DICOM Conformance Statement

Product Name:
ACUSON Juniper 3.0

Release: VC10

Date: Oct. 2025

https://www.siemens-healthineers.com/dicom

SIEMENS Healthineers

1 CONFORMANCE STATEMENT OVERVIEW

This conformance statement applies to the following ACUSON Juniper product version: VC10

For all DICOM Comprehensive Structured Reports generated by the above ACUSON Juniper product, the following attribute values are applicable:

Software Versions (0018,1020)	VC10x
Manufacturer's Model Name (0008,1090)	ACUSON Juniper

The **ACUSON Juniper™ Ultrasound System** supports the following DICOM Application Entities:

- Verification:
  - Verification AE
- Transfer:
  - Storage AE
  - Storage Commitment AE
- Query / Retrieve:
  - Query AE
  - Retrieve AE
- Workflow Management:
  - Worklist AE
  - MPPS AE
- Print Management
  - Print AE

Table 1-1:
Network Services

SOP Classes	Service Class User (SCU)	Service Class Provider (SCP)
VERIFICATION		
Verification AE		
Verification	Yes	Yes
TRANSFER		
Storage AE		
Ultrasound Image Storage	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes
Comprehensive SR	Yes	Yes
Storage Commitment AE		
Storage Commitment Push Model	Yes	Yes
QUERY / RETRIEVE		
Query AE		
Study Root Query/Retrieve Information Model - FIND	Yes	Yes

SOP Classes	Service Class User (SCU)	Service Class Provider (SCP)
Retrieve AE		
Study Root Query/Retrieve Information Model - MOVE	Yes	Yes
WORKFLOW MANAGEMENT		
Worklist AE		
Modality Worklist Information Model - FIND	Yes	No
MPPS AE		
Modality Performed Procedure Step	Yes	No
PRINT MANAGEMENT		
Print AE		
Basic Grayscale Print Management Meta SOP Class	Yes	No
Basic Color Print Management Meta SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Color Image Box SOP Class	Yes	No
Print Job SOP Class	Yes	No

Table 1-2:
UID Values

SOP Class Name	SOP Class UID	Category
Verification AE		
Verification	1.2.840.10008.1.1	Verification
Storage AE		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Transfer
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Transfer
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Transfer
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Transfer
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Transfer
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Transfer
Storage Commitment AE		
Storage Commitment Push Model	**1.2.840.10008.1.20.1**	Transfer
Query AE		
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Query / Retrieve
Retrieve AE		
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Query / Retrieve
Worklist AE		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Workflow Management
MPPS AE		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Workflow Management
Print AE		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Print Management
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Print Management
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Print Management
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Print Management
Print Job SOP Class	1.2.840.10008.5.1.1.14	Print Management

Table 1-3:
Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
DVD—Recordable		
STD-US-ID-SF-DVD STD-US-ID-MF-DVD	Yes	Yes
STD-US-SC-SF-DVD STD-US-SC-MF-DVD	Yes	No
Compact Disk—Recordable		
STD-US-ID-SF-CDR STD-US-ID-MF-CDR	Yes	Yes
STD-US-SC-SF-CDR STD-US-SC-MF-CDR	Yes	No

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3 INTRODUCTION

This document describes the conformance to the ACR-NEMA DICOM 3.0 Standard by the ACUSON Juniper™ ultrasound system, version VC10 from Siemens Healthineers. It shall establish the conformance specifications for this system only, and does not apply to other products offered by Siemens Healthineers or its affiliates.

The ACUSON Juniper system is a device that generates ultrasound images that can be sent using DICOM standard protocols and definitions to other DICOM compliant devices that support SOP classes as defined in Table 4-1: SOP Classes for Storage AE in this document.

The DICOM standard provides a well-defined set of structures and protocols that allow inter-operability of a wide variety of medical imaging devices. The Juniper system provides support for essential services related to ultrasound scanning and connectivity to DICOM compliant devices. Juniper systems will not support all features supported by the DICOM standard. This document clearly states the DICOM services and data classes that are supported by the applications included with the Juniper system. The intent of this document is to allow users and other vendors who also conform to the DICOM standard to exchange information within the specific context of those elements of the DICOM standard that the Juniper system supports.

This document is written with respect to the adopted portions of the DICOM standard, Version 3. The following sections of this document follow the outline specified in the DICOM Standard NEMA publication PS3.2.[1]

3.1 Audience

This document is written for the people that need to understand how the Juniper system will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between the Juniper system and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard.

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

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

The scope of this Conformance Statement is to facilitate communication with Siemens Healthineers and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [1]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity.
- Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.

[1] Source: DICOM® Standards Publication Part 2, © NEMA. The DICOM Standard is under continuous maintenance. The current official version is available at http://dicomstandard.org

- The standard will evolve to meet the users' future requirements. Siemens Healthineers is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

Siemens Healthineers reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Healthineers representative for the most recent product information.

3.3 Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definition of these terms.

Abstract Syntax – The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

ACUSON Juniper™ system – The ultrasound system of this conformance.

Application Entity (AE) – An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – The externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – The specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – A network communication channel set up between *Application Entities*.

Attribute – A unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Attribute Macro - A set of Attributes that are described in a single table that is referenced by multiple Module or other tables.

Information Object Definition (IOD) – A data abstraction of a class of similar Real-World Objects which defines the nature and attributes relevant to the class of Real-World objects represented. Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Integrating the Healthcare Enterprise (IHE) – An initiative sponsored by the Radiological Society of North America (RSNA) to document and demonstrate standards-based methods of sharing information in support of optimal patient care. For additional information, see www.rsna.org/ihe.

Functional Group - A set of logically related Attributes that are likely to vary together. May be used in Multi-frame IODs to describe parameters which change on a per frame basis.

Joint Photographic Experts Group (JPEG) – Joint Photographic Experts Group, The group was organized in 1986, issuing a standard in 1992, which was approved in 1994 as ISO 10918-1. The JPEG standard is used by DICOM applications.

Media Application Profile – The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs), see DICOM PS3.11.

Module – A set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes (among others) Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – First phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Picture Archiving and Communications Systems (PACS) – A DICOM server that accepts medical images from another DICOM system and stores the images for later retrieval.

Presentation Context – The set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – A packet (piece) of a DICOM message sent across the network. It contains protocol control information and user data. Devices must specify the maximum size packet they can receive for DICOM messages.

Request (RQ) – A request from one DICOM AE for service from another DICOM AE.

Response (RSP) – A response from one DICOM AE to the request for service from another DICOM AE.

Security Profile – A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

Service Class Provider (SCP) – The role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – The role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).

Service/Object Pair (SOP) Class – The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – An information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Structured Report (SR) – A DICOM object which contains measurement, calculations, diagnoses, image references, and other non-image information concerning a patient exam.

Tag – A 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].

Transfer Syntax – The encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – A globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.4 Basics of DICOM Communication

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

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

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

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

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

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

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

3.5 Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity
AET	DICOM Application Entity Title
ASCII	American Standard Code for Information Interchange
DB	Database
DCS	DICOM Conformance Statement
DSA	Digital Subtraction Angiography
IIDC	Image-Intensifier Distortion Correction
IOD	DICOM Information Object Definition
ISO	International Standard Organization

MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
R	Required Key Attribute
RIS	Radiology Information System
SC	Storage Commitment
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
SR	Structured Report
U	Unique Key Attribute
US	Ultrasound

3.6 References

[1] DICOM® Standards Publication, PS 3.1 – PS 3.18, © NEMA. The DICOM Standard is under continuous maintenance. The current official version is available at http://www.dicomstandard.org

[2] IHE Radiology Technical Framework, Vol. I – III, https://www.ihe.net/resources/technical_frameworks/

4 NETWORKING

This section contains the Juniper system networking related services.

4.1 Implementation Model

Juniper system users can store images directly on the system hard drive. Images can also be transferred to DICOM workstations and archive servers on a network. Storage Commitment can be used to ensure that patient images and data are safely committed. The system is capable of querying a HIS/RIS, using DICOM Basic Worklist Management Service Class, for a list of scheduled patient procedures. Measurements from exams can be exported as DICOM SR Objects. Performed procedure status and other procedure information can be returned to the HIS/ RIS using Modality Performed Procedure Step (MPPS).

Juniper system real world activities are indicated by “Real World Activity” name while “Juniper AE” indicates the invoked Application Entity. Similarly, the activities associated with service providers are indicated as “Real World Service Activity.”

4.1.1 Application Data Flow

Figure 4-1 and Figure 4-2 provides a functional overview of the Juniper’ Application Entities (AE). Relationships are shown between user-invoked activities (in the circles at the left of the AEs) and the associated real-world activities provided by DICOM service providers (in the circles at the right of the AEs).

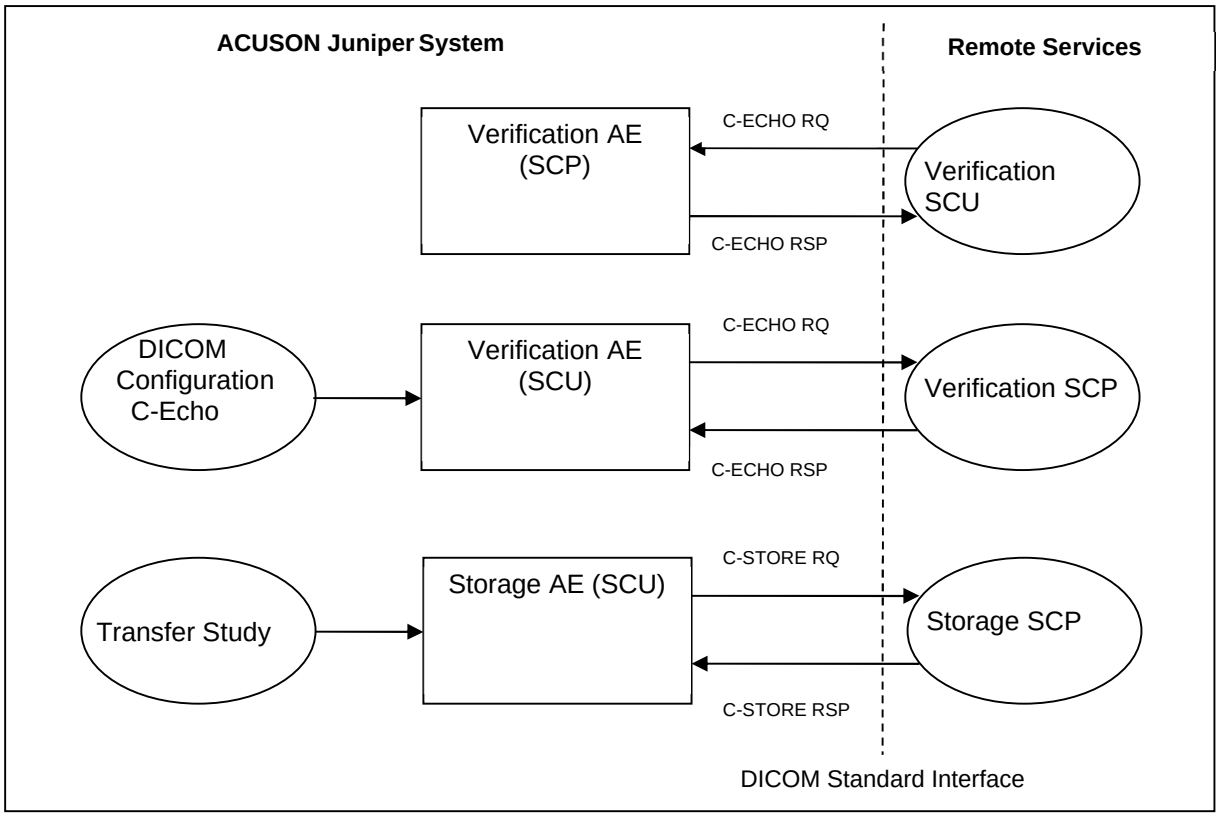


Figure 4-1 **Functional Overview**

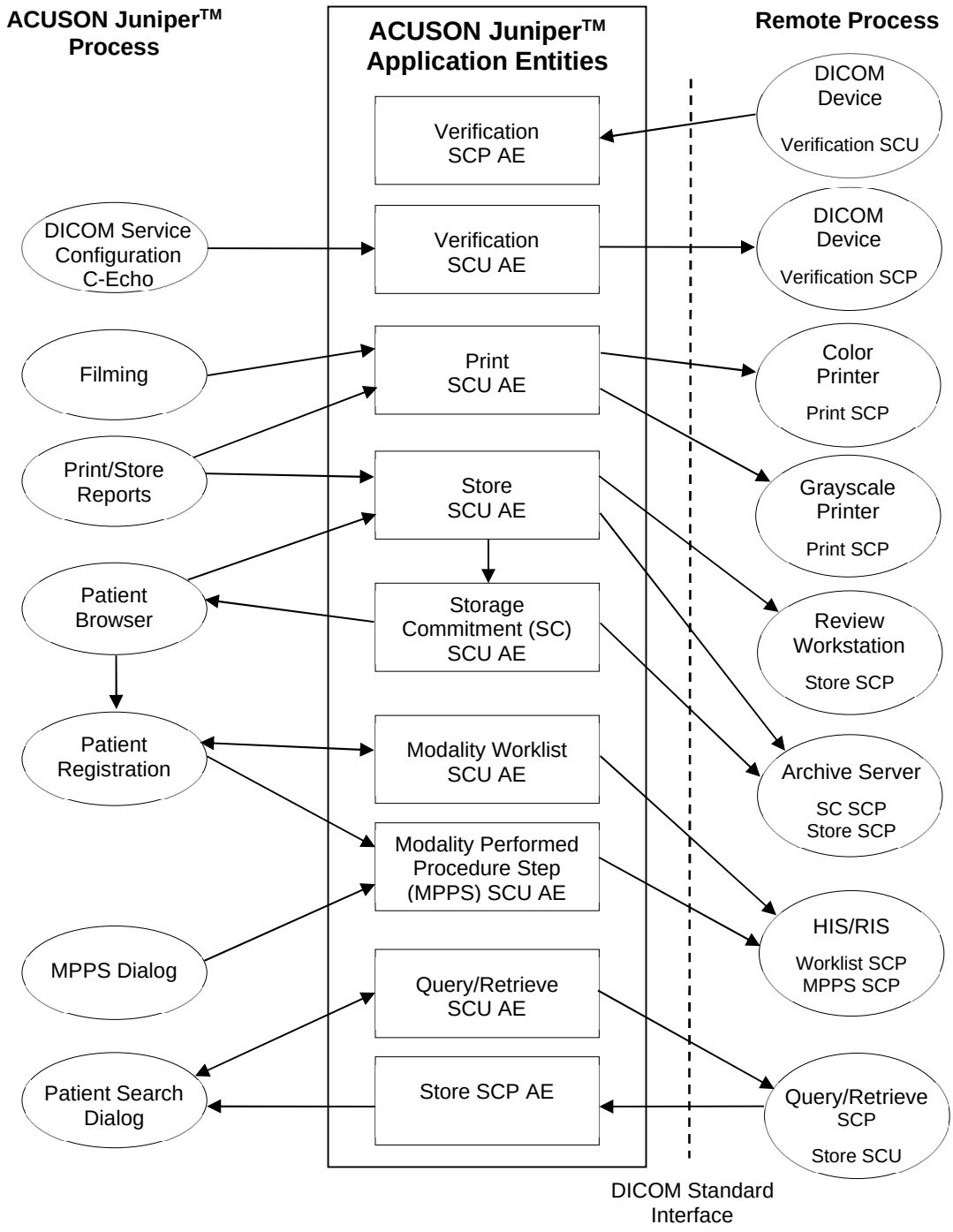


Figure 4-2. **Functional Overview (Continued)**

4.1.2 Functional Definition of AEs

The SCP components of the Juniper operate as background server processes. They exist as soon as the system is powered up and wait for association requests. Upon accepting an association with a negotiated Presentation Context they start to receive and process the request described in the following sections.

