll Request for Worklist

3.1.2.1.1 Associated Real-World Activity – Poll Request for Worklist

ALI NewPORT initiates a new Association to retrieve a worklist. This Association is initiated when a configurable poll interval expires or when retrieved by the user through the user interface. The Association is closed when the worklist is retrieved.

The user can choose whether to perform a broad query or patient-based query for the worklist. With the broad query, the user can specify any combinations of the matching key attributes listed in table 3.

Table 3: MWL Keys for Broad Worklist Queries

Matching Key Attributes	Tag ID	Significance
Scheduled Procedure Step Start Date	(0040,0002)	The date or date range for which the Secheduled Procedure Step is scheduled to be performed.
Modality	(0008,0060)	Source equipment for the image.
Scheduled Station AE Title	(0040,0001)	AE Title of the modality on which the Scheduled Procedure Step is scheduled to be performed.

Additional attributes can be configured to make the request identifier more specific. In all cases, the effectiveness of attributes specified in the identifier depends on the worklist server supporting matching fields and using the same values. (I.e. If the worklist server supports matching on Station AE Title, but uses a different AE Title for the Scheduled Station than its actual AE Title then the query identifier must use the AE Title required by the worklist server). The optional matching key attributes are listed in Table 4:

Table 4: Configurable Identifier Fields - Poll Request for Worklist

Attribute Name	Tag ID	Significance
Scheduled Station Name	(0040,0010)	Institution defined name for the modality on which the Scheduled Procedure Step is to be performed.
Scheduled Procedure Step Location	(0040,0011)	Location at which the Procedure Step is scheduled to start.
Scheduled Procedure Step Description	(0040,0007)	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
Scheduled Performing Physician's Name	(0040,0006)	Scheduled Performing Physician's Name.

With Patient-based Query, ALI NewPORT can restrict the worklist request to a particular patient. The user can specify any combination of the matching key attributes listed in Table 5, in addition to the above board-query matching key attributes if desired.

Table 5: MWL Keys for Patient-based Worklist Queries

Matching Key Attributes	Tag ID	Significance
Patient Name	(0010,0010)	Name of the scheduled patient
Patient ID	(0010,0020)	ID of the scheduled patient
Accession Number	(0008,0050)	Accession Number
Requested Procedure ID	(0040,1001)	Requested Procedure ID

ALI NewPORT requests the following attributes from the Modality Worklist SCP.

Table 6: Requested Return Key Attributes – Modality Worklist

Attribute Name	Tag ID	Significance
Patient's Name	(0010,0010)	Patient full name

Patient's ID	(0010,0020)	ID assigned to the patient
Patient's Sex	(0010,0040)	
Patient's Birth Date	(0010,0030)	
Study Instance UID	(0020,000D)	Unique ID of the Study
Accession Number	(0008,0050)	
Scheduled Procedure Step Description	(0040,0007)	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
Modality	(0008,0060)	
Scheduled Procedure Step ID	(0040,0009)	
Scheduled Procedure Step Start Date	(0040,0002)	
Scheduled Procedure Step Start Time	(0040,0003)	
Scheduled Performing Physician Name	(0040,0006)	
Requesting Physicians	(0032,1032)	
Referring Physician's Name	(0008,0090)	
Current Patient Location	(0038,0300)	
Ethnic Group	(0010,2160)	Patient demographic information
Patient Comments	(0010,4000)	Additional comments by the patient
Additional Patient History	(0010,21B0)	Patient medical information
Requested Procedure ID	(0040,1001)	
Requested Service	(0032,1033)	Imaging service request information
Requested Procedure Description	(0032,1060)	
Requested Procedure Code Sequence	(0032,1064)	
Requested Procedure Comment	(0040,1400)	Additional comments on the requested procedure
Imaging Service Request Comment	(0040,2400)	Additional comments on the request for imaging service
Patient Weight	(0010,1030)	
Contrast Allergies	(0010,2110)	
Requested Contrast Agent	(0032,1070)	
Admission ID	(0038,0010)	
Special Needs	(0038,0050)	
Patient State	(0038,0500)	
Pre-Medication	(0040,0012)	
Scheduled Procedure Step Status	(0040,0020)	Status of the scheduled procedure step
Requested Procedure Priority	(0040,1003)	
Patient Transport Arrangements	(0040,1004)	
Confidentiality Constraint on Patient Data	(0040,3001)	
Scheduled Action Item Code Sequence	(0040,0008)	

Referenced Study Sequence	(0008,1110)	
Referenced Patient Sequence	(0008,1120)	
Other Patient ID	(0010,1000)	Patient identification information
Medical Alerts	(0010,2000)	
Scheduled Station Name	(0040,0010)	
Result Recipient Names	(0040,1010)	List of names to whom the results of the procedure should be sent

