

Siemens.
Ultrasound Division

ACUSON P50™ ultrasound system
DICOM Conformance Statement

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1 Introduction

1.1 Scope

This document is the DICOM 3.0 Conformance Statement for ACUSON P50 ultrasound Imaging System product.

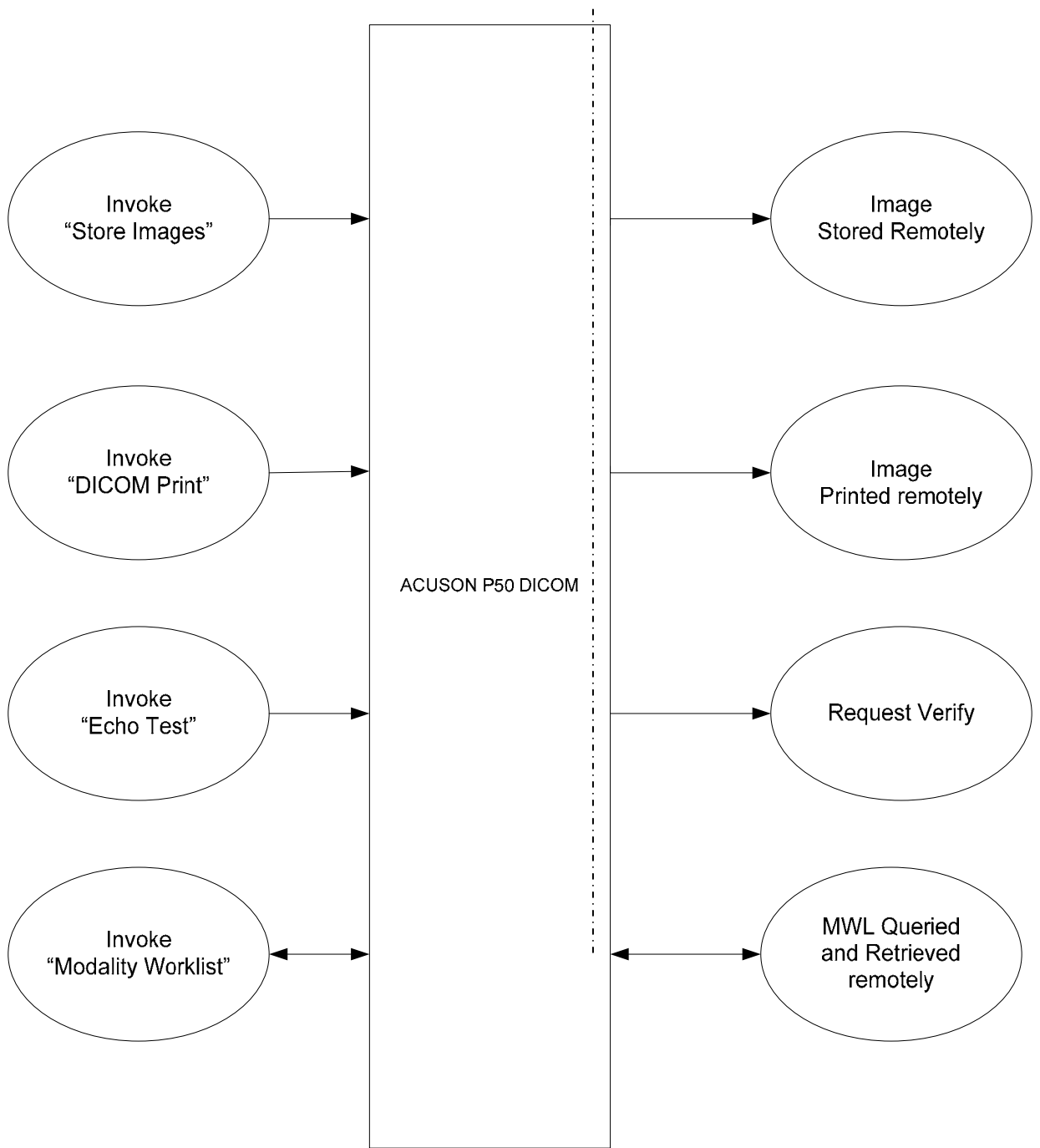
1.1 Products Applicable

The document is applicable to the ACUSON P50 ultrasound Imaging System equipped with the DICOM option. “ACUSON P50 system DICOM” in this document refers to ACUSON P50 system DICOM on the ACUSON P50 ultrasound Imaging System.