4.1.2.1 Functional Definition of Verification Application Entity

The Juniper Verification AE performs Verification Service Class as an SCU and SCP allowing the operator to verify the ability of an application on a remote device to receive DICOM messages and allowing the operator of a remote DICOM device to verify the Juniper's ability to receive DICOM messages. (C-ECHO DIMSE)

Verification is a part of the DICOM configuration located on the 'Network' page of the System Configuration. Verification can be used to send a DICOM Verification request to a remote Application Entity (AE) and listen for a response.

When used as a diagnostic tool, Verification returns the following messages to the user:

- If the verification succeeds: "DICOM – C Echo succeeded".
- If the verification fails: "DICOM – C Echo failed".

4.1.2.2 Functional Definition of Storage Application Entity

The Juniper Store AE performs all of the functions to transmit ultrasound images, structured reports and associated data to network servers or workstations. The Juniper Store AE supports the Ultrasound Image, Ultrasound Multi-Frame Image, Ultrasound Image (Retired), Ultrasound Multi-Frame (Retired), and Secondary Capture storage SOP classes as an SCU.

The Juniper Store AE also supports Structured Reports, for Obstetric-GYN, Vascular, and Cardiac studies, using the Comprehensive SR SOP Class as an SCU.

The Juniper Store AE initiates an association for C-STORE Requests to store providers when the user invokes "DICOM Store". The association may be used to store multiple images, clips, and structured reports and is closed when no images, clips, or structured reports are available to be stored to the remote device for five seconds.

When requested, the Juniper sends images and/or structured reports to the preconfigured DICOM Storage server.

DICOM Store can be seen as two sub-operations:

- Queueing images and/or structured reports for transfer.
- Transferring images and/or structured reports to the storage server.

Queuing images and structured reports for transfer:

The Juniper can be configured to automatically queue up images and structured reports for transfer as they are being created. "Auto Store to DICOM" option in Network configuration is to be set for this.

Alternatively, user can select exams or individual images and manually queue them up from Review mode. When an exam is selected for DICOM store all images and structured reports (generally zero or one) will be queued. Structured reports can't be selected individually for store, the entire exam must be stored.

Transfer of images and structured reports to the storage server:

Further, once images and/or structured reports are queued they may be immediately transferred or delayed till the end of study using the transfer storage configuration.

The Juniper supports two storage configurations: "Store At End of Exam" and "Store During Exam".

If the storage configuration is set to “Store At End of Exam” transfer attempts begin when the user selects “End Exam” or “New Patient”.

If the storage configuration is set to “Store during Exam”, transfer attempts to destination devices begin immediately after they are queued.

For both “Store At End of Exam” and “Store During Exam” settings, image and/or structured report transfer will be delayed if the Juniper is busy performing another DICOM Store operation.

4.1.2.3 Functional Definition of Storage Commitment Application Entity

The Juniper Storage Commitment AE supports Storage Commitment Push Model SOP class to inform servers when all the store operations for a study have been completed. The Storage Commitment SCU uses the N-ACTION primitive to request safekeeping of a set of SOP Instances. The Storage Commitment SCU also processes the N-EVENT-REPORT primitives that are received from the SCP indicating ‘successful’ or ‘non-successful’ commitment status. The N-EVENT-REPORT information is used to mark a study as being successfully archived to a DICOM SCP.

The successful commit status and archival indication on the Juniper does not ensure permanent archival of the images and Structured Reports. The operations performed by the SCP are dependent on its capabilities and configuration.

The user can exercise the Storage Commitment option by configuring and selecting a Storage Commit server from the Network Configuration menu. The Juniper requests commitment of images and structured reports (if any exist) and upon successful acknowledgment from the Storage server marks the study on the system hard drive as ‘Archived’.

4.1.2.4 Functional Definition of Worklist Application Entity

The Juniper Modality Worklist AE supports the DICOM Basic Worklist Management Service as an SCU. The AE initiates an association to the active Worklist server when a Worklist query is selected (via the “Worklist” button). The association is closed upon the completion of each query. A preset maximum number of matching results is accepted, at which point, the Juniper Modality Worklist AE issues a C-CANCEL-RQ request.

Patient registration can be automated by using the 'Worklist' Real World Activity. Pressing the 'New Patient' key on the keyboard initiates the patient data registration process and closes the previous active study. Pressing the 'Worklist' button on the patient data display screen invokes the Worklist screen. The Worklist screen can also be initiated from the Patient browser screen.

Pressing the 'Search' button will attempt to find all matching patient data using the information entered on the Worklist screen. Patient name fields that are partially filled or empty will be treated as though an implicit wildcard was appended at the end of each field. Patient ID, Requested Procedure ID and Accession number will be exact match only. If no matches are found, a message will be presented to the operator indicating so. If more that one matching patient is found, a pick list of patient procedures will be presented to the user to select from. Each of the fields will be sortable in ascending and descending order.

The pick list of patient procedures will be limited to a number of preset entries. If more than this number of matching records are found in the query, the search will terminate and the user will be notified. The search list criteria will contain:

- Patient name
- Patient ID
- Accession number
- Exam start date/time range
- Requested Procedure ID
- Physician name
- US/All modalities
- Scheduled station AE title

4.1.2.5 Functional Definition of Modality Performed Procedure Step Application Entity

The Juniper Modality Performed Procedure Step AE supports Modality Performed Procedure Step (MPPS) in the role of SCU. The Juniper has a capable of displaying scheduled procedure steps via the User Interface (UI) for Modality Performed Procedure Step. The operator can select a single PPS. The operator can notify the MPPS server that a MPPS is 'In Progress', 'Discontinued' or 'Completed'. The user is also allowed to append procedure steps to existing or previously completed procedure steps.

Juniper system supports reporting of Modality Performed Procedure Step (MPPS) orders when the patient registration process utilizes the 'Worklist' Real World Activity. Procedure steps are presented to the operator after successful query of a server that supports the MPPS option. A detail window allows the operator access to individual scheduled procedure steps. Pressing the 'Mpps' push button on the Patient browser Screen actualizes the detail window when multiple procedure steps are listed for the patient.

4.1.2.6 Functional Definition of Query/Retrieve Application Entity

The query/retrieve service class defines an application-level class of services which facilitates the management of images and patient data against the well-defined information model of DICOM and allows a DICOM AE to retrieve images from a remote DICOM node or to request a remote DICOM AE to initiate a transfer of images to another DICOM AE. The Juniper DICOM query/retrieve application supports the query/retrieve services as an SCU.

The Query SCU initiates a C-FIND request to the remote SCP and is invoked directly by the user, using the query parameters entered in the Query/Retrieve screen. The remote SCP returns a list of responses with defined data, which are displayed to the user. The user can decide to start retrieval or to issue another query.

The Juniper supports

- Study Root Query Model.

As the Move SCU, the system initiates a C-MOVE request to the remote Retrieve SCP. The remote Retrieve SCP in turn starts C-STORE sub-operations to the Storage SCP.

- Retrieve only <Product Name> images
- SR not supported

The query/retrieve service class defines an application-level class of services which facilitates the management of images and patient data against the well-defined information model of DICOM and allows a DICOM AE to retrieve images from a remote DICOM node or to request a remote DICOM AE to initiate a transfer of images to another DICOM AE. The Juniper DICOM query/retrieve application supports the query/retrieve services to act as SCU.

4.1.2.7 Functional Definition of DICOM Print Application Entity

The Juniper Print AE provides all aspects of the Print Management SCU. The Juniper AE initiates an association to the printer when the user invokes "DICOM Print". The association may be used to print multiple pages and is closed when no pages are available to be printed to the remote device for five seconds.

The Juniper has a capable of grayscale (B/W) and color printing.

When requested, single frame images will be printed to a pre-configured DICOM network printer.

DICOM Print can be seen as two sub-operations:

- paging images for transfer
- transferring pages to printer

Paging images for transfer:

The Juniper can be configured to automatically queue up images to be printed on B/W Printer and/or Color printer as they are being created.

Alternatively, user can select exams or individual images and manually queue them up from Review mode for print.

Every image queued up is added into a page in the respective printer layout (DICOM B/W Printer Layout or DICOM Color Printer Layout).

Transfer of pages to the Printer:

Further, pages may be immediately transferred to the printer or delayed until the end of study based on the transfer configuration.

The Juniper support two configurations: “Print at end exam” and “Print when page is full”.

If the configuration is set to “Print at end exam,” transfer attempts of all pages to the destination DICOM printer begin as a batch when the user ends the exam.

If the configuration is set to “Print when page is full”, transfer attempt of a page to the destination DICOM printer begins as soon as it becomes full.

For both “Print at end exam” and “Print when page is full” settings, page transfer will be delayed if the Juniper is busy performing another DICOM Print operation.

4.1.3 Sequencing of Real-World Activities

This section describes the sequencing of Real-World Activities performed by the Application Entities using a UML sequence diagram. Real-World Activities are depicted as vertical bars and arrows show the events exchanged between them.

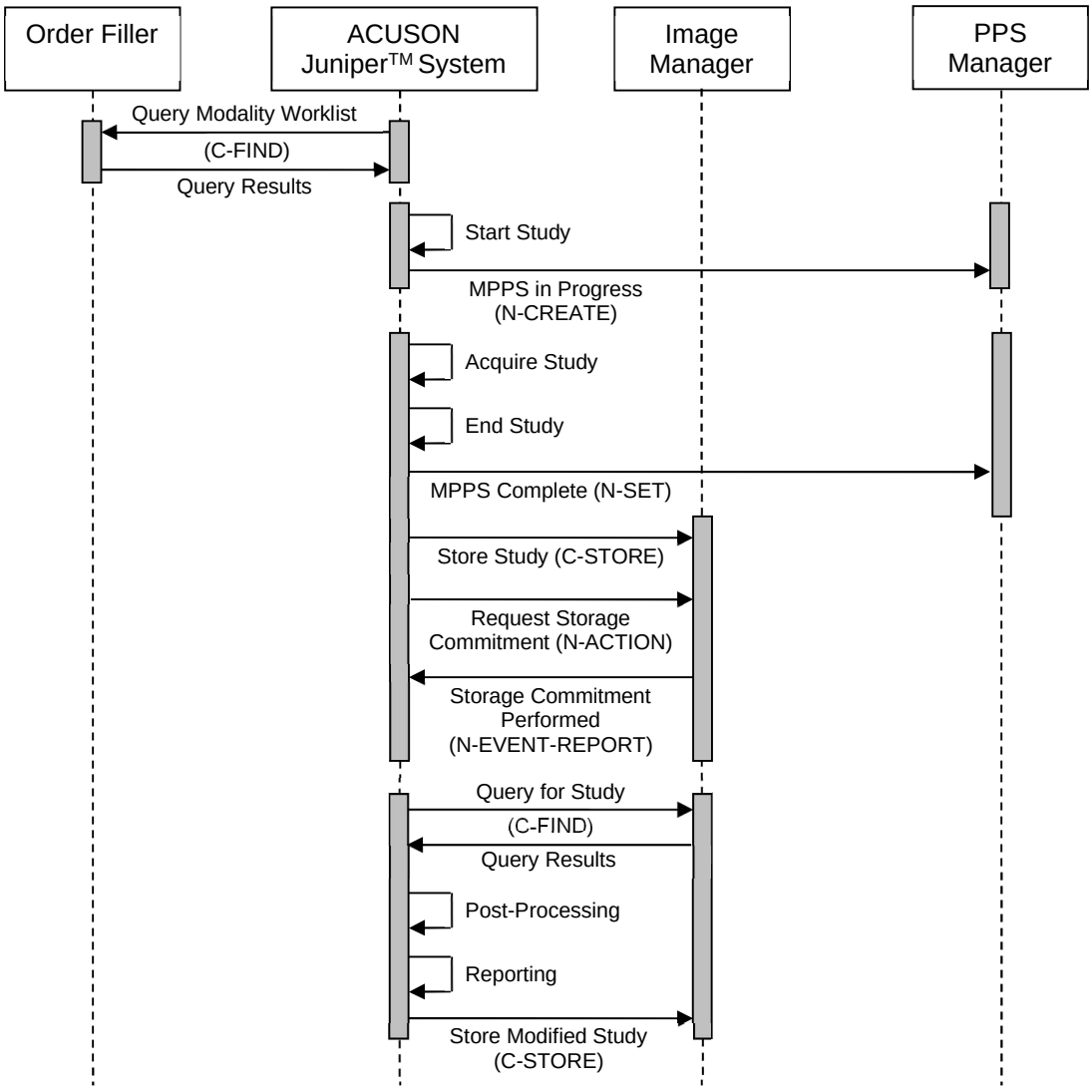


Figure 4-3. Sequence Diagram for Real-World Activities

4.2 AE Specifications

4.2.1 Storage Application Entity Specification

4.2.1.1 SOP Classes

Table 4-1:
SOP Classes for Storage AE

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported Storage SOP Classes			
Verification	1.2.840.10008.1.1	Yes	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes

4.2.1.2 Association Policies

4.2.1.2.1.1 General

Table 4-2:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

Table 4-3:
Number of Associations as an Association Initiator for Storage AE

Maximum number of simultaneous associations	1

Table 4-4:
Number of Associations as an Association Acceptor for Storage AE

Maximum number of simultaneous associations	1

4.2.1.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-5:
Asynchronous Nature as an Association Initiator for Storage AE

Maximum number of outstanding asynchronous transactions	0

4.2.1.2.4 Implementation Identifying Information

Table 4-6:
DICOM Implementation Class and Version for Storage AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.1.3 Association Initiation Policy (Storage SCU)

The Juniper VC10 initiates associations while processing the service operations and internal messages as shown below.

Operation or Real-World Activity	Association for
Send To, Print/Store	C-STORE

4.2.1.3.1 Activity “Send To, Print/Store”

4.2.1.3.1.1 Description and Sequencing of Activities

Storage of a DICOM object to an external entity is triggered by a C-STORE request initiated either automatically by the system or interactively (manually) by the user.

If an association to a remote Application Entity could successfully be established, each image will be transferred one after another via the same open association.

The automatic retry mechanism is configurable. The user can configure the number of retries as well as the time interval between two retries.

Retry is done if:

a) The network connection has been lost from the SCU perspective. In this case, retry is performed as soon as the network connection is available again.

b) The partner is not reachable for other reasons (e.g. partner node has broken down). For this case, a (global, configurable) timeout has been implemented after which retry is performed.

4.2.1.3.1.2 Proposed Presentation Contexts

For all supported images (see SOP Classes in Table 4-1: SOP Classes for Storage AE), the following Transfer Syntaxes are supported.