3.1.2.1.2 Proposed Presentation Contexts - Poll Request for Worklist

Table 7: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
Modality Worklist	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.2.1 SOP Specific Conformance - Modality Worklist

ALI Newport may request the following Type 3 Optional Return Key attributes:

Table 8: Requested Type 3 Optional Return Key Attributes – Modality Worklist

Attribute Name	Tag ID	Significance
Code Meaning	(0008,0104)	Scheduled Action Item Code sequence
Ethnic Group	(0010,2160)	Patient demographic information
Patient Comments	(0010,4000)	Additional comments by the patient
Other Patient ID	(0010,1000)	Patient identification information
Additional Patient History	(0010,21B0)	Patient medical information
Requesting Service	(0032,1033)	Imaging service request information
Code Meaning	(0008,0104)	Requested Procedure Code sequence
Scheduled Procedure Step Status	(0040,0020)	Status of the scheduled procedure step
Result Recipient Names	(0040,1010)	List of names to whom the results of the procedure should be sent
Requested Procedure Comment	(0040,1400)	Additional comments on the requested procedure
Imaging Service Request Comment	(0040,2400)	Additional comments on the request for imaging service

3.1.3 Association Acceptance Policy

The Modality Worklist AE does not accept Associations.

3.2 Storage AE

The Storage AE provides Standard Conformance to the following SOP Classes as an SCU.

Table 9: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

3.2.1 Association Policies

3.2.1.1 General

The maximum PDU size is configurable. The default PDU size which will be offered is 16,386 bytes.

3.2.1.2 Number of Associations

ALI NewPORT can have one or more Associations active with different Storage SCPs to perform Storage services simultaneously. However, only one Association is allowed during 'live' sending. The user can choose the 'primary' sending destination (SCP) for the case of live sending.

3.2.1.3 Asynchronous Nature

The Storage AE does not provide asynchronous behavior.

3.2.1.4 Implementation Identifying Information

An implementation class UID and version name is configured at the time of installation. The default implementation class UID is 1.2.840.113711.1.1 and the default version name is V3.0.0.

3.2.2 Association Initiation by Real-World Activity

3.2.2.1 Real-World Activity – Image Captured

3.2.2.1.1 Associated Real-World Activity – Image Captured

An Association is initiated when image(s) of an examination need to be transferred to an external system. ALI NewPORT users also have the option to send the images of completed and closed Exams.

Behavior when sending images is configurable and depends on whether “live” sending is enabled or not. Live sending means that images will be sent over a DICOM Association as soon as they are captured. The alternative configurable behavior is that images are sent all at once only after an Exam has been closed. An Association will contain images from at most one Study.

If live sending is enabled, a new Association will be requested as soon as an Exam is opened, whether it is an existing Exam or a new one. For ALI NewPORT, an Exam can correspond to one or more DICOM Series. However, only one Series is active for capturing at a time. When an Exam starts, Association is open to the first Series. When the user switch from one Series to another, existing Association will be closed, and a new Association will be established for the next Series. As long as an Association remains open for the current Series, new images will be sent over the Association until the Exam is closed.

ALI NewPORT can be configured to automatically request a new Association if the Association is dropped at any time. If this new Association is established, the ALI NewPORT will send all unsent images beginning from the image for which the C-STORE failed (it will not resend all the prior images). ALI NewPORT will only attempt to perform this re-connection once. If ALI NewPORT is not configured to perform re-connection, or if the re-connection fails, no further attempt will be made to re-establish the Association and the entire Exam will be marked as not sent. The Exam must then be manually re-sent at a later time.

If live sending is not enabled, the system can be configured to operate in two different modes. In one mode the user will always be queried when an Exam is closed as to whether they wish to send the images to another AE or export them to media. In the other mode the Exam is simply marked as not sent and it is up to the user to select that Exam for sending at a later time. If an error occurs during the transmission of an image, the Association will be closed and the user will be alerted of the error. The Series will be marked afterwards that it has images that have not been sent. Users always have the option to resend the entire Series after a send has been completed. To make it easier to send Exams in this mode the user can choose to send all 'new' (those that have not been successfully sent) Exams rather than having to select each Exam.

Whether live sending is configured or not, when an Association is requested the ALI NewPORT AE will request that a set of modalities be supported. If ALI NewPORT is configured as an Ultrasound capture device then it will request that US, US Retired, US Multi-frame Image, US Multi-frame Image Retired and Secondary Capture SOP Classes be accepted. Otherwise, it will only request that the Secondary Capture SOP Class be supported. The preferred SOP Class for single image is US followed by US Retired and finally Secondary Capture. The preferred SOP Class for CINE object is Multi-frame Image, followed by Multi-frame Image Retire. It is possible to alter this list so that only a subset are requested but the order of preference always remains.