Please see the DICOM Conformance Statement for *syngo*[®] US Workplace, if that software is installed on the ACUSON P50 platform.

2 Implementation Model

2.1 Application Data Flow Diagram



DICOM
Standard
Interface

2.2 Functional Definitions

ACUSON P50 system DICOM has a single Application Entity (AE) for all Service



Classes.

ACUSON P50 system DICOM is an SCU for Storage Service Class operation.

ACUSON P50 system DICOM is an SCU for Print Management Service Class operation.

ACUSON P50 system DICOM is an SCU and SCP for Verification Service Class operation.

ACUSON P50 system DICOM is an SCU for Modality Worklist Service Class operation.

2.3 Sequencing of Real-World Activities

ACUSON P50 system DICOM can transfer SOP Instances another remote AE automatically. This is accomplished by selecting to send or print DICOM images from the ACUSON P50 system. Images are transferred asynchronously from a local cache. All configurable parameters are pre-selected by the user.

3 AE Specifications

3.1 AE Specification

ACUSON P50 system DICOM has only one AE implementation. AE title is user configurable (Default is ACUSONP50). With any AE title specified by user, ACUSON P50 system DICOM (in standard configuration) provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

Table 3.1.1 *SOP Class Names and UIDs for Storage*

SOP Class Name	SOP Class UID	Role
Verification	1.2.840.20008.1.1	SCU SCP
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	SCU
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	SCU

ACUSON P50 system DICOM provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 3.1.2 *SOP Class Names and UIDs for Print*

SOP Class Name	SOP Class UID	Role
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	SCU

Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	SCU
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ACUSON P50 system DICOM provides Standard Conformance to the following DICOM V3.0 SOP Class:

Table 3.1.3 SOP Class Name and UID for MWL

SOP Class Name	SOP Class UID	Role
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	SCU

3.1.1 Association Establishment Policies

3.1.1.1 General

The maximum PDU size, which ACUSON P50 system DICOM will use, is 16384 bytes. If an SCP does not specify the maximum PDU in association, ACUSON P50 system DICOM sends PDU of maximum size, 16384 bytes. If the SCP specifies the maximum PDU size greater than 16384 bytes, ACUSON P50 system DICOM will send PDU of 16384 bytes or less.

3.1.1.2 Number of Associations

ACUSON P50 system DICOM supports multiple associations. Four simultaneous associations are possible: Storage Service Class operation, Print Management Service Class operation, Verification Service Class operation and Modality Worklist Service Class operation.

3.1.1.3 Asynchronous Nature

ACUSON P50 system DICOM does not support negotiation of multiple outstanding transactions.

3.1.1.4 Implementation Identifying Information

Implementation Class UID: 1.2.840.113820.2

Implementation Version Name: EBM_DICOM_26

3.1.2 Association Initiation Policy

ACUSON P50 system DICOM initiates associations under the following conditions:

User invokes Image Store to a remote AE.

User invokes Image Print to a remote AE.

User invokes Echo Test to a remote AE.

User invokes MWL query and retrieve to a remote AE.

3.1.2.1 Image Store to a remote AE

3.1.2.1.1 Associated Read-World Activity

The associated Real-World activity with the Storage Service is the transfer of images to a remote DICOM Storage SCP selected by the user.

3.1.2.1.2 Proposed Presentation Contexts

Table 3.1.2.1.2

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

Note: Refer to Tables 3.1.1 and 3.1.2.

If transfer syntax of the SOP Instance to be transferred is not Implicit VR Little Endian, ACUSON P50 system DICOM proposes two transfer syntax's; 1) Transfer syntax of the original SOP Instance and 2) Implicit VR Little Endian. ACUSON P50 system DICOM always includes Implicit Little Endian as proposed transfer syntax for each abstract syntax.

3.1.2.1.3 SOP Specific Conformance for Storage SOP Class

ACUSON P50 system DICOM provides standard conformance to the DICOM Storage Service Class.

3.1.2.2 Verification of a remote AE

3.1.2.2.1 Associated Read-World Activity

When a user submits a request to verify a remote AE, ACUSON P50 system DICOM initiates an association to the user specified DICOM Verification SCP.