Table 4-7:
Store Presentation Context

Abstract Syntax		Transfer Syntax	
Name	**UID**	**Name List**	**UID List**
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
Ultrasound 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
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2
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
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
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1

4.2.1.3.1.3 Photometric Interpretation

Photometric Interpretation (color mode of the pixel image data) is not a negotiable parameter in DICOM 3.0. The Photometric Interpretation Attribute (0028,0004) is set depending on the transfer syntax, and the system configuration:

Table 4-8:
Photometric Interpretation

SOP Class		Transfer Syntax		Photometric Interpretation
Name	**UID**	**Name List**	**UID List**	
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	RGB or MONOCHROME2 (if RGB to MONOCHROME is configured)
		Explicit VR Little Endian	1.2.840.10008.1.2.1	
		Explicit VR Big Endian	1.2.840.10008.1.2.2	
Ultrasound Multi-frame Image Storage (Clips)	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossy (Baseline)	1.2.840.10008.1.2.4.50	YBR_FULL_422

4.2.1.3.1.4 SOP Specific Conformance to SOP Classes

The DICOM images created by the Juniper system DICOM application conform to the DICOM IOD definitions (Standard extended IODs). But they will contain additional private elements that may be discarded by a DICOM system when modifying the image.

Refer to section 8.1.1, Created SOP Instances, for a detailed list of attributes.

Table 4-9:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Refused	Out of resources	A7xx	User Notified
Error	Data does not match SOP class Cannot Understand	A9xx Cxxx	User Notified
Warning	Coercion of Data elements Data sed does not match SOP Class Elements Discarded	B000 B007 B006	User Notified
Success	Process completed	0000	None

Table 4-10:
DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure reported to user (Timeout configurable; default 30s). The system retries according to the configured retry parameters.
Association Aborted	Failure reported to user and the storage job is cancelled.

4.2.1.4 Association Acceptance Policy

The Juniper system DICOM application attempts to initiate a new association for DIMSE C-STORE operation. Activity “Receive Instances”

4.2.1.4.1.1 Accepted Presentation Contexts

1.2.840.10008.1.2.2	Explicit Value Representation Big Endian
1.2.840.10008.1.2.1	Explicit Value Representation Little Endian
1.2.840.10008.1.2	Implicit Value Representation Little Endian: Default Transfer Syntax for DICOM
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression

4.2.1.4.1.2 SOP Specific Conformance to SOP Classes

In case of a successful C-STORE operation, the image has successfully been written on disk either in Explicit Little Endian format or in the compression format received.

Table 4-11:
Storage C-STORE Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Success

4.2.2 Storage Commitment AE

4.2.2.1 SOP Classes

Table 4-12:
SOP Classes for Storage Commitment AE

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported Storage Commitment SOP Classes			
Storage Commitment - Push Model	1.2.840.10008.1.20.1	Yes	Yes

4.2.2.2 Association Policies

4.2.2.2.1 General

Table 4-13:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2 Number of Associations

Table 4-14:
Number of Associations as an Association Initiator for Storage Commitment AE

Maximum number of simultaneous associations	1

Table 4-15:
Number of Associations as an Association Acceptor for Storage Commitment AE

Maximum number of simultaneous associations	1

4.2.2.2.3 Asynchronous Nature

The Juniper system Storage Commitment AE does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-16:
Asynchronous Nature as an Association Initiator for Storage Commitment AE

Maximum number of outstanding asynchronous transactions	0

4.2.2.2.4 Implementation Identifying Information

Table 4-17:
DICOM Implementation Class and Version for Storage Commitment AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.2.3 Association Initiation Policy (Storage Commitment SCU)

The Juniper initiates associations while processing the service operations and internal messages as shown below.

Operation or Real-World Activity	Association for
Storage Commitment	N-ACTION, N-EVENT-REPORT

4.2.2.3.1 Activity “Storage Commitment Request”

4.2.2.3.1.1 Description and Sequencing of Activities

The user has sent (or archived) images to another DICOM node, which is configured as storage commitment SCP. The Juniper system will automatically attempt to send a storage commitment request for these images.

4.2.2.3.1.2 Proposed Presentation Contexts

Table 4-18:
Proposed Presentation Contexts for Storage Commitment AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.2.3.1.3 SOP Specific Conformance to SOP Classes

Table 4-19:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Storage is complete	0000	UI status is updated

Table 4-20:
DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure Reported to User
Association Aborted	Failure Reported to User

4.2.2.4 Association Acceptance Policy

The Juniper system Storage Commitment AE accepts an association when acting as SCU if configured to receive N-EVENT-REPORT on a separate association.

Note: The Juniper system may be configured to accept results in the same or separate association as the Storage Commitment Request.

4.2.3 Query AE

The Juniper provides Standard Conformance to the following DICOM V3.0 SOP Classes as SCP/SCU.

4.2.3.1 SOP Classes

Table 4-21:
SOP Classes for Query AE

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported Query SOP Classes			
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes

4.2.3.2 Association Policies

4.2.3.2.1 General

Table 4-22:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2 Number of Associations

Table 4-23:
Number of Associations as an Association Initiator for Query AE

Maximum number of simultaneous associations	1

Table 4-24:
Number of Associations as an Association Acceptor for Query AE

Maximum number of simultaneous associations	1

4.2.3.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-25:
Asynchronous Nature as an Association Initiator for Query AE

Maximum number of outstanding asynchronous transactions	0

4.2.3.2.4 Implementation Identifying Information

Table 4-26:
DICOM Implementation Class and Version for Query AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.3.3 Association Initiation Policy (Query SCU)

The Juniper will initiate new associations for the following operations as an SCU.

Operation or Real–World Activity	Association for
Search	C-FIND

4.2.3.3.1 Activity "Search"

4.2.3.3.1.1 Description and Sequencing of Activities

The associated Real-World activity is to fill out a query form with search data and pass it as query to the network application which issues a C-FIND over a previously built association. The remote SCP will respond with related data-entries that will be passed to a browser application. When data transfer is finished the association is closed.

4.2.3.3.1.2 Proposed Presentation Contexts

The Juniper will propose Presentation Contexts as shown in the following table.

Table 4-27:
Proposed Presentation Contexts for Query AE

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Study Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.3.3.1.3 SOP Specific Conformance to SOP Classes

Refer to section 8.1.1, Created SOP Instances, for a detailed list of attributes.

The Juniper checks for the following status codes in the Query SCP's C-Find-Response.

Table 4-28:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Refused	Out of Resources	A700	Failure reported to user
Failed	Identifier Does not match SOP Class Unable to process	A900	Failure reported to user
Failed	Unable to process	CXX	Failure reported to user
Cancel	Matching terminated due to cancel request	FE00	Search is cancelled
Success	Matching is complete	0000	Success reported to user
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Status reported to user
Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Failure reported to user

Table 4-29:
DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure reported to user
Association Aborted	Failure reported to user

The Juniper supports the following query levels:

- Study

4.2.3.4 Association Acceptance Policy

The Juniper system DICOM application will accept associations for the following DIMSE-C operations as SCP:

- C-FIND
- C-FIND-CANCEL

4.2.4 Retrieve AE

4.2.4.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

Table 4-30:
SOP Classes for Retrieve AE

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported Query SOP Classes			
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes

4.2.4.2 Association Policies

4.2.4.2.1 General

Table 4-31:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.4.2.2 Number of Associations

Table 4-32:
Number of Associations as an Association Initiator for Retrieve AE

Maximum number of simultaneous associations	1

Table 4-33:
Number of Associations as an Association Acceptor for Retrieve AE

Maximum number of simultaneous associations	1

4.2.4.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-34:
Asynchronous Nature as an Association Initiator for Retrieve AE

Maximum number of outstanding asynchronous transactions	0

4.2.4.2.4 Implementation Identifying Information

Table 4-35:
DICOM Implementation Class and Version for Retrieve AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.4.3 Association Initiation Policy

When requesting Import of related items the browser requests the retrieve application to send a C-MOVE request to the related remote node. Images will then be received by the Storage SCP as described in the related section.

4.2.4.3.1 Activity "Move"

The associated Real-World activity is to respond to retrieve requests to an SCU. The SCP supports the query model Patient Root, Study Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service, which is generated by the C-MOVE service. Relational retrieve operation is NOT supported.

Multiple C-MOVE requests over the same association are NOT supported.

4.2.4.3.1.1 Description and Sequencing of Activities

The C-MOVE-RQs are used to retrieve the referenced instances.

4.2.4.3.1.2 Accepted Presentation Contexts

Table 4-36:
Proposed Presentation Contexts for Retrieve AE and Activity "Move"

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.4.3.1.3 SOP Specific Conformance to Move SCU Classes

At association establishment time, the C-MOVE presentation context shall be negotiated. When the CMOVE-RQ is processed, the Move Destination attribute (receiver of images) is ignored. However, the Move Destination AE must conform to the DICOM conventions (value representation AE).

Table 4-37:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failed	Identifier Does not match SOP Class Unable to process	A900	Failure reported to user
Failed	Unable to process	CXX	Failure reported to user
Cancel	Matching terminated due to cancel request	FE00	Search is cancelled
Success	Matching is complete	0000	Success reported to user
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Status reported to user

Table 4-38:
DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure reported to user
Association Aborted	Failure reported to user

4.2.4.4 Association Acceptance Policy

The Juniper system DICOM application will accept associations for the following DIMSE-C operations as SCP:

- C-MOVE
- C-MOVE-CANCEL

4.2.5 Worklist AE

4.2.5.1 SOP Classes

This Application Entity provides Standard Conformance to the SOP Classes listed in the table below.

Table 4-39:
SOP Classes for Worklist AE

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported Worklist SOP Classes			
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

4.2.5.2 Association Policies

4.2.5.2.1 General

The configuration of the Juniper system DICOM modality worklist application defines the Application Entity Title, the port number, the host name and IP address.

Table 4-40:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.5.2.2 Number of Associations

Table 4-41:
Number of Associations as an Association Initiator for Worklist AE

Maximum number of simultaneous associations	1

Table 4-42:
Number of Associations as an Association Acceptor for Worklist AE

Maximum number of simultaneous associations	1

4.2.5.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-43:
Asynchronous Nature as an Association Initiator for Worklist AE

Maximum number of outstanding asynchronous transactions	0

4.2.5.2.4 Implementation Identifying Information

Table 4-44:
DICOM Implementation Class and Version for Worklist AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.5.3 Association Initiation Policy

The Juniper initiates associations while processing the service operations and internal messages as shown below.

Operation or Real-World Activity	Association for
Query for Modality Worklist	C-FIND

4.2.5.3.1 Activity "Query for Modality Worklist"

4.2.5.3.1.1 Description and Sequencing of Activities

The associated Real-World activity is a C-Find request initiated by the user of the system. The user specifies some attributes which the remote Application should use to query its database. If the query user successfully establishes an association to the remote Application Entity, it will send a C-Find request (according to the query model) and will then return the results to the application.

4.2.5.3.1.2 Proposed Presentation Contexts

Table 4-45:
Proposed Presentation Contexts for Worklist AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist-FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No

There is no extended negotiation as an SCU.

4.2.5.3.1.3 SOP Specific Conformance to Modality Worklist Service SOP Class

The following table provides the list of user configurable matching attributes requested in the Broad Query of the Modality Worklist (C-FIND).
The broad query C-FIND-RQ is populated from the RIS Server configuration parameters. The broad query is always an automatic query, which is initiated by the system at intervals defined by the user, in the RIS Server configuration.

Table 4-46:
Modality Worklist Matching Key Attributes (Broad Query)

RIS Server Configuration	Attribute Name	Tag	Query Value
	Scheduled Procedure Step Sequence	(0040,0100)	
Scheduled Station	>Scheduled Station AE Title	(0040,0001)	
SPS Start Date Interval	>Scheduled Procedure Step Start Date	(0040,0002)	Today's date or user specified date range
Modality	>Modality	(0008,0060)	

The following table provides the list of user configurable matching attributes requested in the Patient based Query of the Modality Worklist (C-FIND).

The patient based query C-FIND-RQ is populated from the query parameters specified for a particular RIS server on Juniper Data View. The patient based query is interactively (manually) initiated by the user, after selecting the RIS server from the Data view “look in” drop down field and populating at least one of the Worklist Data View fields defined in the table below.

Table 4-47:
Modality Worklist Matching Key Attributes (Patient Based Query)

Worklist Data View Field	Attribute Name	Tag	Query Value
Requested Procedure ID	Requested Procedure ID	(0040,1001)	As entered in the “Worklist Data View” UI - Requested Procedure ID.
Accession Number	Accession Number	(0008,0050)	As entered in the “Worklist Data View” UI - Accession Number.
Patient’s Name	Patient’s Name	(0010,0010)	As entered in the “Worklist Data View” UI - Patient’s Name.
Patient ID	Patient ID	(0010,0020)	As entered in the “Worklist Data View” UI - Patient ID.
Scheduled Start Date	Scheduled Procedure Step Sequence >Scheduled Procedure Step Start Date	(0040,0100) >(0040,0002)	As entered in the “Worklist Data View” UI - Scheduled Start Date.

Return Key Attributes used from the Worklist C_FIND_RSP

The Juniper system DICOM worklist SCU supports worklist queries with return key attributes of all types. The following table describes the return keys that the SCU supports or are needed to display the results on the Worklist view. Most attributes can be shown in the User Interface; Patient Registration or Data View. Attributes displayed on the Data View are configurable.

Note: Juniper system will not display any of the query results, if even one of the results does not conform to the “Return Key Type” column according to the DICOM standard, in the table below. This means that the returning worklist results need to have all the Type 1 and Type 1C populated, for the Juniper to be able to display the returned results. The returning Type 2 and 2C tags could remain empty, but need to be present. Type 3 tags are not mandatory.

Table 4-48:
Modality Worklist C_FIND_RSP Return Key Attributes

Attribute Name	Tag	Return Key Type	Displayable on UI	Display Location
SOP Common				
Specific Character Set	(0008,0005)	1C	No	
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	1		
>Scheduled Station AE Title	(0040,0001)	1	No	
>Scheduled Procedure Step Start Date	(0040,0002)	1	Yes	Patient Registration

Attribute Name	Tag	Return Key Type	Displayable on UI	Display Location
>Scheduled Procedure Step Start Time	(0040,0003)	1	Yes	Patient Registration
>Scheduled Procedure Step End Date	(0040,0004)	3	No	
>Scheduled Procedure Step End Time	(0040,0005)	3	No	
>Modality	(0008,0060)	1	No	
>Scheduled Performing Physician's Name	(0040,0006)	2	Yes	Patient Registration
>Scheduled Procedure Step Description	(0040,0007)	1C	Yes	Patient Registration
>Scheduled Station Name	(0040,0010)	2	No	
>Scheduled Procedure Step Location	(0040,0011)	2	No	
>Scheduled Protocol Code Sequence	(0040,0008)	1C	No	
>>Code Value	(0008,0100)	1C	No	
>>Coding Scheme Designator	(0008,0102)	1C	No	
>>Coding Scheme Version	(0008,0103)	3	No	
>>Code Meaning	(0008,0104)	3	No	
>Pre-Medication	(0040,0012)	2C	No	
>Scheduled Procedure Step ID	(0040,0009)	1	No	
>Requested Contrast Agent	(0032,1070)	2C	No	
>Scheduled Procedure Step Status	(0040,0020)	3	No	
>Comments on the Scheduled Procedure Step	(0040,0400)	3	No	
Requested Procedure				
Requested Procedure ID	(0040,1001)	1	Yes	Patient Registration
Requested Procedure Description	(0032,1060)	1C	Yes	Patient Registration
Requested Procedure Code Sequence	(0032,1064)	1C		
>Code Value	(0008,0100)	1C	No	
>Code Scheme Designator	(0008,0102)	1C	No	
>Code Scheme Version	(0008,0103)	3	No	
>Code Meaning	(0008,0104)	3	No	
Study Instance UID	(0020,000D)	1	No	
Referenced Study Sequence	(0008,1110)	2		
>Referenced SOP Class UID	(0008,1150)	1C	No	
>Referenced SOP Instance UID	(0008,1155)	1C	No	
Requested Procedure Priority	(0040,1003)	2	No	
Patient Transport Arrangements	(0040,1004)	2	No	
Reason for the Requested Procedure	(0040,1002)	3	No	
Confidentiality Code	(0040,1008)	3	No	
Reporting Priority	(0040,1009)	3	No	
Names of Intended Recipients of Results	(0040,1010)	3	No	
Requested Procedure Comments	(0040,1400)	3	No	