3.2.2.1.2 Proposed Presentation Contexts – Image Captured

The following presentation context list applies when ALI NewPORT is configured to support the Storage Service Class:

Table 10: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Abstract Syntax		Transfer Syntax			
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline (Process 1): Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50	SCU	None
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Baseline (Process 1): Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.2.1.2.1 SOP Specific Conformance – Storage

In the case of a successful C-STORE response from the SCP, the ALI NewPORT AE will continue to send any subsequently captured image on the same Association if the examination is in progress. If the examination is closed, the ALI NewPORT AE will continue to send the rest of the images that have been marked for transmission. The Association will be properly released after all relevant images have been sent.

If secondary objects are transferred, all the mandatory modules of the Secondary Capture Image Information Object Definition are provided. No non-mandatory modules are provided. Of the

mandatory modules, all Type 1 and Type 2 elements are provided. Specific optional data elements (elements of Type 3) are provided if ALI NewPORT is configured to do so.

If ultrasound objects are transferred, all the mandatory modules of the Ultrasound Image Information Object Definition are provided. No non-mandatory modules are provided (e.g. Frame of Reference, US Region Calibration, Overlay Plane, etc.). Of the mandatory modules, all Type 1 and Type 2 data elements are provided. Specific optional data elements (elements of Type 3) are provided if ALI NewPORT is configured to do so.

The following attributes are in transmitted images:

Table 11: Attributes in Sent Images

Attribute Name	Tag ID	Significance
Specific Character Set	(0008,0005)	Always set to ISO_IR 100 (Latin No. 1)
Image Type	(0008,0008)	Present only if Modality is non-Secondary Capture. Always specified pixel data characteristic as "ORIGINAL" and patient examination characteristic as "PRIMARY".
SOP Class UID	(0008,0016)	Always specified. 1.2.840.10008.5.1.4.1.1.6.1 (US Image Storage) for non-Secondary Capture images. 1.2.840.10008.5.1.4.1.1.7 (Secondary Capture Image Storage) for Secondary Capture images. 1.2.840.10008.5.1.4.1.1.3.1 (US Multi-frame Image Storage) for multi-frame images.
SOP Instance UID	(0008,0018)	Always specified. Globally unique ID of the image.
Study Date	(0008,0020)	Always specified.
Acquisition Date	(0008,0022)	Present only if Modality is non-Secondary Capture.
Study Time	(0008,0030)	Always specified.
Acquisition Time	(0008,0032)	Present only if Modality is non-Secondary Capture.
Accession Number	(0008,0050)	Can be empty.
Modality	(0008,0060)	Always specified. The field is configurable with the default being 'US'.
Conversion Type	(0008,0064)	Present only if Modality is Secondary Capture. Always specified as "DV".
Manufacturer	(0008,0070)	Always specified as "A.L.I. Technologies Inc."
Institution Name	(0008,0080)	
Referring Physician's Name	(0008,0090)	Always empty.
Station Name	(0008,1010)	Always specified as the host name of the local machine.
Study Description	(0008,1030)	Can be present if configured. Can be empty if present. Value corresponds to exam types. Can be 1 to 3 exam types delimited by '\'s.
Series Description	(0008,103E)	Can be present if configured. Can be empty if present. Value is identical to Study Description.
Physician(s) of	(0008,1048)	

Record		
Name of Physician Reading Study	(0008,1060)	Can be present if configured. Only first and last names are entered on the PCU. Names can be set using carat, '^', or comma, ',', delimiters depending on the configuration.
Operators' Name	(0008,1070)	Can be present if configured. Can be empty if present. Only first and last names are entered on the PCU. Names can be set using carat, '^', or comma, ',', delimiters depending on the configuration.
Manufacturer's Model Name	(0008,1090)	Always specified as "ALI NewPORT".
Reference Study Seqence	(0008,1110)	
Referenced Study Component Sequence	(0008,1111)	
Patient Name	(0010,0010)	Always specified. Only first and last names are entered on the PCU. Names can be set using carat, '^', or comma, ',', delimiters depending on the configuration. Thus names can be either in the format of 'lname^fname' or 'lname, fname'. Note that for removable media names are always in the carat format.
Patient ID	(0010,0020)	Always specified.
Patient's Birth Date	(0010,0030)	Can be empty
Patient's Sex	(0010,0040)	Can be empty.
Other Patient's ID's	(0010,1000)	
Ethnic Group	(0010,2160)	
Additional Patient History	(0010,21B0)	
Patient Comments	(0010,4000)	
Device Serial Number	(0018,1000)	Always specified.
Date of Secondary Capture	(0018,1012)	Present only if Modality is Secondary Capture.
Time of Secondary Capture	(0018,1014)	Present only if Modality is Secondary Capture.
Software Versions	(0018,1020)	Always specified.
Protocol Name	(0018,1030)	
Frame Time	(0018,1063)	Specified only for multi-frame image.
Study Instance UID	(0020,000D)	Globally unique ID provided by worklist. NewPORT will generate the UID if it is not provided.
Series Instance UID	(0020,000E)	Globally unique ID generated by NewPORT.
Study ID	(0020,0010)	Always specified.
Series Number	(0020,0011)	Always specified.
Image Number	(0020,0013)	Always specified. Unique within its Series.
Patient Orientation	(0020,0020)	Always present but empty.
Samples per pixel	(0028,0002)	Always specified. 3 for RGB. 1 for MONOCHROME2.
Photometric	(0028,0004)	The following photometric interpretations can be