3.1.2.2.2 Proposed Presentation Contexts

Table 3.1.2.3.2

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.20008.1.1	Implicit VR	1.2.840.10008.1.2	SCU	N/A
		Little Endian			
		Explicit VR	1.2.840.10008.1.2.1		
		Little Endian			
		Explicit VR	1.2.840.10008.1.2.2		
		Big Endian			

3.1.2.2.3 SOP Specific Conformance for Verification SOP Class

ACUSON P50 system DICOM provides standard conformance to the DICOM Verification SOP Class SCU role.

3.1.2.3 Image Print to a remote AE

3.1.2.3.1 Associated Read-World Activity

The associated Real-World activity with the Print Management Service is the transfer of images to a remote DICOM Print Management SCP pre-selected by the user.

3.1.2.3.2 Proposed Presentation Contexts

Table 3.1.2.3.2

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Implicit VR	1.2.840.10008.1.2	SCU	N/A
		Little Endian			
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Implicit VR	1.2.840.10008.1.2	SCU	N/A
		Little Endian			

3.1.2.3.3 SOP Specific Conformance for Grayscale Print Management Meta SOP Class

Table 3.1.2.4.2.1

DIMSE Service Elements for Grayscale Print Management Meta SOP Class

SOP Class Name and UID	Usage SCU / SCP	Role	DIMSE Service Element
Basic Film Session SOP Class 1.2.840.10008.5.1.1.1	M / M	SCU	N-CREATE
Basic Film Box SOP Class 1.2.840.10008.5.1.1.2	M / M	SCU	N-CREATE N-SET N-ACTION*1 N-DELETE*1
Basic Grayscale Image Box SOP Class 1.2.840.10008.5.1.1.4	M / M	SCU	N-SET
Printer SOP Class 1.2.840.10008.5.1.1.16	M / M	SCU	N-GET*2

*1: No collation is performed.

*2: ACUSON P50 system DICOM sends one N-GET before printing. If the Printer Status is returned and indicates that the printer is on-line, ACUSON P50 system DICOM continues with the print request; otherwise, the print is considered to have failed. After N-ACTION is confirmed by the print server, ACUSON P50 system DICOM considers the print to have succeeded sends N-DELETE and requests to close the association. ACUSON P50 system DICOM does not wait for an N-EVENT-REPORT before closing the association.

3.1.2.3.4 SOP Specific Conformance for Color Print Management Meta SOP Class

Table 3.1.2.4.2.2

DIMSE Service Elements for Color Print Management Meta SOP Class

SOP Class Name and UID	Usage SCU / SCP	Role	DIMSE Service Element
Basic Film Session SOP Class 1.2.840.10008.5.1.1.1	M / M	SCU	N-CREATE
Basic Film Box SOP Class	M / M	SCU	N-CREATE

1.2.840.10008.5.1.1.2			N-SET N-ACTION*1 N-DELETE*1
Basic Color Image Box SOP Class 1.2.840.10008.5.1.1.4.1	M / M	SCU	N-SET
Printer SOP Class 1.2.840.10008.5.1.1.16	M / M	SCU	N-GET*2

*1: No collation is performed.

*2: ACUSON P50 system DICOM sends one N-GET before printing. If the Printer Status is returned and indicates that the printer is on-line, ACUSON P50 system DICOM continues with the print request; otherwise, the print is considered to have failed. After N-ACTION is confirmed by the print server, ACUSON P50 system DICOM considers the print to have succeeded sends N-DELETE and requests to close the association. ACUSON P50 system DICOM does not wait for an N-EVENT-REPORT before closing the association.

3.1.2.3.5 Basic Film Session SOP Class Attributes

Attribute Name	Tag	Usage SCU / SCP	Usage and Range
Number of Copies	(2000,0010)	U / M	1 to 9
Print Priority	(2000,0020)	U / M	HIGH MED LOW
Medium Type *	(2000,0030)	U / M	PAPER CLEAR FILM BLUE FILM or no attribute for "Printer Default"
Film Destination *	(2000,0040)	U / M	MAGAZINE PROCESSOR or attribute for "Print Default"
Film Session Label	(2000,0050)	U / U	Max 64 characters (ISO IR-6) Always left blank

* Attributes are not provided, if user selects "Printer Default".