Attribute Name	Tag	Return Key Type	Displayable on UI	Display Location
Requested Procedure Location	(0040,1005)	3	No	
Imaging Service Request				
Accession Number	(0008,0050)	2	Yes	Patient Registration
Requesting Physician	(0032,1032)	2	No	
Referring Physician's Name	(0008,0090)	2	Yes	Patient Registration/ Report
Reason for the Imaging Service Request	(0040,2001)	3	No	
Imaging Service Request Comments	(0040,2400)	3	No	
Requesting Service	(0032,1033)	3	No	
Issuing Date of Imaging Service Request	(0040,2004)	3	No	
Issuing Time of Imaging Service Request	(0040,2005)	3	No	
Placer Order Number / Imaging Service Request	(0040,2016)	3	No	
Filler Order Number / Imaging Service Request	(0040,2017)	3	No	
Order entered by...	(0040,2008)	3	No	
Order Enterer's Location	(0040,2009)	3	No	
Order Callback Phone Number	(0040,2010)	3	No	
Visit Identification				
Admission ID	(0038,0010)	2	No	
Issuer of Admission ID	(0038,0011)	3	No	
Visit Status				
Current Patient Location	(0038,0300)	2	No	
Visit Relationship				
Referenced Patient Sequence	(0008,1120)	2		
>Referenced SOP Class UID	(0008,1150)	2	No	
>Referenced SOP Instance UID	(0008,1155)	2	No	
Visit Admission				
Institution Name	(0008,0080)	3	Yes	Report
Institution Address	(0008,0081)	3	No	
Admitting Diagnoses Description	(0008,1080)	3	No	
Patient Identification				
Patient's Name	(0010,0010)	1	Yes	Patient Registration/ Report
Patient ID	(0010,0020)	1	Yes	Patient Registration/ Report
Other Patient IDs	(0010,1000)	3	No	
Other Patient Names	(0010,1001)	3	No	
Patient Demographic				
Patients Birth Date	(0010,0030)	2	Yes	Patient Registration/ Report
Patient's Sex	(0010,0040)	2	Yes	Patient Registration/ Report
Patient's Primary Language Code Sequence	(0010,0101)	3		
>Code Value	(0008,0100)	1	No	

Attribute Name	Tag	Return Key Type	Displayable on UI	Display Location
>Coding Scheme Designator	(0008,0102)	1	No	
>Code Meaning	(0008,0104)	1	No	
>Patient's Primary Language Code Modifier Sequence	(0010,0102)	3	No	
>>Code Value	(0008,0100)	1	No	
>>Coding Scheme Designator	(0008,0102)	1	No	
>>Code Meaning	(0008,0104)	1	No	
Patient's Size	(0010,1020)	3	Yes	Patient Registration/ Report
Patient's Weight	(0010,1030)	2	Yes	Patient Registration/ Report
Confidentiality constraint on patient data	(0040,3001)	2	No	
Patient's Address	(0010,1040)	3	No	
Military Rank	(0010,1080)	3	No	
Ethnic Group	(0010,2160)	3	No	
Patient Comments	(0010,4000)	3	No	
Patient Medical				
Patient State	(0038,0500)	2	No	
Pregnancy Status	(0010,21C0)	2	No	
Medical Alerts	(0010,2000)	2	No	
Contrast Allergies	(0010,2110)	2	No	
Special Needs	(0038,0050)	2	No	
Smoking Status	(0010,21A0)	3	No	
Last Menstrual Date	(0010,21D0)	3	Yes	Patient Registration/ Report

4.2.5.3.1.4 SOP Specific Conformance to SOP Classes

Refer to section 8.1.1, Created SOP Instances, for a detailed list of attributes.

Table 4-49:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	Error not logged to the job queue	Any zero Code	Failure reported to user
Success	Success not logged to the job queue	0000	Success reported to user

Table 4-50:
DICOM Command Communication Failure Behavior

Exception	Behavior

Timeout	Failure not reported to user
Association Aborted	Failure not reported to user

4.2.5.4 Association Acceptance Policy

Worklist AE does not accept Association requests.

4.2.6 MPPS AE

4.2.6.1 SOP Classes

This Application Entity provides Standard Conformance to the SOP Classes listed in the table below.

Table 4-51:
SOP Classes for MPPS

SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Supported MPPS SOP Classes			
MPPS (N-Create, N-Set)	1.2.840.10008. 3.1.2.3.3	Yes	No

4.2.6.2 Association Policies

4.2.6.2.1 General

Table 4-52:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.6.2.2 Number of Associations

Table 4-53:
Number of Associations as an Association Initiator for MPPS AE

Maximum number of simultaneous associations	1

4.2.6.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.6.2.4 Implementation Identifying Information

Table 4-54:
DICOM Implementation Class and Version for MPPS AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.6.3 Association Initiation Policy

Juniper initiates associations while processing the service operations and internal messages as shown below.

Operation or Real-World Activity	Association for
DIMSE N-CREATE, N-SET (forwarding MPPS)	N-CREATE, N-SET

4.2.6.3.1 Activity "Send MPPS"

4.2.6.3.1.1 Description and Sequencing of Activities

The Juniper supports the DICOM Modality Performed Procedure Step Service as an SCU. The Modality Performed Procedure Step SCU informs the Performed Procedure Step SCP about the procedure performed at the modality using the N-CREATE and N-SET DIMSE service.

Immediately after a new patient, study, or scheduled procedure is registered (via Patient Registration), the Juniper automatically performs an MPPS N-CREATE-RQ operation with a status of IN-PROGRESS for the newly created Performed Procedure Step. When the current patient procedure ends (either with an End Exam, or new Patient / Study / Procedure), the Juniper automatically performs an MPPS N-SET-RQ final operation with a status of COMPLETED. The user may also manually complete or discontinue the current Performed Procedure Step. An MPPS N-SET-RQ final operation is performed with the appropriate status of COMPLETED or DISCONTINUED.

4.2.6.3.1.2 Proposed Presentation Contexts

Table 4-55:
Proposed Presentation Contexts for MPPS AE

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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

There is no extended negotiation as an SCU.

4.2.6.3.1.3 SOP Specific Conformance to SOP classes

All Attributes listed in DICOM PS3.4 in Table F8.2-1 are potentially supported the Juniper. They will be part of the MPPS Message if set by the Application triggering the Service.

Refer to section 8.1.1, Created SOP Instances, for a detailed list of attributes.

Table 4-56:
DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	No Auto retry of failed jobs	Any none null Code	Failure not reported to user
Success	Success not logged to the job queue	0000	Success reported to user

Table 4-57:
DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure reported to user
Association Aborted	Failure reported to user

4.2.6.4 Association Acceptance Policy

MPPS AE does not accept Association requests.

4.2.7 DICOM Print AE

4.2.7.1.1 Activity "DICOM Print Activity"

4.2.7.1.1.1 Description and Sequencing of Activities

The Juniper facilitates user to print images as they are being created or later in review mode.

Paging images during acquisition

One or more of "Print Store 1" and "Print Store 2" keys on the control panel can be configured for Print (DICOM B/W Print and/or DICOM Color Print). When the user presses one of the configured keys on the control panel, the image is acquired, stored on the hard disk and placed in a page under the respective printer layout (DICOM B/W Printer Layout or DICOM Color Printer Layout).

Paging images in Review mode

User can select either individual images from open or closed studies, or one or more closed studies and queue them up for print. DICOM B/W Printer and DICOM Color Printer buttons are available in Patient browser for this operation. When a study is selected for print, all single-frame images belonging to the study will be printed.

Transfer of pages to the Printer

Pages may be immediately transferred or delayed till the end of study using the transfer configuration.

The Juniper supports two configurations: "Print at end exam" and "Print when page ss full".

If the configuration is set to “Print at end exam”, all pages queued to destination devices will be transferred as a batch when the user selects “End Exam” or “New Patient”.

If the configuration is set to “Print when page is full”, a page is transferred to destination devices immediately after it is full.

For both “Print at end Exam”, and “Print when page is full” settings, image transfer will be delayed if the Juniper is busy to perform another DICOM Command (Store/Print/Echo).

Associated Real World Activities

An association is established when the user initiates a “B/W Print” or “Color Print” operation from the Patient browser. Individual images or entire exams can be transferred to the selected DICOM Print device. The association is closed no pages are available to be printed for five seconds. An association may also be opened after a network outage or when the system is powered-on if images are queued to be printed.**Association Policies**

4.2.7.2.1.1 General

Table 4-58:
DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.7.2.2 Number of Associations

Table 4-59:
Number of Associations as an Association Initiator for Print AE

Maximum number of simultaneous associations	1

Table 4-60:
Number of Associations as an Association Acceptor for Print AE

Maximum number of simultaneous associations	1

4.2.7.2.3 Asynchronous Nature

The Juniper system DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4-61:
Asynchronous Nature as an Association Initiator for Print AE

Maximum number of outstanding asynchronous transactions	0

4.2.7.2.4 Implementation Identifying Information

Table 4-62:
DICOM Implementation Class and Version for Print AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

4.2.7.3 Grayscale Print

4.2.7.3.1 Presentation Context

Table 4-63:
Grayscale Print Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.7.3.2 SOP Classes

4.2.7.3.2.1 SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The Juniper AE provides standard conformance of the Grayscale Meta SOP classes as an SCU. Specifically, with respect to the Basic Grayscale Print Management Meta SOP Class this means conformance to the underlying SOP classes:

Table 4-64:
Conformance to Grayscale Print Meta SOP Class

SOP Class Name	SOP Class UID	Conformance Level
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Standard
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Standard
Printer SOP Class	1.2.840.10008.5.1.1.16	Standard

All mandatory elements of these classes are supported

4.2.7.3.2.2 Specific Conformance to Basic Film Session SOP Class

DICOM specified usage - M = Mandatory; U = User Option

Table 4-65:
Supported DIMSE Services for Basic Film Session SOP Class

Name	Usage	Description
N-Create	M	Creates the Film Session.
N-Set	U	Not used.

N-Delete	U	Deletes the Film Session.
N-Action	U	Not used.

4.2.7.3.2.3 Specific Conformance to Basic Film Box SOP Class

Table 4-66:
Supported DIMSE Services for Basic Film Box SOP Class

Name	Usage	Description
N-Create	M	Creates the Film Box.
N-Set	U	Not used.
N-Delete	U	Deletes the Film Box. Issued after each film is printed.
N-Action	M	PRINT. Sent after each Film Box is filled, and at the end of the exam to force a print of partially filled Film Box.

4.2.7.3.2.4 Attributes set for the Basic Film Box SOP Class

Table 4-67:
Attributes set for the Basic Film Box SOP Class

Attribute Name	Attribute Tag	Usage	Range	Description
Image Display Format	(2010,0010)	M	STANDARD\ X,Y	Where X, Y can be configured/ selected as 1*1, 1*2, 2*2, 2*3, 3*2, 3*3, 3*5, 4*5, 4*6, 5*6
Film Orientation	(2010,0040)	U	PORTRAIT LANDSCAPE	Range may be limited by print server/printer.
Film Size ID	(2010,0050)	U	8INX10IN 8.5INX11IN 10INX12IN 10INX14IN 11INX14IN 11INX17IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM A3 A4	Range may be limited by print server/printer.
Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Min. Density	(2010,0120)	U	0-999	Printer specific
Max Density	(2010,0130)	U	0-999	Printer specific
Configuration Information	(2010,0150)	U		Printer specific

Attribute Name	Attribute Tag	Usage	Range	Description
Smoothing Type	(2010,0080)	U		Printer specific
Border Density	(2010,0100)	U	BLACK WHITE	
Empty Image Density	(2010,0110)	U	BLACK WHITE	
Trim	(2010,0140)	U	YES NO	

4.2.7.3.2.5 Attributes Conformance to Basic Grayscale Image Box SOP Class

Table 4-68:
Supported DIMSE Services for the Basic Grayscale Image Box SOP

Name	Usage	Description
N-Set	M	The SCP for each potential image of the film box creates an image box instance. Only those instances, which actually contain images, will be updated with the N-SET message.

Table 4-69:
Attributes set for the Basic Grayscale Image Box SOP Class

Name	Attribute	Range	Description
Image Position	(2020,0010)	1-30	Value according to Image Display Format
Polarity	(2020,0020)	NORMAL, REVERSE	Intensity mapping between display and print

Table 4-70:
Supported DIMSE Services for the Printer SOP

Name	Usage	Description
N-Event-Report	M	Ignored and not handled.
N-Get	U	May be issued by this device at any time to get printer status.

Table 4-71:
Supported Printer SOP Class Element

Name	Usage	Range	Description
Printer Status	U	WARNING FAILURE	During a “Failure”, the Print job will be displayed as “Failed”.
Printer Status Information	U	Vendor specific	Reported to user if printer status = WARNING or FAILURE.

4.2.7.4 Color Print

4.2.7.4.1 Presentation Context

Table 4-72:
Color Print Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.7.4.2 SOP Classes

4.2.7.4.2.1 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The Juniper Print AE provides standard conformance to the color printing Meta SOP classes as an SCU. Specifically, with respect to the Basic Color Print Management Meta SOP Class this means conformance to the underlying SOP classes:

Table 4-73:
Conformance to Grayscale Color Meta SOP Class

SOP Class Name	SOP Class UID	Conformance Level
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Standard
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Standard
Printer SOP Class	1.2.840.10008.5.1.1.16	Standard

4.2.7.4.2.2 SOP Specific Conformance to Basic Color Image Box SOP Class

The Basic Color Print Management Meta SOP Class makes identical use of the *Basic Film Session SOP Class*, *Basic Film Box SOP Class* and *Printer SOP Class* elements, which have been previously described for grayscale image printing. Therefore, these will not be described again in this section on color printing. However, it should be noted that certain attributes, such as Medium Type which is defined in the Basic Film Session SOP Class, are highly likely to require printer/print server specific media

Table 4-74:
Supported DIMSE Services for the Basic Color Image Box SOP Class

Name	Usage	Description
N-Set	M	The SCP for each potential image of the film box creates an image box instance. Only those instances, which actually contain images, will be updated with the N-SET message.

Table 4-75:
Attributes set for the Basic Color Image Box SOP Class

Name	Attribute	Range	Description
Planar Configuration	(0028,0006)	0 – color by pixel 1 – color by plane	Color by plane. Color frame pixel order is configured as a planar image. Set to 0 (color by pixel) for RBG pixel-ordered image, 1 (color by plane) for planar image. Required when Samples per Pixel has a value greater than 1.

The Printer SOP Class behavior is identical to that used for grayscale printing

4.2.7.4.2.3 SOP Specific Conformance to SOP Classes

The Juniper Print AE supports the following error codes and reports failures to the user.

Table 4-76:
Supported Error Codes for Printer Classes

Service Status	Further Meaning	Protocol Codes
Success	Film accepted for Printing	0000
Warning	Film accepted for Printing, one or more settings ignored.	107,116,B600,B605
Failure	Printing not successful	C602, C603, C613

If the print operation is not successful, the image(s) are spooled on the Juniper system hard drive. A user-configured number of additional attempts are made to print the image(s). If these attempts fail, the user must select the job and press "Retry Job" on the DICOM Screen to complete the print operation.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The Juniper is independent from the physical medium over which TCP/IP executes; it inherits this from the OS system upon which it executes.