Interpretation		specified: MONOCHROME2 for mono, RGB for color, or YBR_FULL_422 for multi-frame.
Planar Configuration	(0028,0006)	Present if RGB. Always specified as Color-by-pixel (0).
Number of Frames	(0028,0008)	Specified only for multi-frame image.
Frame Increment Pointer	(0028,0009)	Specified only for multi-frame image.
Rows	(0028,0010)	Always specified.
Columns	(0028,0011)	Always specified.
Bits Allocated	(0028,0100)	Always specified as 8.
Bits Stored	(0028,0101)	Always specified as 8.
High bit	(0028,0102)	Always specified as 7.
Pixel Representation	(0028,0103)	Always specified as 0, unsigned integer.
Planar Configuration	(0028,0034)	If image is RGB will be specified as 0, color by pixel.
Window Center	(0028,1050)	System can be configured to specify a value for this
Window Width	(0028,1051)	System can be configured to specify a value for this.
Rescale Intercept	(0028,1052)	If Window Center and Window Width are defined then will be set to 0.0.
Rescale Slope	(0028,1053)	If Window Center and Window Width are defined then will be set to 1.0.
Scheduled Procedure Step Description	(0040,0007)	
Scheduled Action Item Code Sequence	(0040,0008)	
Scheduled Procedure Step ID	(0040,0009)	
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Start Time	(0040,0245)	
Performed Procedure Step ID	(0040,0253)	
Performed Procedure Step Description	(0040,0254)	
Performed Action Item Code Sequence	(0040,0260)	
Request Attributes Sequence	(0040,0275)	
Request Procedure ID	(0040,1001)	
Pixel Data	(7FE0,0010)	Always specified.

The following table lists the optional elements that may be present in the image object.

Table 12: Optional Elements in Sent Images - Storage

Attribute Name	Tag ID
Image Type	(0008,0008)

Acquisition Date	(0008,0022)
Acquisition Time	(0008,0032)
Institution Name	(0008,0080)
Code Meaning	(0008,0104)
Station Name	(0008,1010)
Study Description	(0008,1030)
Series Description	(0008,103E)
Physician(s) of Record	(0008,1048)
Name of Physician Reading Study	(0008,1060)
Operators' Name	(0008,1070)
Manufacturer's Model Name	(0008,1090)
Referenced Study Sequence	(0008,1110)
Referenced Study Component Sequence	(0008,1111)
Referenced Patient Sequence	(0008,1120)
Other Patient Ids	(0010,1000)
Patient's Weight	(0010,1030)
Ethnic Group	(0010,2160)
Additional Patient's History	(0010,21B0)
Patient Comments	(0010,4000)
Device Serial Number	(0018,1000)
Software Version	(0018,1020)
Protocol Name	(0018,1030)
Scheduled Procedure Step Description	(0040,0007)
Scheduled Action Item Code Sequence	(0040,0008)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step ID	(0040,0253)
Performed Procedure Step Description	(0040,0254)
Request Attributes Sequence	(0040,0275)

3.2.3 Association Acceptance Policy

The Storage AE does not accept Association.

3.3 Print AE

The Print AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU.

Table 13: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
Basic Greyscale Print Management	1.2.840.10008.5.1.1.9
Basic Color Print Management	1.2.840.10008.5.1.1.18
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Basic Color Image Box	1.2.840.10008.5.1.1.4.1

3.3.1 Association Policies

3.3.1.1 General

The maximum PDU size is configurable. The default PDU size which will be offered is 16,386 bytes.

3.3.1.2 Number of Associations

ALI NewPORT can create one Association to perform Color Print Management Service, and one Association to perform Grayscale Print Management Service. It is possible to have Color and Grayscale Print Management Associations active simultaneously.

3.3.1.3 Asynchronous Nature

The Print AE does not provide asynchronous behavior.

3.3.1.4 Implementation Identifying Information

An implementation class UID and version name is configured at the time of installation. The default implementation class UID is 1.2.840.113711.1.3 and the default version name is V3.0.0.

3.3.2 Association Initiation by Real-World Activity

3.3.2.1 Real-World Activity – User Submits List of Images to be Printed

3.3.2.1.1 Associated Real-World Activity - User Submits List of Images to be Printed

An Association is initiated when image(s) of an Exam need to be printed on a DICOM 3.0 compliant printer.