3.1.2.3.6 Basic Film Box SOP Class Attributes

Attribute Name	Tag	Usage SCU / SCP	Usage and Range
Image Display Format	(2010,0010)	M / M	STANDARD∄C,R Where R is 1 and C is 1
Referenced Film Session Sequence	(2010,0500)	M / M	Provided.
> Referenced SOP Class UID	(0008,1150)	M / M	Provided.
> Referenced SOP Instance UID	(0008,1155)	M / M	Provided.
Film Orientation	(2010,0040)	U / M	PORTRAIT LANDSCAPE
Film Size ID *	(2010,0050)	U / M	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM or no attribute for “Printer default”
Magnification Type *	(2010,0060)	U / M	REPLICATE BILINEAR CUBIC or no attribute for “Printer default”
Border Density *	(2010,0100)	U / U	BLACK WHITE or no attribute for “Printer default”
Empty Image Density *	(2010,0110)	U / U	BLACK WHITE or no attribute for

			“Printer default”
Trim	(2010,0140)	U / U	NO

* Attributes are not provided, if user selects “Printer Default”.

3.1.2.3.7 Basic Grayscale Image SOP Class Attributes

Attribute Name	Tag	Usage SCU / SCP	Usage and Range
Image Position	(2020,0010)	M / M	Provided.
Basic Grayscale Image Sequence	(2020,0110)	M / M	Provided.
> Samples Per Pixel	(0028,0002)	M / M	1
> Photometric Interpretation	(0028,0004)	M / M	MONOCHROME1 MONOCHROME2
> Rows	(0028,0010)	M / M	Provided.
> Columns	(0028,0011)	M / M	Provided.
> Pixel Aspect Ratio	(0028,0034)	MC / M	Always Provided.
> Bits Allocated	(0028,0100)	M / M	8
> Bits Stored	(0028,0101)	M / M	8
> High Bit	(0028,0102)	M / M	7
> Pixel Representation	(0028,0103)	M / M	0000H
> Pixel Data	(7FE0,0010)	M / M	Provided.
Polarity	(2020,0020)	U / M	NORMAL

3.1.2.3.8 Basic Color Image SOP Class Attributes

Attribute Name	Tag	Usage SCU / SCP	Usage and Range
Image Position	(2020,0010)	M / M	Provided.
Basic Color Image Sequence	(2020,0111)	M / M	Provided.
> Samples Per Pixel	(0028,0002)	M / M	3
> Photometric Interpretation	(0028,0004)	M / M	RGB
> Planar Configuration	(0028,0006)	M / M	0001H
> Rows	(0028,0010)	M / M	Provided.
> Columns	(0028,0011)	M / M	Provided.
> Pixel Aspect Ratio	(0028,0034)	MC / M	Always provided.
> Bits Allocated	(0028,0100)	M / M	8

> Bits Stored	(0028,0101)	M / M	8
> High Bit	(0028,0102)	M / M	7
> Pixel Representation	(0028,0103)	M / M	0000H
> Pixel Data	(7FE0,0010)	M / M	Provided.

3.1.2.4 MWL to a Remote AE

3.1.2.4.1 Associated Read-World Activity

The associated Real-World activity with the MWL Service is the query of the Modality Worklist to a remote DICOM MWL SCP selected by the user. After receiving the Worklist, the association is released. In any case that the remote AE does not respond, the operations will time out and the association will be released.

3.1.2.4.2 Proposed Presentation Contexts

Table 3.1.2.4.2

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

Note: Refer to Tables 3.1.3.

3.1.2.4.3 Asynchronous Nature

The Modality Worklist AE will not use asynchronous operations window negotiation.

2.1.2.5.4 Modality Worklist Information Attributes

Table

Module	Attribute Name	Tag	Match Type	Return Type
Patient Identification	Patient Name	0010,0010	R	1
Patient Identification	Patient ID	0010,0020	R	1

Patient Demographic	Patient's Birth Date	0010,0030	O	2
Patient Demographic	Patient's Sex	0010,0040	O	2
Requested Procedure	Study Instance UID	0020,000D	O	1
Requested Procedure	Requested Procedure Description	0032,1060	O	1C
Scheduled Procedure Step	Sequence	0040,0100	R	1
Scheduled Procedure Step	>Scheduled Station AE Title	0040,0001	R	1
Scheduled Procedure Step	>Scheduled Procedure Step Start Date	0040,0002	R	1
Scheduled Procedure Step	>Scheduled Procedure Step Start Time	0040,0003	R	1
Scheduled Procedure Step	>Scheduled Performing Physician's Name	0040,0006	R	2
Scheduled Procedure Step	>Scheduled Procedure Step Description	0040,0007	O	1C
Scheduled Procedure Step	>Scheduled Station Name	0040,0010	O	2
Scheduled Procedure Step	>Scheduled Procedure Step Location	0040,0011	O	2
Scheduled Procedure Step	>Modality	0008,0060	R	1
Imaging Service Request	Accession Number	0008,0050	O	2
Imaging Service Request	Referring Physician's Name	0008,0090	O	2

3.1.3 Association Acceptance Policy

ACUSON P50 system DICOM accepts associations initiated by a remote AE under the following conditions:

Association for Verification SOP Class is accepted.