4.3.2 Additional Protocols

[See example in DICOM Standard, Part 2, section B.4.3.2.]

4.3.2.1 DHCP

[See example in DICOM Standard, Part 2, section B.4.3.2.1.]

4.3.3 IPv4 and IPv6 Support

IPv4 supported, IPv6 not supported.

4.4 Configuration

DICOM and networking parameters can be configured for both the local Juniper and remote DICOM Service Class Providers through the User Configuration – Networking/Printing pages.

4.4.1 Local Host - TCP/IP and General

The Juniper's local network parameters are configurable. The following parameters can be configured for the Juniper:

- Host Name
- Alias Name
- IP address
- Network IP mask
- Router/Gateway IP addresses
- Media Type
- Duplex Mode

4.4.1.1 DICOM Storage Configuration

Remote DICOM Storage and Storage Commitment Service Class Providers are configured through the Store Configuration or Storage Commitment Configuration of the User Configuration – Networking/Printing pages. The following parameters can be configured for each device:

- Alias name
- IP address
- AET - Application Entity Title
- Port number
- Time Out in Seconds
- Number of Times to Retry After Failure
- Seconds Between Each Retry
- Write Time Out in Seconds
- Connect Time Out in Seconds
- Auto Store to DICOM
- Image Format
- Monochrome
- Storage Commitment

4.4.1.2 DICOM HIS/RIS Configuration

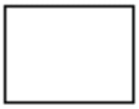
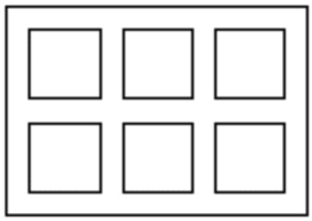
Remote DICOM Worklist and Modality Performed Procedure Step Service Class Providers are configured through the RIS Server Configuration of the User Configuration – Networking/Printing pages. The following parameters can be configured for each Worklist/MPPS server:

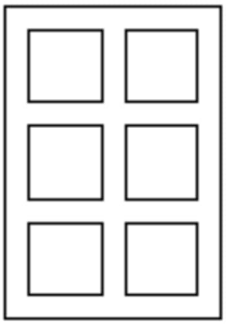
- Alias name
- IP address
- AET - Application Entity Title
- Port number
- Time Out in Seconds
- Number of Times to Retry After Failure (MPPS only)
- Seconds Between Each Retry (MPPS only)
- Write Time Out in Seconds
- Connect Time Out in Seconds
- Maximum number of matching results

4.4.1.3 DICOM Print Configuration

For each DICOM Print server, the following data is configurable by the user using the System Presets DICOM Print User Interface. The effect of changing parameters of the DICOM Print server will be seen at the next created film sheet. The current film sheet is not affected by changing these parameters.

Table 4-77:
User-Configurable Printer Parameters

Parameter	Description
Printer Type	Color or Black and White - depends on printer
Film Size	Select the size of the film - 8x10 inches, 8.5x11 inches, 10x12 inches, 10x14 inches, 11x14 inches, 11x17 inches, 14x14 inches, 14x17 inches, 24x24 centimeters, 24x30 centimeters, A3, or A4.
Film Orientation	Select from Portrait:  or Landscape: 
Display Format	You must supply the number of rows and columns of images on the printed sheet. For example, a 6 on 1 print with Landscape mode should have 3 columns and 2 rows: 

Parameter	Description
	A 6 on 1 with Portrait mode would have 2 columns and 3 rows: 
Print Priority	HIGH, MEDIUM or LOW
Medium Type	PAPER, CLEAR FILM, BLUE FILM, TRANSPARENCY or CURRENT (to use the currently loaded media)
Film Destination	MAGAZINE, PROCESSOR or CURRENT
Max. Density	Used to define the Black value - printer specific
Min. Density	Used to define the White value - printer specific
Smoothing Type	Printer specific value
Border Density	BLACK or WHITE
Empty Image Density	BLACK or WHITE
Trim	YES/NO to having a border around each image
Polarity	Normal/reverse. Normal means black is printed as black. Reverse means the grayscale is inverted so that black comes out as white and white as black.
Magnification	Replicate, Bilinear, Cubic, None
Configuration Information	Printer Specific values

5 MEDIA INTERCHANGE

5.1 Implementation Model

5.1.1 Application Data Flow

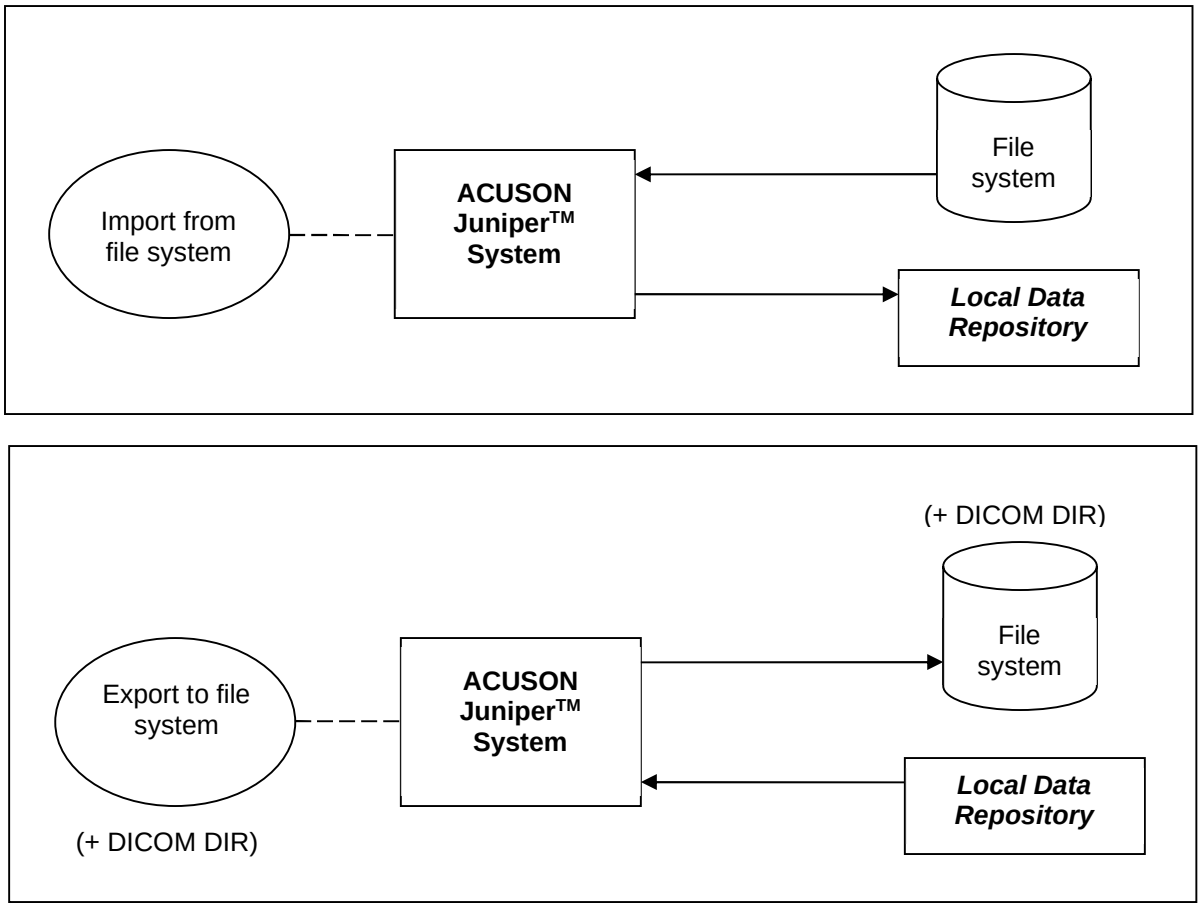


Figure 5-1. Media Application Data Flow Diagram

The Juniper provides the functionality to Import or Export DICOM Instances to and from the File System. During exportation, a DICOMDIR may also be generated. A complete ISO Image ready-to-burn can be generated. All SOP Classes defined in Table 4-1: SOP Classes for Storage AE are supported for the Import/Export functionality.

5.1.2 Functional Definition of AEs

The Juniper is capable of

- Creating a new File-set in the File System (Export to ...)
- Importing SOP Instances from the File System onto local storage

5.1.3 Sequencing of Real-World Activities

Not applicable.

5.1.4 File Meta Information for Implementation Class and Version

Table 5-1:
Implementation Class/Version Name – Media Interchange

File Meta Information Version	0x0001
Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	**5.19**

5.2 AE Specifications

5.2.1 Media Storage AE Specification

The Juniper system Media Storage AE provides conformance to the following DICOM SOP Classes as an FSC. The following specifications apply to the AE.

When configuring an uncompressed Transfer Syntax, the STD-US and STD-GEN application profile classes will be extended to store instances of the following SOP classes in compressed format.

Table 5-2:
Application Profiles, Activities, and Roles for DICOM Exchange Media

Application Profiles Supported	Real World Activity	Role
STD-US-ID-SF-CDR	Create CD-R	FSC, FSR
STD-US-ID-MF-CDR	Create CD-R	FSC, FSR
STD-US-SC-SF-CDR	Create CD-R	FSC
STS-US-SC-MF-CDR	Create CD-R	FSC
STD-US-ID-SF-DVD	Create DVD	FSC, FSR
STD-US-ID-MF-DVD	Create DVD	FSC, FSR
STD-US-SC-SF-DVD	Create DVD	FSC
STS-US-SC-MF-DVD	Create DVD	FSC
STD-GEN-USB	Export to USB	FSC, FSU
STD-GEN-USB	Import from USB	FSR

5.2.2 Implementation Identifying Information

Table 5-3:
DICOM Implementation Class and Version for Media Storage AE

Implementation Class UID	1.3.12.2.1107.5.5.5
Implementation Version Name	5.19

5.3 Media Storage Application Profile

5.3.1 DICOMDIR Keys

The DICOMDIR file will contain the following attributes for the levels Patient - Study - Series - Image (valid for all Application profiles described in this section).

Table 5-4:
DICOMDIR Keys

Attribute Name	Tag	Type	Notes
File-Set Identification			
File-set ID	(0004,1130)	2	Volume label of media
Directory Information			
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	0000H
Directory Record Sequence	(0004,1220)	2	
> Offset of the Next Directory Record	(0004,1400)	1C	
> Record In-use flag	(0004,1410)	1C	FFFFH
> Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
> Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE, SR DOCUMENT, RAW DATA
> Referenced File ID	(0004,1500)	1C	contains the filename on media for the Directory Records of Type IMAGE, SR DOCUMENT, RAW DATA
> Referenced SOP Class UID in File	(0004,1510)	1C	for the Directory Records of Type IMAGE, SR DOCUMENT, RAW DATA
> Referenced SOP Instance UID in File	(0004,1511)	1C	for the Directory Records of Type IMAGE, SR DOCUMENT, RAW DATA
> Referenced Transfer Syntax UID in File	(0004,1512)	1C	for the Directory Records of Type IMAGE, SR DOCUMENT, RAW DATA
> Record Selection Keys	see below	-	
Patient Keys			**Directory Record Type PATIENT**
Specific Character Set	(0008,0005)	1C	
Patient's Name	(0010,0010)	2	
Patient ID	(0010,0020)	1	
Date Of Birth	(0010,0030)	3	
Patient's Sex	(0010,0040)	3	
Other Patient IDs	(0010,1000)		

Attribute Name	Tag	Type	Notes
Study Keys			**Directory Record Type STUDY**
Specific Character Set	(0008,0005)	1C	
Study Date	(0008,0020)	1	
Study Time	(0008,0030)	1	
Accession Number	(0008,0050)	2	
Study Description	(0008,1030)	2	
Study Instance UID	(0020,000D)	1C	
Study ID	(0020,0010)	1	Will be generated automatically
Series Keys			**Directory Record Type SERIES**
Specific Character Set	(0008,0005)	1C	
Modality	(0008,0060)	1	
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
Image Keys			**Directory Record Type IMAGE**
Specific Character Set	(0008,0005)	1C	
Image Type	(0008,0008)	3	
Referenced file ID	(0040,1500)	1C	
Referenced SOP Class UID in File	(0004,1510)	1C	
Referenced SOP Instance UID in File	(0004,1511)	1C	
Referenced Transfer Syntax UID in File	(0004,1512)	1C	
Acquisition Number	(0020,0012)	3	
Instance Number	(0020,0013)	1	
SR Document Keys			**Directory Record Type SR Document**
Specific Character Set	(0008,0005)	1C	
Content Date	(0008,0023)	1	
Content Time	(0008,0033)	1	
Instance Number	(0020,0013)	1	
Concept Name Code Sequence	(0040,A043)	1	
>Include Code Sequence Macro			
Referenced SOP Class UID in File	(0004,1510)	1C	
Referenced SOP Instance UID in File	(0004,1511)	1C	
Referenced Transfer Syntax UID in File	(0004,1512)	1C	
Completion Flag	(0040,A491)	1	
Verification Flag	(0040,A493)	1	

5.3.2 Compliance to STD-US-SC-MF-DVD

For media conforming to the STD-US-SC-MF-DVD profiles the following SOP Classes and transfer syntaxes will be supported as an FSC.

Table 5-5:
STD-US-SC-MF-DVD Supported SOP Classes

IOD	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian 1.2.840.10008.1.2.1	Yes	Yes	No
Ultrasound Multi-frame Image Storage (Clips)	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossy (Baseline) 1.2.840.10008.1.2.4.50	Yes	Yes	No

† The Juniper system acts as a File Set Updater (FSU) only for DVD-R discs that were created on an Juniper system.

The following Photometric Interpretations are supported by FSC:

- RGB - Ultrasound Image Storage only
- YBR_FULL_422 - Ultrasound Multi-frame Image Storage (Clips) only

6 SUPPORT OF CHARACTER SETS

6.1 Character Sets for Juniper System

The “ISO-IR 100”, "GB18030", "ISO_IR 144" character sets are supported by the Juniper based on the following language selections:

English, French, Italian, German, Spanish: "ISO_IR 100"

Chinese: "GB18030"

Russian: "ISO_IR 144"

7 SECURITY

7.1 Security Profiles

- None supported.

7.2 Association Level Security

- It is possible to configure whether the DICOM Server will only answer to known AETs or to any AET.

7.3 Application Level Security

- For configuration and maintenance, the Service Technician must login with a separate password.

7.4 Virus Protection

The Juniper computer system's networking has been configured to significantly reduce the possibility of virus and hacking

vulnerabilities. On the Juniper, all ingress TCP and UDP ports are closed and/or absent of any type of server. The only exception to this is due to the necessity of a DICOM server available at ingress TCP port 104. Additionally, all non-essential computer services and components are disabled to minimize Juniper egress network footprint.

Outside of some minimal network exchanges required by the Juniper's commercial computer operating system, the only network connections initiated by the Juniper are for DICOM connectivity and network-share export function.

8 ANNEXES

8.1 IOD Contents

8.1.1 Created SOP Instances

8.1.1.1 US Image IOD Attributes

The system shall comply with the DICOM standard for the storage and transmission of the US Image IOD objects. In the following table is a list of fields that are user editable on the system.