Associations with printers can be initiated either on a “live” or a “buffered” basis.

“Live” printing means images are routed to printers when they are captured. In this case, the Association is initiated when the first image of the examination is captured. If color images are captured, an attempt will be made to form an Association with the Basic Color Print Management SOP Class presentation context, and all subsequent color images will be routed along this

Association. This "color" Association will be maintained independently from the "gray" Association.

"Buffered" printing means images are held on the local hard disk until a sufficient number of images have been captured to fill a page. When this occurs, an Association will be formed with the printer, all the images for the page transferred, and the Association will be closed.

3.3.2.1.2 Proposed Presentation Contexts - User Submits List of Images to be Printed

The following list applies when ALI NewPORT is configured to support the Print Management Service Class:

Table 14: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
Basic Grayscale Print Mngmt.	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Mngmt.	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.3.2.1.2.1 SOP Specific Conformance - Basic Print Management

Standard conformance is provided to the Basic Greyscale and Basic Color Print Management Meta SOP Classes as an SCU. All mandatory elements for film sessions, basic film boxes, and basic greyscale image boxes are provided. The User Optional attributes that can be set are listed below:

Table 15: Optional Attributes Set for Film Sessions

Name	Tag	Possible Values
Number of Copies	(2000,0010)	Any non-negative integer
Print Priority	(2000,0020)	HIGH, MED, LOW
Medium Type	(2000,0030)	PAPER, CLEAR FILM, BLUE FILM
Film Destination	(2000,0040)	MAGAZINE, PROCESSOR

Table 16: Optional Attributes Set for Film Boxes

Name	Tag	Possible Values
Film Orientation	(2010,0040)	PORTRAIT, LANDSCAPE
Film Size ID	(2010,0050)	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX30CM, 24CMX24CM
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC,NONE
Smoothing Type	(2010,0080)	values depend on printer
Empty Image Density	(2010,0010)	BLACK, WHITE
Min Density	(2010,0120)	nnn

Max Density	(2010,0130)	nnn
Trim	(2010,0140)	YES, NO
Configuration Information	(2010,0150)	values depend on printer

Table 17: Optional Attributes Set for Image Boxes

Name	Tag	Possible Values
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC, NONE
Smoothing Type	(2010,0080)	Values depend on printer
Polarity	(2020,0020)	NORMAL, REVERSE
Requested Image Size	(2020,0030)	Values depend on printer

3.3.3 Association Acceptance Policy

The Print AE does not accept Association.

3.4 Modality Performed Procedure Step AE

The Modality Performed Procedure Step AE provides Standared Conformance to the following DICOM V3.0 SOP Classes as an SCU.

Table 18: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

3.4.1 Association Policies

3.4.1.1 General

The maximum PDU size is configurable. The default PDU size which will be offered is 16,386 bytes.

3.4.1.2 Number of Associations

ALI NewPORT will only have at most one Association active to perform the Modality Performed Procedure Step Services.

3.4.1.3 Asynchronous Nature

The Modality Performed Procedure Step AE does not provide asynchronous behavior.

3.4.1.4 Implementation Identifying Information

An implementation class UID and version name is configured at the time of installation. The default implementation class UID is 1.2.840.113711.1.6 and the default version name is V3.0.0.

3.4.2 Association Initiation by Real-World Activity

3.4.2.1 Real-World Activity – Exam Started or Finished

3.4.2.1.1 Associated Real-World Activity – Exam Started or Finished

ALI NewPORT initiates an Association with a Modality Performed Procedure Step server to update the status of a scheduled procedure. An Association is initiated in two cases: to issue an N-CREATE to the Modality Performed Procedure Step server setting the scheduled procedure step status to “IN PROGRESS”, and to issue an N-SET informing the server that the procedure is either “COMPLETED” or “DISCONTINUED”.

The Association to send an N-CREATE message is opened immediately once the Exam begins, then the Association is closed when N-CREATE is successfully sent. The Association to update (N-SET) the performed procedure step status is opened immediately when the Exam is completed or aborted, and is closed after the N-SET message is successfully sent.