- 2.1.3.1 Verification requested by a remote AE

3.1.3.1 Associated Read-World Activity

Associated real-world activity is the verification of the DICOM communications. When ACUSON P50 system DICOM receives C-ECHO-RQ message, it returns C-ECHO-RSP to the SCU.

3.1.3.2 Accepted Presentation Context Table

Table 2.1.3.1.2

Acceptable Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR	1.2.840.10008.1.2	SCP	N/A
		Little Endian			
		Explicit VR	1.2.840.10008.1.2.1		
		Little Endian			
		Explicit VR	1.2.840.10008.1.2.2		
		Big Endian			

3.1.3.3 SOP Specific Conformance for Verification SOP Class

ACUSON P50 system DICOM provides standard conformance to the DICOM Verification Service Class.

3.1.3.4 Presentation Context Acceptance Criterion

Any of the Presentation Contexts shown in *Table 2.1.3.1.2* are acceptable for ACUSON P50 system DICOM.

3.1.3.5 Transfer Syntax Selection Policies

ACUSON P50 system DICOM will use the first transfer syntax proposed by the remote AE in the presentation context. If both big endian and little endian are proposed, ACUSON P50 system DICOM will choose little endian.

4 Communication Profiles

4.1 Supported Communication Stacks

ACUSON P50 system DICOM provides DICOM V3.0 TCT/IP Network Communication Support.

4.2 TCP/IP Stacks

4.2.1 Physical Media Support

ACUSON P50 system DICOM is indifferent to the physical medium over which TCP/IP executes.

5 Extensions / Specializations / Privatizations

Not applicable.

6 Configuration

6.1 AE Title / Presentation Address Mapping

See section 6.2 for Local AE Title and Port ID settings.

Local IP Address is configured through the Windows user interfaces.

6.2 Configurable Parameters

The following parameters are user configurable on the ACUSON P50 system DICOM user interface.

6.2.1 Local Settings

 Local AE Title and Port

- Log File Path and size limit (default to 1024KB)

6.2.2 Send Settings

- Server AE Title, IP Address, and Port
- PDU Size (default to 16KB)
- Timeout (default to 180 seconds)
- Retries: 0 to 9 (default to 3)
- Image Path
- Failed Image Path and size limit (default to no limit)

6.2.3 Print Settings

- Server AE Title, IP Address, and Port
- PDU Size (default to 16KB)
- Timeout (default to 180 seconds)

- Retries: 0 to 9 (default to 3)
- Image Path
- Failed Image Path and size limit (default to no limit)
- Copies: 1 to 9 (default to 1)
- Print Priority: High, Med or Low (default to High)
- Film Destination: MAGAZINE or PROCESSOR. (default to printer default)
- Film Orientation: PORTRAIT or LANDSCAPE. (default to PORTRAIT)
- Border Density: BLACK or WHITE. (default to BLACK)
- Empty Density: BLACK or WHITE. (default to BLACK)
- Medium Type: PAPER, CLEAR FILM or BLUE FILM. (default to printer default)
- Film Size ID: 8 inches x 10 inches, 10 inches x 12 inches, 10 inches x 14 inches, 11 inches x 14 inches, 14 inches x 14 inches, 14 inches x 17 inches, 24 cm x 24 cm, 24 cm x 30 cm. (default to printer default)
- Magnification Type: REPLICATE, BILINEAR, CUBIC, NONE.(Default to BILINEAR)
- Configuration Information: Character string for overriding other configuration values. (default to empty string)

6.2.4 Modality Worklist Settings

- Server AE Title, IP Address, and Port
- PDU Size (default to 16KB)
- Timeout (default to 180 seconds)
- Retries: 0 to 9 (default to 3)
- Patient Related Query Criteria – Patient Name, ID or Accession Number
- Group Query Criteria – AE Name or Data Range

7 Support For Extended Character Sets

No extended character set is supported. ACUSON P50 system DICOM does not rely on the information contained within the Data Elements.