Table 8-1:
US Image IOD Attributes

Module	Attribute	Tag	Type	VR	VM	Notes
Patient Identification	Patient's Name	(0010,0010)	2	PN	1	Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	2	LO	1	Patient Data Screen – ID field. Default is today's date & time (e.g., 03_04_2015_17_54_43 = Apr. 3, 2015 at 5:54:43 PM). Populated from Modality Worklist if used.
Patient Demographic	Patient's Birth Date	(0010,0030)	2	DA	1	Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	2	CS	1	Patient Data Screen – Gender field. M = male F = female. O = Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Age	(0010,1010)	3	AS	1	Calculated from Patient Data Screen DOB field.
	Patient's Size	(0010,1020)	3	DS	1	Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	3	DS	1	Patient Data Screen – Weight field. Populated from Modality Worklist if used.
	Other Patient IDs	(0010,1000)	3	LO	1-n	Populated from Worklist
Patient Study	Admitting Diagnosis Description	(0008,1080)	3	LO	1	Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	1	UI	1	Populated from Modality Worklist if used; generated by Juniper otherwise
	Image Type	(0008,0008)	1	CS	2-n	Example value: ORIGINAL\PRIMARY\OB\0001 Value 1: ORIGINAL or DERIVED Value 2: PRIMARY or SECONDARY Value 3:

Module	Attribute	Tag	Type	VR	VM	Notes
						Set to value by exam type Value 4: It is constructed as a modality bit map to allow for a description of multi-modality displays. In using this bit map, the sum of the values of the various modalities will unambiguously Determine the constituent modalities. 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering 0100 = Color Power Mode
	Study Date	(0008,0020)	2	DA	1	Date the exam started.
	Study Time	(0008,0030)	2	TM	1	Time the exam started.
	Referring Physician's Name	(0008,0090)	2	PN	1	Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	2	SH	1	Generated by Juniper
	Accession Number	(0008,0050)	2	SH	1	Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	3	LO	1	Populated with the first attribute from Modality Worklist that contains a valid value from the following list of attributes: Study Description (0008,1030), Scheduled Procedure Step Description (0040,0007), Requested Procedure Description (0032,1060). If Modality Worklist was not used or none of the attributes contains a valid value, QuickSet Screen – Description field is used. If Decscription field is empty, QuickSet Screen – Exam/QuickSet name is used.
General Series	Modality	(0008,0060)	1	CS	1	Always set to “US”
	Series Instance UID	(0020,000E)	1	UI	1	Generated by Juniper
	Series Number	(0020,0011)	2	IS	1	Series Number in study (1-n).
	Laterality	(0020,0060)	2	CS	1	Always sent as 0 length attribute
	[(a)]Series Date	(0008,0021)	3	DA	1	Date the series started.
	[(a)]Series Time	(0008,0031)	3	TM	1	Time the series started.
	[(a)]Series Description	(0008,103E)	3	LO	1	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.
	Body Part Examined	(0018, 0015)				The exam type of the most recent image stored in a particular series. If no images are stored for a series then the value is set to “Ultrasound”.
	Protocol Name	(0018,1030)	3	LO	1	Value is set to “NONE”

Module	Attribute	Tag	Type	VR	VM	Notes
	[a]Request Attributes Sequence	(0040,0275)	3	SQ	1	Populated with Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[a]Scheduled Procedure Step Description	(0040,0007)	3	LO	1	Populated with Scheduled Procedure Step Description (0040, 0007) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[a]Scheduled Protocol Code Sequence	(0040,0008)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040, 0008) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>Requested Procedure Description	(0032,1060)	3	LO	1	Populated from Requested Procedure Description in MWL query
	>[a]Scheduled Procedure Step ID	(0040,0009)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[a]Requested Procedure ID	(0040,1001)	3	SH	1	Populated with Requested Procedure ID (0040, 1001) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	[a]Performed Procedure Step Start Date	(0040,0244)	3	DA	1	Date the Performed Procedure Step was started.
	[a]Performed Procedure Step Start Time	(0040,0245)	3	TM	1	Time the Performed Procedure Step was started.
	[a]Performed Procedure Step ID	(0040,0253)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) if provided by Modality Worklist.
	[a]Performed Procedure Step Description	(0040,0254)	3	LO	1	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	[a]Performed Procedure Protocol Code Sequence	(0040,0260)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.
	[a]Comments on the Performed Procedure Step	(0040,0280)	3	ST	1	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.
	Referenced Performed Procedure Step Sequence	(0008,1111)	3	SQ	1	Populated with MPPS SOP Class UID and MPPS SOP instance UID of MPPS command sent for the procedure step(s) performed.
General Equipment	Manufacturer	(0008,0070)	2	LO	1	Set to “SIEMENS Healthineers”
	Station Name	(0008, 1010)				Station AE title
	Institution Name	(0008,0080)	3	LO	1	System Configuration – Institution Name field.
	Software Versions	(0018,1020)	3	LO	1-n	Set to the DICOM Software Version
	Manufacturer’s Model Name	(0008,1090)	3	LO	1	Set to “ACUSON <Product Name>”
General Image	Acquisition Date	(0008,0022)	2	DA	1	The date of the acquisition of data. Can influence sort order in browser and review
	Acquisition Time	(0008,0032)	2	TM	1	The time of the acquisition of data. Can influence sort order in browser and review
	Content Date	(0008,0023)	2C	DA	1	Image creation date <yyyymmdd>

Module	Attribute	Tag	Type	VR	VM	Notes
	Content Time	(0008,0033)	2C	TM	1	Image creation time <hhmmss.ffffff>. The ffffff component (fractional part of a second), if present, shall contain 1 to 6 digits.
	Instance Number	(0020,0013)	2	IS	1	Image number in study (1 – n)
	Patient Orientation	(0020,0020)	2	CS	2	Always sent as 0 length attribute
Image Pixel	Samples per Pixel	(0028,0002)	1	US	1	Set to 1 for MONOCHROME2 images, 3 for RGB images.
	Photometric Interpretation	(0028,0004)	1	CS	1	Set to “MONOCHROME2“or “RGB“
	Planar Configuration	(0028,0006)	1C	US	1	Color by plane. Color frame pixel order is configured as a planar image. Set to 0 (color by pixel) for RGB pixel-ordered image, 1 (color by plane) for planar image. Required when Samples per Pixel has a value greater than 1.
	Rows	(0028,0010)	1	US	1	This value may be from 240 and 864.
	Columns	(0028,0011)	1	US	1	This value may be from 320 and up to 1152.
	Bits Allocated	(0028,0100)	1	US	1	Set to 8.
	Bits Stored	(0028,0101)	1	US	1	Set to 8.
	High Bit	(0028,0102)	1	US	1	Set to 7.
	Pixel Representation	(0028,0103)	1	US	1	Set to 0
	Pixel Data	(7FE0,0010)	1	OB/OW	1	
US Image	Heart Rate	(0018,1088)	3	IS	1	Only provided if heart rate is > 0
	Lossy Image Compression	(0028,2110)	1	CS	1	“00”
	Transducer Data	(0018,5010)	3	LO	1-n	An array of values associated with transducer information, sequence of data is contained as <TransducerName>, <TransducerSerialNumber>, <TransducerVendor>.
SOP Common	SOP Class UID	(0008,0016)	1	UI	1	1.2.840.10008.5.1.4.1.1.6.1 or 1.2.840.10008.5.1.4.1.1.6
	SOP Instance UID	(0008,0018)	1	UI	1	Generated by Juniper
	Specific Character Set	(0008,0005)	1C	CS	1-n	Set to values as defined in Section **Error! Reference source not found.** of this document.
Image Plane	Pixel Spacing	(0028,0030)	1	DS	2	Pixel Spacing information is only provided for single, full screen, 2D image types (2D image types are B-mode, B-mode with color, B-mode with power).
Region Calibration	(b)Sequence of Ultrasound Regions	(0018,6011)	3	SQ	1	
	>(b)Region Spatial Format	(0018,6012)	3	US	1	B-Mode (Tissue or Color) = 0001H M-Mode (Tissue or Color) = 0002H Spectral (CW/PW) Doppler = 0003H

Module	Attribute	Tag	Type	VR	VM	Notes
	>[(b)]Region Data Type	(0018,6014)	3	US	1	B-Mode, M-Mode = 0001H (Tissue) Spectral Doppler = 0004H (CW Spectral Doppler) Spectral Doppler = 0003H (PW Spectral Doppler)
	>[(b)]Region Flags	(0018,6016)	3	UL	1	1st Bit (LSB) = 1 (All images acquired are transparent) 2nd Bit = 1 (All images acquired are automatically scaled) 3rd Bit = 1 for frequency scale 3rd Bit = 0 for velocity scale. The value of the 3rd bit is undefined for any mode other than Doppler. The value for 3rd bit is undefined if both frequency and velocity scales are selected on the Doppler image. 4th Bit is Reserved and value is always 0
	>[(b)]Region Location Min X0	(0018,6018)	3	UL	1	
	>[(b)]Region Location Min Y0	(0018,601A)	3	UL	1	
	>[(b)]Region Location Max X1	(0018,601C)	3	UL	1	
	>[(b)]Region Location Max Y1	(0018,601E)	3	UL	1	
	>[(b)]Physical Units X direction	(0018,6024)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0004H (seconds) Spectral (CW/PW) Doppler = 0004H (seconds)
	>[(b)]Physical Units Y direction	(0018,6026)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0003H (cm) Spectral (CW/PW) Doppler = 0007H (cm/sec)
	>[(b)]Physical Delta X	(0018,602C)	3	FD	1	
	>[(b)]Physical Delta Y	(0018,602E)	3	FD	1	
	>[(b)]Reference Pixel X0	(0018,6020)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(b)]Reference Pixel Y0	(0018,6022)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(b)]Reference Pixel Physical Value X	(0018,6028)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.
	>[(b)]Reference Pixel Physical Value Y	(0018,602A)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.

[(a)] The Attribute is only provided if the procedure step is queried from the MWL server.

[(b)] Region Calibration is provided only for 2D (B-Mode), M-Mode, and Spectral Doppler Regions. Region Calibration is not supported on Ultrasound RETIRED images, Screen Captures, and post-processed images. Region Calibration is not supported for M-Mode or Spectral Doppler still images taken from Live Imaging.

8.1.1.2 US Multi-frame Image IOD Attributes

Table 8-2:
US Multi-frame Image IOD Attributes

Module	Attribute	Tag	Type	VR	VM	Notes
Patient Identification	Patient's Name	(0010,0010)	2	PN	1	Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	2	LO	1	Patient Data Screen – ID field. Default is today's date & time (e.g., 03_04_2015_17_54_43 = Apr. 3, 2015 at 5:54:43 PM). Populated from Modality Worklist if used.
Patient Demographic	Patient's Birth Date	(0010,0030)	2	DA	1	Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	2	CS	1	Patient Data Screen – Gender field. M = male F = female. O= Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Age	(0010,1010)	3	AS	1	Calculated from Patient Data Screen DOB field.
	Patient's Size	(0010,1020)	3	DS	1	Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	3	DS	1	Patient Data Screen – Weight field. Populated from Modality Worklist if used.
	Other Patient IDs	(0010,1000)	3	LO	1-n	Populated from Worklist
Patient Study	Admitting Diagnosis Description	(0008,1080)	3	LO	1	Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	1	UI	1	Populated from Modality Worklist if used; generated by Juniper otherwise.
	Image Type	(0008,0008)	1	CS	2-n	Example value: ORIGINAL\PRIMARY\OB\0001 Value 1: ORIGINAL or DERIVED Value 2: PRIMARY or SECONDARY Value 3: Set to value by exam type Value 4:

Module	Attribute	Tag	Type	VR	VM	Notes
						It is constructed as a modality bit map to allow for a description of multi-modality displays. In using this bit map, the sum of the values of the various modalities will unambiguously determine the constituent modalities. 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering
	Study Date	(0008,0020)	2	DA	1	Date the exam started.
	Study Time	(0008,0030)	2	TM	1	Time the exam started.
	Referring Physician's Name	(0008,0090)	2	PN	1	Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	2	SH	1	Generated by Juniper
	Accession Number	(0008,0050)	2	SH	1	Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	3	LO	1	Populated with the first attribute from Modality Worklist that contains a valid value from the following list of attributes: Study Description (0008, 1030), Scheduled Procedure Step Description (0040, 0007), Requested Procedure Description (0032, 1060). If Modality Worklist was not used or none of the attributes contains a valid value, QuickSet Screen – Description field is used. If Decscription field is empty, QuickSet Screen – Exam/QuickSet name is used.
General Series	Modality	(0008,0060)	1	CS	1	Always set to “US”
	Series Instance UID	(0020,000E)	1	UI	1	Generated by Juniper
	Series Number	(0020,0011)	2	IS	1	Series Number in study (1-n).
	Laterality	(0020,0060)	2	CS	1	Always sent as 0 length attribute
	[(b)]Series Date	(0008,0021)	3	DA	1	Date the series started.
	[(b)]Series Time	(0008,0031)	3	TM	1	Time the series started.
	[(b)]Series Description	(0008,103E)	3	LO	1	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.

Module	Attribute	Tag	Type	VR	VM	Notes
	Body Part Examined	(0018, 0015)				The exam type of the most recent image stored in a particular series. If no images are stored for series then the value is set to “Ultrasound”.
	Protocol Name	(0018,1030)	3	LO	1	In case of Stress Echo image, value is set to procotol name, and in case of other images, value is set to “NONE”
	(b)Request Attributes Sequence	(0040,0275)	3	SQ	1	Populated with Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step Description	(0040,0007)	3	LO	1	Populated with Scheduled Procedure Step Description (0040, 0007) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Protocol Code Sequence	(0040,0008)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040, 0008) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step ID	(0040,0009)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Requested Procedure ID	(0040,1001)	3	SH	1	Populated with Requested Procedure ID (0040, 1001) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>Requested Procedure Description	(0032,1060)	3	LO	1	Populated from Requested Procedure Description in MWL query
	(b)Performed Procedure Step Start Date	(0040,0244)	3	DA	1	Date the Performed Procedure Step was started.
	(b)Performed Procedure Step Start Time	(0040,0245)	3	TM	1	Time the Performed Procedure Step was started.
	(b)Performed Procedure Step ID	(0040,0253)	3	SH	1	Populated with Scheduled Procedure Step ID (0040,0009) if provided by Modality Worklist.
	(b)Performed Procedure Step Description	(0040,0254)	3	LO	1	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	(b)Performed Procedure Protocol Code Sequence	(0040,0260)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.
	(b)Comments on the Performed Procedure Step	(0040,0280)	3	ST	1	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.
	Referenced Performed Procedure Step Sequence	(0008,1111)	3	SQ	1	Populated with MPPS SOP Class UID and MPPS SOP instance UID of MPPS command sent for the procedure step(s) performed.
	Manufacturer	(0008,0070)	2	LO	1	Set to “SIEMENS Healthineers”