3.4.2.1.2 Proposed Presentation Contexts – Exam Started or Finished

Table 19: Proposed Presentation Contexts

Abstract Syntax	Transfer Syntax

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.4.2.1.2.1 SOP Specific Conformance – Modality Performed Procedure Step

The following attributes may have attribute values set in the N-CREATE request:

Table 20: N-CREATE Attributes set by ALI NewPORT

Attribute Name	Tag ID
Specific Character Set	(0008,0005)
Accession Number	(0008,0050)
Retrieve AE Title	(0008,0054)
Modality	(0008,0060)
Code Value	(0008,0100)
Code Scheme Designator	(0008,0102)
Code Meaning	(0008,0104)
Procedure Code Sequence	(0008,1032)
Serices Description	(0008,103E)
Performing Physician's Name	(0008,1050)
Operator's Name	(0008,1070)
Referenced Study Sequence	(0008,1110)
Referenced Patient Sequence	(0008,1120)
Referenced Image Sequence	(0008,1140)
Referenced SOP Class UID	(0008,1150)
Referenced SOP Instance UID	(0008,1155)
Patient Name	(0010,0010)
Patient's ID	(0010,0020)
Patient's Birth Date	(0010,0032)
Patient's Sex	(0010,0040)
Protocol Name	(0018,1030)
Study Instance UID	(0020,000D)
Series Instance UID	(0020,000E)
Study ID	(0020,0010)
Requested Procedure Description	(0032,1060)
Scheduled Procedure Step Description	(0040,0007)
Scheduled Action Item Code Sequence	(0040,0008)
Scheduled Procedure Step ID	(0040,0009)
Referenced Standalone SOP Instance Sequence	(0040,0220)
Performed Station AE Title	(0040,0241)
Performed Station Name	(0040,0242)
Performed Location	(0040,0243)

Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step End Date	(0040,0250)
Performed Procedure Step End Time	(0040,0251)
Performed Procedure Step Status	(0040,0252)
Performed Procedure Step ID	(0040,0253)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Performed Action Item Code Sequence	(0040,0260)
Scheduled Step Attribute Sequence	(0040,0270)
Performed Series Sequence	(0040,0340)
Requested Procedure ID	(0040,1001)

The following attributes may have attribute values set in N-SET request:

Table 21: N-SET Attributes set by ALI NewPORT

Attribute Name	Tag ID
Retrieve AE Title	(0008,0054)
Code Value	(0008,0100)
Code Scheme Designator	(0008,0102)
Code Meaning	(0008,0104)
Procedure Code Sequence	(0008,1032)
Serices Description	(0008,103E)
Performing Physician's Name	(0008,1050)
Operator's Name	(0008,1070)
Referenced Image Sequence	(0008,1140)
Referenced SOP Class UID	(0008,1150)
Referenced SOP Instance UID	(0008,1155)
Protocol Name	(0018,1030)
Series Instance UID	(0020,000E)
Referenced Standalone SOP Instance Sequence	(0040,0220)
Performed Procedure Step End Date	(0040,0250)
Performed Procedure Step End Time	(0040,0251)
Performed Procedure Step Status	(0040,0252)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Performed Action Item Code Sequence	(0040,0260)
Performed Series Sequence	(0040,0340)

ALI NewPORT will create the Modality Performed Procedure Step Instance when the operator begins the Exam. It does not matter whether the images are sent in "Live" or "Batch" mode.

ALI NewPORT will update the status Modality Performed Procedure Step Instance when the operator completes the Exam. Again it is independent from whether images are sent in “Live” or “Batch” mode.

The status is set to “COMPLETED” if the operator successfully completes the Exam. The status is set to “DISCONTINUED” if the operator aborts the Exam.

3.4.3 Association Acceptance Policy

The Modality Performed Procedure Step AE does not accept Association.

3.5 Storage Commitment Push Model AE

The Storage Commitment Push Model AE provides Standard Conformance to the following DICOM V3.0 SOP Class as an SCU.

Table 22: SOP Class Conformance as SCU

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

3.5.1 Association Establishment Policies

3.5.1.1 General

The maximum PDU size is configurable. The default PDU size which will be offered is 16,386 bytes.

3.5.1.2 Number of Associations

ALI NewPORT could have multiple Associations active at one time to perform the Storage Commitment service.

3.5.1.3 Asynchronous Nature

ALI NewPORT creates a new Association to send Storage Commitment message for each Transaction when requested. It is possible to have multiple Associations active at the same time. Each sending Association is closed once the message is sent.
A listening process is always active to accept Association initiated by the Storage Commitment SCPs. A new child process is created for each accepting Association, thus multiple Associations can be active at the same time. Each accepting Association is close once the N-EVENT-REPORT message is read.

3.5.1.4 Implementation Identifying Information

An implementation class UID and version name is configured at the time of installation. The default implementation class UID is 1.2.840.113711.1.7 and the default version name is V3.0.0.

3.5.2 Association Initiation by Real-World Activity

3.5.2.1 Real-World Activity – Images are sent

3.5.2.1.1 Associated Real-World Activity – Images are sent

ALI NewPORT initiates an Association with a Storage Commitment SCP when it has successfully sent a set of images to a Storage SCP. Images are sent in one of two ways: Live or Batch. In either case, images of the same Series are sent in the same Storage Association. When the Storage Association is closed, ALI NewPORT will open an Association and send an N-ACTION Storage Commitment request to the Storage Commitment SCP, only if the images (Storage SOP Instances) are sent successfully.