Module	Attribute	Tag	Type	VR	VM	Notes
General Equipment	Station Name	(0008, 1010)				Station AE title
	Institution Name	(0008,0080)	3	LO	1	System Configuration – Institution Name field.
	Software Versions	(0018,1020)	3	LO	1-n	Set to the DICOM Software Version
	Manufacturer's Model Name	(0008,1090)	3	LO	1	Set to "ACUSON <Product Name>".
General Image	Acquisition Date	(0008,0022)	2	DA	1	The date of the acquisition of data. Can influence sort order in browser and review
	Acquisition Time	(0008,0032)	2	TM	1	The time of the acquisition of data. Can influence sort order in browser and review
	Content Date	(0008,0023)	2C	DA	1	Image creation date <yyyymmdd>
	Content Time	(0008,0033)	2C	TM	1	Image creation time <hhmmss.ffffff>. The ffffff component (fractional part of a second), if present, shall contain 1 to 6 digits.
	Instance Number	(0020,0013)	2	IS	1	Image number in study (1 - n)
	Patient Orientation	(0020,0020)	2	CS	2	Always sent as 0 length attribute
Image Pixel	Samples per Pixel	(0028,0002)	1	US	1	Set to 1 for MONOCHROME2 images, 3 for RGB and YBR_FULL_422 images.
	Photometric Interpretation	(0028,0004)	1	CS	1	"YBR_FULL_422" if sent compressed, "RGB" or "MONOCHROME2" if sent uncompressed.
	Planar Configuration	(0028,0006)	1C	US	1	Color by plane. Color frame pixel order is configured as a planar image. Set to 0 (color by pixel) for RBG pixel-ordered image, 1 (color by plane) for planar image. Required when Samples per Pixel has a value greater than 1.
	Rows	(0028,0010)	1	US	1	This value may be from 240 and 864.
	Columns	(0028,0011)	1	US	1	This value may be from 320 and up to 1152.
	Bits Allocated	(0028,0100)	1	US	1	Set to 8.
	Bits Stored	(0028,0101)	1	US	1	Set to 8.
	High Bit	(0028,0102)	1	US	1	Set to 7.
	Pixel Representation	(0028,0103)	1	US	1	Set to 0.
	Pixel Data	(7FE0, 0010)				
US Image	Image Type	(0008,0008)	1	CS	2-n	Sent as a 0 length attribute.
	Heart Rate	(0018,1088)	3	IS	1	Only provided if heart rate is > 0
	Lossy Image Compression	(0028,2110)	1	CS	1	Always set to "01"
	[a]Stage Name	(0008,2120)	3	SH	1	
	[a]Stage Number	(0008,2122)	3	IS	1	

Module	Attribute	Tag	Type	VR	VM	Notes
	[a]Number of Stages	(0008,2124)	3	IS	1	
	[a]View Names	(0008,2127)	3	LO	1-n	
	[a]View Number	(0008,2128)	3	IS	1	
	[a]Number of Views in Stage	(0008,212A)	3	IS	1	
	[a]Transducer Type	(0018,6031)	3	CS	1	
	[a]R Wave Time Vector	(0018,6060)	3	FD	1-n	
	[a]Mechanical Index	(0018,5022)	3	DS	1	
	[a]Depth Of Scan Field	(0018,5050)	3	DS	1	2D FOV depth in mm unit
	[a]Number Of Event Timers	(0018,2129)	3	IS	1	The number of event timers used at the time of acquisition of a Multi-frame image.
	[a]Event Elapsed Time(s)	(0018,2130)	3	DS	1-n	An array of values associated with each event timer. Units in milliseconds.
	[a]Event Timer Name(s)	(0018,2132)	3	LO	1-n	Name that identifies the event timer.
	Transducer Data	(0018,5010)	3	LO	1-n	An array of values associated with transducer information, sequence of data is contained as <TransducerName>, <TransducerSerialNumber>, <TransducerVendor>.
WaveForm	[a]Waveform Sequence	(5400,0100)	3	SQ	1	
	>Acquisition DateTime	(0008,002A)	3	DT	1	
	>Trigger Time Offset	(0018,1069)	3	FD	1	
	>Waveform Originality	(003A,0004)	1	CS	1	ORIGINAL
	>Number of Waveform Channels	(003A,0005)	1	US	1	1
	>Number of Waveform Samples	(003A,0010)	1	UL	1	
	>Sampling Frequency	(003A,001A)	1	DS	1	
	>Channel Definition Sequence	(003A,0200)	1	SQ	1	
	>>Channel Source Sequence	(003A,0208)	1	SQ	1	
	>>>Include ‘Code Sequence Macro’					
	>>Channel Sensitivity	(003A,0210)	1	DS	1	
	>>Channel Sensitivity Units Sequence	(003A,0211)	1	SQ	1	
	>>>Include ‘Code Sequence Macro’					
	>>Waveform Bits Stored	(003A,021A)	1	US	1	
	>Waveform Bits Allocated	(5400,1004)	1	US	1	

Module	Attribute	Tag	Type	VR	VM	Notes
	>Waveform Sample Interpretation	(5400,1006)	1	CS	1	
	>Waveform Data	(5400,1010)	1	OW/ OB	1	
SOP Common	SOP Class UID	(0008,0016)	1	UI	1	1.2.840.10008.5.1.4.1.1.3.1 or 1.2.840.10008.5.1.4.1.1.3
	SOP Instance UID	(0008,0018)	1	UI	1	Generated by Juniper
	Specific Character Set	(0008,0005)	1C	CS	1-n	Set to values as defined in Section **Error! Reference source not found.** of this document
	[(a)]Instance Creation Date	(0008,0012)	3	DA	1	Created
	[(a)]Instance Creation Time	(0008,0013)	3	TM	1	Created
Image Plane	Pixel Spacing	(0028,0030)	1	DS	2	Pixel Spacing information is only provided for single, full screen, 2D image types (2D image types are B-Mode, B-Mode Color, B-Mode with power).
Cine	Frame Time Vector	(0018,1065)	3	DS	1-n	
Multi-Frame	Number of Frames	(0028,0008)	1	IS	1	
	Frame Increment Pointer	(0028,0009)	1	AT	1-n	00181065H
Region Calibration	[(c)]Sequence of Ultrasound Regions	(0018,6011)	3	SQ	1	
	>[(c)]Region Spatial Format	(0018,6012)	3	US	1	B-Mode (Tissue or Color) = 0001H M-Mode (Tissue or Color) = 0002H Spectral (CW/PW) Doppler = 0003H
	>[(c)]Region Data Type	(0018,6014)	3	US	1	B-Mode, M-Mode = 0001H (Tissue) Spectral Doppler = 0004H (CW Spectral Doppler) Spectral Doppler = 0003H (PW Spectral Doppler)
	>[(c)]Region Flags	(0018,6016)	3	UL	1	1st Bit (LSB) = 1 (All images acquired are transparent) 2nd Bit = 1 (All images acquired are automatically scaled) 3rd Bit = 1 for frequency scale 3rd Bit = 0 for velocity scale. The value of the 3rd bit is undefined for any mode other than Doppler. The value for 3rd bit is undefined if both frequency and velocity scales are selected on the Doppler image. 4th Bit is Reserved and value is always 0
	>[(c)]Region Location Min X0	(0018,6018)	3	UL	1	
	>[(c)]Region Location Min Y0	(0018,601A)	3	UL	1	
	>[(c)]Region Location Max X1	(0018,601C)	3	UL	1	
	>[(c)]Region Location Max Y1	(0018,601E)	3	UL	1	

Module	Attribute	Tag	Type	VR	VM	Notes
	>[(c)]Physical Units X direction	(0018,6024)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0004H (seconds) Spectral (CW/PW) Doppler = 0004H (seconds)
	>[(c)]Physical Units Y direction	(0018,6026)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0003H (cm) Spectral (CW/PW) Doppler = 0007H (cm/sec)
	>[(c)]Physical Delta X	(0018,602C)	3	FD	1	
	>[(c)]Physical Delta Y	(0018,602E)	3	FD	1	
	>[(c)]Reference Pixel X0	(0018,6020)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(c)]Reference Pixel Y0	(0018,6022)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(c)]Reference Pixel Physical Value X	(0018,6028)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.
	>[(c)]Reference Pixel Physical Value Y	(0018,602A)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.

[(a)] The Attribute is provided for Stress Echo Images, the waveform sequence attribute is provided for single layout images with physio stream, too.

[(b)] The Attribute is only provided if the procedure step is queried from the MWL server.

[(c)] Region Calibration is provided only for 2D (B-Mode), M-Mode and Spectral Doppler Regions. Region Calibration is not supported on Ultrasound Retired images, Screen Captures and post-processed images. Region Calibration is not supported for M-Mode or Spectral Doppler still images taken from Live Imaging.

8.1.1.3 US Multi-frame Image IOD Attributes – 3D Volumetric Data

This table denotes the attributes included in the Ultrasound Multi-Frame Image IOD as implemented on the Juniper, when used for 3D volumetric data sets. Each frame represents a single slice from the 3D volume.

Table 8-3:
US Multi-frame Image IOD Attributes – 3D Volumetric Data

Module	Attribute	Tag	Type	VR	VM	Notes
Patient Identification	Patient's Name	(0010,0010)	2	PN	1	Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	2	LO	1	Patient Data Screen – ID field. Default is today's date & time (e.g., 03_04_2003_17_54_43 = Apr. 3, 2003 at 5:54:43 PM). Populated from Modality Worklist if used.
Patient Demographic	Patient's Birth Date	(0010,0030)	2	DA	1	Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	2	CS	1	Patient Data Screen – Gender field. M = male F = female. O= Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Age	(0010,1010)	3	AS	1	Calculated from Patient Data Screen DOB field.
	Patient's Size	(0010,1020)	3	DS	1	Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	3	DS	1	Patient Data Screen – Weight field. Populated from Modality Worklist if used.
	Other Patient IDs	(0010,1000)	3	LO	1-n	Populated from Worklist
Patient Study	Admitting Diagnosis Description	(0008,1080)	3	LO	1	Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	1	UI	1	Populated from Modality Worklist if used; generated by Juniper otherwise.

Module	Attribute	Tag	Type	VR	VM	Notes
	Image Type	(0008,0008)	1	CS	2-n	Example value: ORIGINAL\PRIMARY\OB\0001 Value 1: ORIGINAL or DERIVED Value 2: PRIMARY or SECONDARY Value 3: Set to value by exam type Value 4: It is constructed as a modality bit map to allow for a description of multi-modality displays. In using this bit map, the sum of the values of the various modalities will unambiguously determine the constituent modalities. 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering
	Study Date	(0008,0020)	2	DA	1	Date the exam started.
	Study Time	(0008,0030)	2	TM	1	Time the exam started.
	Referring Physician's Name	(0008,0090)	2	PN	1	Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	2	SH	1	Generated by Juniper
	Accession Number	(0008,0050)	2	SH	1	Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	3	LO	1	Populated with the first attribute from Modality Worklist that contains a valid value from the following list of attributes: Study Description (0008, 1030), Scheduled Procedure Step Description (0040, 0007), Requested Procedure Description (0032, 1060). If Modality Worklist was not used or none of the attributes contains a valid value QuickSet Screen – Description field is used. If Decscription field is empty, QuickSet Screen – Exam/QuickSet name is used.

Module	Attribute	Tag	Type	VR	VM	Notes
General Series	Modality	(0008,0060)	1	CS	1	Always set to “US”
	Series Instance UID	(0020,000E)	1	UI	1	Generated by Juniper
	Series Number	(0020,0011)	2	IS	1	Series Number in study (1-n).
	Laterality	(0020,0060)	2	CS	1	Always sent as 0 length attribute
	(b)Series Date	(0008,0021)	3	DA	1	Date the series started.
	(b)Series Time	(0008,0031)	3	TM	1	Time the series started.
	(b)Series Description	(0008,103E)	3	LO	1	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.
	Protocol Name	(0018,1030)	3	LO	1	Value is set to “NONE”
	(b)Request Attributes Sequence	(0040,0275)	3	SQ	1	Populated with Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step Description	(0040,0007)	3	LO	1	Populated with Scheduled Procedure Step Description (0040, 0007) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Protocol Code Sequence	(0040,0008)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040, 0008) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step ID	(0040,0009)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>(b)Requested Procedure ID	(0040,1001)	3	SH	1	Populated with Requested Procedure ID (0040, 1001) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>Requested Procedure Description	(0032,1060)	3	LO	1	Populated from Requested Procedure Description in MWL query
	(b)Performed Procedure Step Start Date	(0040,0244)	3	DA	1	Date the Performed Procedure Step was started.
	(b)Performed Procedure Step Start Time	(0040,0245)	3	TM	1	Time the Performed Procedure Step was started.
	(b)Performed Procedure Step ID	(0040,0253)	3	SH	1	Populated with Scheduled Procedure Step ID (0040,0009) if provided by Modality Worklist.
	(b)Performed Procedure Step Description	(0040,0254)	3	LO	1	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	(b)Performed Procedure Protocol Code Sequence	(0040,0260)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.

Module	Attribute	Tag	Type	VR	VM	Notes
	[b]Comments on the Performed Procedure Step	(0040,0280)	3	ST	1	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.
	Referenced Performed Procedure Step Sequence	(0008,1111)	3	SQ	1	Populated with MPPS SOP Class UID and MPPS SOP instance UID of MPPS command sent for the procedure step(s) performed.
General Equipment	Manufacturer	(0008,0070)	2	LO	1	Set to “SIEMENS Healthineers”
	Station Name	(0008, 1010)	3	SH	1	Station AE title
	Institution Name	(0008,0080)	3	LO	1	System Configuration – Institution Name field.
	Software Versions	(0018,1020)	3	LO	1-n	Set to the DICOM Software Version
	Manufacturer’s Model Name	(0008,1090)	3	LO	1	Set to “ACUSON <Product Name>”.
General Image	Instance Number	(0020,0013)	2	IS	1	Image number in study (1 - n)
	Patient Orientation	(0020,0020)	2	CS	2	Always sent as 0 length attribute
Image Pixel	Samples per Pixel	(0028,0002)	1	US	1	Set to 1 for MONOCHROME2 images, 3 for RGB and YBR_FULL_422 images.
	Photometric Interpretation	(0028,0004)	1	CS	1	“YBR_FULL_422” if sent compressed, “RGB” or “MONOCHROME2“ if sent uncompressed.
	Planar Configuration	(0028,0006)	1C	US	1	Color by plane. Color frame pixel order is configured as a planar image. Set to 0 (color by pixel) for RBG pixel-ordered image, 1 (color by plane) for planar image. Required when Samples per Pixel has a value greater than 1.
	Rows	(0028,0010)	1	US	1	This value may be from 240 and 864.
	Columns	(0028,0011)	1	US	1	This value may be from 320 and up to 1152.
	Bits Allocated	(0028,0100)	1	US	1	Set to 8.
	Bits Stored	(0028,0101)	1	US	1	Set to 8.
	High Bit	(0028,0102)	1	US	1	Set to 7.
	Pixel Representation	(0028,0103)	1	US	1	Set to 0.
	Pixel Data	(7FE0, 0010)	1	OB/ OW	1	
US Image	Image Type	(0008,0008)	1	CS	2-n	Sent as a 0 length attribute.
	Heart Rate	(0018,1088)	3	IS	1	Only provided if heart rate is > 0
	Lossy Image Compression	(0028,2110)	1	CS	1	Always set to “01”
	[a]Stage Name	(0008,2120)	3	SH	1	
	[a]Stage Number	(0008,2122)	3	IS	1	
	[a]Number of Stages	(0008,2124)	3	IS	1	
	[a]View Names	(0008,2127)	3	LO	1-n	
	[a]View Number	(0008,2128)	3	IS	1	