If the Storage AE of ALI NewPORT fails to send images of a Series, the Series is marked as 'unsent'. The user will then have to manually send the images at a later time. Once the images are finally sent successfully, ALI NewPORT will open an Association with the Storage

Commitment SCP and send an N-ACTION Storage Commitment request along with SOP Instance UID of the images.

Images can be sent to more than one Storage SCP. Thus more than one Storage Commitment request can be sent for a single image. The local database will record all the pending storage commitment requests for each image. The pending record will be removed for an image when all Storage Commitment SCPs are committed to the storage of the image.

When all images of a Series are committed, the Series is marked as committed too. Sending an already committed Series to Storage SCP will not initiate a further Storage Commitment Association.

3.5.2.1.2 Proposed Presentation Contexts – Images are sent

Table 23: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.5.2.1.2.1 SOP Specific Conformance – Storage Commitment

SOP Instances (images) are transferred via ALI NewPORT Storage AE, as described in Section 3.2 of this document.

ALI NewPORT may perform Storage Commitment for a subset of images of a Study Component. Storage Commitment AE of ALI NewPORT will not support Referenced Study Component Sequence (0008,1111) attribute in N-ACTION request.

The duration of applicability of a Transaction UID (0008,1195) is indefinite. N-EVENT-REPORT messages are accepted at any point in time.

Storage Commitment AE does not support Storage Media File-Set ID & UID Attributes in the N-ACTION request.

The following attributes are set in the N-ACTION request:

Table 24: N-ACTION Attributes set by ALI NewPORT

Attribute Name	Tag ID
Transaction UID	(0008,1195)

Referenced SOP Sequence	(0008,1199)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)

3.5.3 Association Acceptance Policy

3.5.3.1 Real-World Activity – Receive Response of Storage Commitment

ALI NewPORT has sent a N-ACTION Storage Commitment request with a Transaction UID. It is then waiting for the N-EVENT-REPORT response from the SCP.

3.5.3.1.1 Associated Real-World Activity – Receive Response of Storage Commitment

After sending the N-ACTION request, ALI NewPORT is waiting for the N-EVENT-REPORT from the Storage Commitment SCP.

If a successful Storage Commitment response is received, ALI NewPORT will be free to remove the committed images. If a failed response is received or there is no response after the life time of a Transaction UID, ALI NewPORT will stop waiting and the corresponding images are still not committed.

Note that more than one Storage Commitment Response may be required for an image sent to multiple destinations. In which case the image can only be freed if all Responses are received and indicate success.

3.5.3.1.2 Presentation Contexts – Receive Response of Storage Commitment

Table 25: Presentation Contexts

Abstract Syntax		Transfer Syntax			
Name	**UID**	**Name**	**UID**	**Role**	**Extended Negotiation**
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.5.3.1.2.1 SOP Specific Conformance – Storage Commitment

When ALI NewPORT receives a N-EVENT-REPORT response, it will first try to match the Transaction UID (0008,1195) with the internal database. If there is no matching Transaction UID, the N-EVENT-REPORT response will be ignored. Otherwise, the Event Type ID of the response is read to determine whether there is any failure status.

ALI NewPORT will read through the list of successful SOP Instances in the Referenced SOP Sequence, and mark the corresponding image records in the internal database as "committed" by the responding Storage Commitment SCP. If all the pending Storage Commitment requests

for an image are fulfilled, the image will be marked as "committed". If all the images in a single Series are marked as committed, the Series is then marked as "Committed" too.

Once an image is marked as committed, further incoming Storage Commitment responses for the image are ignored. Once a Series is committed, re-sending the Series to Storage SCP will not initiate any Storage Commitment Association.

Committed Series (or Studies) are ready to be removed from the local database. However, the removal of the Series will not occur until the local storage device has been filled up to a specified limit. If a Series is not committed, ALI NewPORT will not remove any image from the Series, even though some images belongs to this Series are committed.

ALI NewPORT will also read through the list of failed SOP Instances in the Failed SOP Sequence (0008,1198) of the N-EVENT-REPORT response. The Failure Reason (0008,1197) number code of each failed image will be recorded in the local database. The same information will also be recorded in the Storage Commitment AE log file. Failed images stay as 'not committed' in the local database.

When a Storage Commitment Response indicates a failure status, ALI NewPORT will send a Storage Commitment request for the same set of images for a configurable number of times.

If an image is already committed, any further Storage Commitment responses indicating status of failure for the same image will be ignored.

If a Series of images are sent, but only some images are committed, the Series will be marked as 'not committed'. The user must then manually re-send the not committed Series. ALI NewPORT will give a option whether to send the whole Series, or to send only the not committed images of the Series. This action will in term initiate another Storage Commitment request.

3.5.3.1.3 Presentation Context Acceptance Criterion - Receive Response of Storage Commitment

The Storage Commitment AE will only accept the Presentation Contexts specified in Table 23. The Storage Commitment AE can be configured to reject valid Presentation Contexts if the external DICOM host is not listed in a local configuration file. In addition, a valid Presentation Context can be rejected if the maximum limit on the number of simultaneous processes has been reached.

The Storage Commitment AE does not check for and will accept duplicate presentation contexts.

3.5.3.1.4 Transfer Syntax Selected Policies - Receive Response of Storage Commitment

The default behavior of the Storage Commitment AE supports the Implicit VR Little Endian and Explicit VR Little Endian transfer syntaxes for all Associations.

The default preferred acceptance order for syntaxes for the Storage Commitment AE is: Little Endian Explicit, Little Endian Implicit (if all these contexts are proposed). This order of preference is configurable.

3.6 Removable Media AE

A DICOM conformant Magneto-Optical Disk (MOD) is created when a non-conformant MOD is inserted into the ALI NewPORT and one or more DICOM Exams are transferred to the MOD. When Exams are first transferred, their files are added to the MOD in DICOM Part 10 format and a valid DICOMDIR is created and saved to the MOD. ALI NewPORT can add images to an existing DICOM conferment MOD and update its DICOMDIR. The ALI NewPORT, however, does not have the capability of inquiring the date and time of file creation for any file within the File-set and thus can only be considered a File-set Creator and not a Reader or Updater.

3.6.1 Presentation Contexts - Removable Media

The following list applies when ALI NewPORT is configured to support DICOM Removable Media:

Abstract Syntax		Transfer Syntax	
Name	**UID**	**Name**	**UID**
DICOMDIR	1.2.840.10008.1.3.10	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
US Image Storage.	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1

3.6.2 Subset of Basic Directory Information Object Model Supported

The Removable Media AE supports both the File Information Module and the Directory Information Module. Also, the Patient, Study, Series, and Image Directory Record types are supported.

3.6.3 Service Class Options

The Removable Media AE supports only the Interchange Service Class Option. The Directory Information Module is always present.

When the Directory Information Module is created, the following optional elements may be included in each Directory Record.

Table 26: Optional Elements in Directory Information Module

Directory Record Type	Element Name	Tag ID
Patient	Patient's Name	(0010,0010)
	Patient's Sex	(0010,0040)
Series	Series Date	(0008,0021)
	Series Time	(0008,0031)
Image	Image Date	(0008,0023)
	Image Time	(0008,0033)
	Samples Per Pixel	(0028,0002)

	Photometric Interpretation	(0028,0004)
	Rows	(0028,0010)
	Columns	(0028,0011)
	Bits Allocated	(0028,0100)
	Bits Stored	(0028,0101)
	Pixel Representation	(0028,0103)
	Planar Configuration	(0028,0006)

3.6.4 Association Acceptance Policy

The Removable Media AE does not accept Association.

4 Communication Profiles

4.1 Supported Communication Stacks

The ALI NewPORT AE provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 TCP/IP Stack

The ALI NewPORT AE inherits its TCP/IP stack from the Windows 95 or Windows NT system upon which it executes.

4.2.1 Physical Media Support

The ALI NewPORT AE is indifferent to the physical medium over which TCP/IP executes as it inherits this support from the Windows 95 or Windows NT system upon which it executes.

5 Extensions/Specializations/Privatizations

Not applicable.

6 Configuration

6.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by ALI Installation Personnel.

The default settings are as follows:

Table 27: Default AE Names

ALI NewPORT Application Entity	AE Title
Storage Service Class SCU	PCU_STORE_SCU
Removable Media Creator	PCU_STORE_SCU
Print Service Class SCU	PCU_PRINT_SCU
Modality Worklist Service Class SCU	PCU_QWL_SCU
Modality Performed Procedure Step Service Class SCU	PCU_MPPS_SCU
Storage Commitment Service Class (Push Model) SCU	PCU_SC_SCU

6.2 Configurable Parameters

The following items are configurable:

- The AE Title, ports of SCP's, implementation class UID, implementation version name of local and external DICOM entities.
- The print parameters of the Print Management modules, e.g. film session, film box, etc., are configurable via the PCU's user interface.

7 Support for Extended Character Sets

ISO_IR 100 (Latin No. 1) is always used.
No support for other Extended Character Sets.

A.L.I. Technologies Inc.
130-10711 Cambie Road, Richmond, BC Canada V6X 3G5

A.L.I. Imaging Systems Corp.
700 Walnut Ridge Drive, Suite 203, Hartland, WI, USA 53029

Tel: (800) 661-5885 / Fax: (800) 261-5432
e-mail: info@alitech.com / Web Site: www.alitech.com