Module	Attribute	Tag	Type	VR	VM	Notes
	[a]Number of Views in Stage	(0008,212A)	3	IS	1	
	[a]Transducer Type	(0018,6031)	3	CS	1	
	[a]R Wave Time Vector	(0018,6060)	3	FD	1-n	
	[a]Mechanical Index	(0018,5022)	3	DS	1	
	[a]Depth Of Scan Field	(0018,5050)	3	DS	1	2D FOV depth in mm unit
	[a]Number Of Event Timers	(0018,2129)	3	IS	1	The number of event timers used at the time of acquisition of a Multi-frame image.
	[a]Event Elapsed Time(s)	(0018,2130)	3	DS	1-n	An array of values associated with each event timer. Units in milliseconds.
	[a]Event Timer Name(s)	(0018,2132)	3	LO	1-n	Name that identifies the event timer.
WaveForm	[a]Waveform Sequence	(5400,0100)	1	SQ	1	
	>Acquisition DateTime	(0008,002A)	3	DT	1	
	>Trigger Time Offset	(0018,1069)	3	FD	1	
	>Waveform Originality	(003A,0004)	1	CS	1	ORIGINAL
	>Number of Waveform Channels	(003A,0005)	1	US	1	1
	>Number of Waveform Samples	(003A,0010)	1	UL	1	
	>Sampling Frequency	(003A,001A)	1	DS	1	
	>Channel Definition Sequence	(003A,0200)	1	SQ	1	
	>>Channel Source Sequence	(003A,0208)	1	SQ	1	
	>>>Include ‘Code Sequence Macro’		3	UN	1	
	>>Channel Sensitivity	(003A,0210)	1	DS	1	
	>>Channel Sensitivity Units Sequence	(003A,0211)	1	SQ	1	
	>>>Include ‘Code Sequence Macro’		3	UN	1	
	>>Waveform Bits Stored	(003A,021A)	1	US	1	
	>Waveform Bits Allocated	(5400,1004)	1	US	1	
	>Waveform Sample Interpretation	(5400,1006)	1	CS	1	
	>Waveform Data	(5400,1010)	1	OW/OB	1	
SOP Common	SOP Class UID	(0008,0016)	1	UI	1	1.2.840.10008.5.1.4.1.1.3.1 or 1.2.840.10008.5.1.4.1.1.3
	SOP Instance UID	(0008,0018)	1	UI	1	Generated by Juniper
	Specific Character Set	(0008,0005)	1C	CS	1-n	Set to values as defined in Section **Error! Reference source not found.** of this document

Module	Attribute	Tag	Type	VR	VM	Notes
	[a]Instance Creation Date	(0008,0012)	3	DA	1	Created
	[a]Instance Creation Time	(0008,0013)	3	TM	1	Created
Image Plane	Pixel Spacing	(0028,0030)	1	DS	2	Pixel Spacing information is only provided for single, full screen, 2D image types (2D image types are B-Mode, B-Mode Color, B-Mode with power).
Cine	Frame Time Vector	(0018,1065)	3	DS	1-n	
Multi-Frame	Number of Frames	(0028,0008)	1	IS	1	
	Frame Increment Pointer	(0028,0009)	1	AT	1-n	00181065H
Region Calibration	[c]Sequence of Ultrasound Regions	(0018,6011)	3	SQ	1	
	>[c]Region Spatial Format	(0018,6012)	3	US	1	B-Mode (Tissue or Color) = 0001H M-Mode (Tissue or Color) = 0002H Spectral (CW/PW) Doppler = 0003H
	>[c]Region Data Type	(0018,6014)	3	US	1	B-Mode, M-Mode = 0001H (Tissue) Spectral Doppler = 0004H (CW Spectral Doppler) Spectral Doppler = 0003H (PW Spectral Doppler)
	>[c]Region Flags	(0018,6016)	3	UL	1	1st Bit (LSB) = 1 (All images acquired are transparent) 2nd Bit = 1 (All images acquired are automatically scaled) 3rd Bit = 1 for frequency scale 3rd Bit = 0 for velocity scale. The value of the 3rd bit is undefined for any mode other than Doppler. The value for 3rd bit is undefined if both frequency and velocity scales are selected on the Doppler image. 4th Bit is Reserved and value is always 0.
	>[c]Region Location Min X0	(0018,6018)	3	UL	1	
	>[c]Region Location Min Y0	(0018,601A)	3	UL	1	
	>[c]Region Location Max X1	(0018,601C)	3	UL	1	
	>[c]Region Location Max Y1	(0018,601E)	3	UL	1	
	>[c]Physical Units X direction	(0018,6024)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0004H (seconds) Spectral (CW/PW) Doppler = 0004H (seconds)
	>[c]Physical Units Y direction	(0018,6026)	3	US	1	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0003H (cm)

Module	Attribute	Tag	Type	VR	VM	Notes
						Spectral (CW/PW) Doppler = 0007H (cm/sec)
	>[(c)]Physical Delta X	(0018,602C)	3	FD	1	
	>[(c)]Physical Delta Y	(0018,602E)	3	FD	1	
	>[(c)]Reference Pixel X0	(0018,6020)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(c)]Reference Pixel Y0	(0018,6022)	3	UL	1	Attribute only set for Spectral Doppler Regions
	>[(c)]Reference Pixel Physical Value X	(0018,6028)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.
	>[(c)]Reference Pixel Physical Value Y	(0018,602A)	3	FD	1	Attribute only set for Spectral Doppler Regions When provided, value is always 0.
	>[(a,c)]Transducer Frequency	(0018,6030)	3	DS	1	
	>[(a,c)]Pulse Repetition Frequency	(0018,6032)	3	DS	1	
	>[(a,c)]Doppler Correction Angle	(0018,6034)	3	DS	1	

[a)] The Attribute is provided for Stress Echo Images, the waveform sequence attribute is provided for single layout images with physio stream, too.

[(b)] The Attribute is only provided if the procedure step is queried from the MWL server.

[(c)] Region Calibration is provided only for 2D (B-Mode), M-Mode and Spectral Doppler Regions. Region Calibration is not supported on Ultrasound Retired images, Screen Captures and post-processed images. Region Calibration is not supported for M-Mode or Spectral Doppler still images taken from Live Imaging

8.1.1.4 Secondary Capture Image IOD Attributes

Table 8-4:
Secondary Capture Image IOD Attributes

Module	Attribute	Tag	Type	VR	VM	Notes
Patient Identification	Patient's Name	(0010,0010)	2	PN	1	Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	2	LO	1	Patient Data Screen – ID field. Default is today's date & time (e.g., 03_04_2015_17_54_43 = Apr. 3, 2015 at 5:54:43 PM). Populated from Modality Worklist if used.

Module	Attribute	Tag	Type	VR	VM	Notes
Patient Demographic	Patient's Birth Date	(0010,0030)	2	DA	1	Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	2	CS	1	Patient Data Screen – Gender field. M = male F = female. O = Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Age	(0010,1010)	3	AS	1	Calculated from Patient Data Screen DOB field.
	Patient's Size	(0010,1020)	3	DS	1	Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	3	DS	1	Patient Data Screen – Weight field. Populated from Modality Worklist if used.
	Other Patient IDs	(0010,1000)	3	LO	1-n	Populated from Worklist
Patient Study	Admitting Diagnosis Description	(0008,1080)	3	LO	1	Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	1	UI	1	Populated from Modality Worklist if used; generated by Juniper otherwise
	Study Date	(0008,0020)	2	DA	1	Date the exam started.
	Study Time	(0008,0030)	2	TM	1	Time the exam started.
	Referring Physician's Name	(0008,0090)	2	PN	1	Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	2	SH	1	Generated by Juniper
	Accession Number	(0008,0050)	2	SH	1	Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	3	LO	1	Populated with the first attribute from Modality Worklist that contains a valid value from the following list of attributes: Study Description (0008,1030), Scheduled Procedure Step Description (0040,0007), Requested Procedure Description (0032,1060). If Modality Worklist was not used or none of the attributes contains a valid value, QuickSet Screen – Description field is used. If Decscription field is empty, QuickSet Screen – Exam/QuickSet name is used.
General Series	Modality	(0008,0060)	1	CS	1	Always set to "US"
	Series Instance UID	(0020,000E)	1	UI	1	Generated by Juniper
	Series Number	(0020,0011)	2	IS	1	Series Number in study (1-n).
	Laterality	(0020,0060)	2	CS	1	Always sent as 0 length attribute
	[(a)]Series Date	(0008,0021)	3	DA	1	Date the series started.
	[(a)]Series Time	(0008,0031)	3	TM	1	Time the series started.
	[(a)]Series Description	(0008,103E)	3	LO	1	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.

Module	Attribute	Tag	Type	VR	VM	Notes
	Protocol Name	(0018,1030)				The exam type of the most recent image stored in a particular series. If no images are stored for a series then the value is set to “Ultrasound”.
	[(a)]Request Attributes Sequence	(0040,0275)	3	SQ	1	Populated with Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(a)]Scheduled Procedure Step Description	(0040,0007)	3	LO	1	Populated with Scheduled Procedure Step Description (0040, 0007) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(a)]Scheduled Protocol Code Sequence	(0040,0008)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040, 0008) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>Requested Procedure Description	(0032,1060)	3	LO	1	Populated from Requested Procedure Description in MWL query
	>[(a)]Scheduled Procedure Step ID	(0040,0009)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(a)]Requested Procedure ID	(0040,1001)	3	SH	1	Populated with Requested Procedure ID (0040, 1001) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	[(a)]Performed Procedure Step Start Date	(0040,0244)	3	DA	1	Date the Performed Procedure Step was started.
	[(a)]Performed Procedure Step Start Time	(0040,0245)	3	TM	1	Time the Performed Procedure Step was started.
	[(a)]Performed Procedure Step ID	(0040,0253)	3	SH	1	Populated with Scheduled Procedure Step ID (0040, 0009) if provided by Modality Worklist.
	[(a)]Performed Procedure Step Description	(0040,0254)	3	LO	1	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	[(a)]Performed Procedure Protocol Code Sequence	(0040,0260)	3	SQ	1	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.
	[(a)]Comments on the Performed Procedure Step	(0040,0280)	3	ST	1	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.
	Referenced Performed Procedure Step Sequence	(0008,1111)	3	SQ	1	Populated with MPPS SOP Class UID and MPPS SOP instance UID of MPPS command sent for the procedure step(s) performed.
SC Equipment Module	Conversion Type	(0008,0064)				Set to “WSD”
General Equipment	Manufacturer	(0008,0070)	2	LO	1	Set to “SIEMENS Healthineers”
	Station Name	(0008, 1010)				Station AE title
	Institution Name	(0008,0080)	3	LO	1	System Configuration – Institution Name field.
	Software Versions	(0018,1020)	3	LO	1-n	Set to the DICOM Software Version
	Manufacturer’s Model Name	(0008,1090)	3	LO	1	Set to “ACUSON <Product Name>”
General Image	Instance Number	(0020,0013)	2	IS	1	Image number in study (1 – n)

Module	Attribute	Tag	Type	VR	VM	Notes
	Patient Orientation	(0020,0020)	2	CS	2	Always sent as 0 length attribute
Image Pixel	Samples per Pixel	(0028,0002)	1	US	1	Set to 1 for MONOCHROME2 images, 3 for RGB images.
	Photometric Interpretation	(0028,0004)	1	CS	1	Set to “MONOCHROME2“or “RGB“
	Planar Configuration	(0028,0006)	1C	US	1	Color by plane. Color frame pixel order is configured as a planar image. Set to 0 (color by pixel) for RGB pixel-ordered image, 1 (color by plane) for planar image. Required when Samples per Pixel has a value greater than 1.
	Rows	(0028,0010)	1	US	1	This value may be from 240 and 864.
	Columns	(0028,0011)	1	US	1	This value may be from 320 and up to 1152.
	Bits Allocated	(0028,0100)	1	US	1	Set to 8.
	Bits Stored	(0028,0101)	1	US	1	Set to 8.
	High Bit	(0028,0102)	1	US	1	Set to 7.
	Pixel Representation	(0028,0103)	1	US	1	Set to 0
	Pixel Data	(7FE0,0010)	1	OB/OW	1	

[a] The Attribute is only provided if the procedure step is queried from the MWL server.

8.1.1.5 Comprehensive SR IOD Attributes

Table 8-5:
Comprehensive SR IOD Attributes

Module Name	Attribute	Tag	Type	Notes
Patient	Patient's Name	(0010,0010)	2	
	Patient ID	(0010,0020)	2	
	Patient's Birth Date	(0010,0030)	2	
	Patient's Sex	(0010,0040)	2	
	Other Patient IDs	(0010,1000)	3	
General Study	Study Instance UID	(0020,000D)	1	
	Study Date	(0008,0020)	2	
	Study Time	(0008,0030)	2	
	Referring Physician's Name	(0008,0090)	2	
	Study ID	(0020,0010)	2	
	Accession Number	(0008,0050)	2	
	Study Description	(0008,1030)	3	
Patient Study	Patient's Age	(0010,1010)	3	
	Patient's Size	(0010,1020)	3	

Module Name	Attribute	Tag	Type	Notes
	Patient's Weight	(0010,1030)	3	
	Admitting Diagnosis Description	(0008,1080)	3	
General Equipment	Manufacturer	(0008,0070)	2	
	Institution Name	(0008,0080)	3	
	Station Name	(0008,1010)	3	
	Manufacturer's Model Name	(0008,1090)	3	
	Software Versions	(0018,1020)	3	Set to "SR1.0_VC10x_Juniper"
SR Document Series	Modality	(0008,0060)	1	Defined term "SR" used
	Series Instance UID	(0020,000E)	1	
	Series Number	(0020,0011)	1	
	Reference Performed Procedure Step Sequence	(0008,1111)	2	
	>Referenced SOP Class UID	(0008,1150)	1C	
	>Reference SOP Instance UID	(0008,1155)	1C	
SR Document General	Instance Number	(0020,0013)	1	
	Completion Flag	(0040,A491)	1	
	Verification Flag	(0040,A493)	1	
	Content Date	(0008,0023)	1	
	Content Time	(0008,0033)	1	
	Referenced Request Sequence	(0040, A370)	1C	
	>Study Instance UID	(0020,000D)	1	
	>Referenced Study Sequence	(0008,1110)	2	
	>Accession Number	(0008,0050)	2	
	>Placer Order Number/Imaging Service Request	(0040,2016)	2	
	>Filler Order Number/Imaging Service Request	(0040,2017)	2	
	>Requested Procedure ID	(0040,1001)	2	
	>Requested Procedure Description	(0032,1060)	2	
	>Requested Procedure Code Sequence	(0032,1064)	2	
SR Document Content	Value Type	(0040,A040)	1	CONTAINER
	Concept Name Code Sequence	(0040,A043)	1C	
	>Code Value	(0008,0100)	1	Set to "125200" for Adult Echocardiography Procedure Report ,"125100" for Vascular Ultrasound Procedure Report, ""125000" for OB-GYN Ultrasound Procedure Report or "125196" for Fetal Cardiac Ultrasound Report
	>Coding Scheme Designator	(0008,0102)	1	Set to "DCM"
	>Code Meaning	(0008,0104)	1	Set to "Adult Echocardiography Procedure Report" , "Vascular Ultrasound Procedure Report", "OB-GYN Ultrasound Procedure Report" or "Fetal Cardiac Ultrasound Report"
	Continuity of Content	(0040,A050)	1	SEPARATE
	Content Template Sequence	(0040,A504)	1C	

Module Name	Attribute	Tag	Type	Notes
	>Mapping Resource	(0008,0105)	1	Set to “DCMR”
	>Template Identifier	(0040,DB00)	1	Set to “5200” for Adult Echocardiography Procedure Report , “5100” for Vascular Ultrasound Procedure Report, “5000” for OB-GYN Ultrasound Procedure Report or “5220” for Fetal Cardiac Ultrasound Report
	Content Sequence	(0040,A730)	1C	See Appendix for content of “Adult Echocardiography Procedure Report” ,“Vascular Ultrasound Procedure Report”, “OB-GYN Ultrasound Procedure Report” or “Fetal Cardiac Ultrasound Report”
SOP Common	SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.88.33
	SOP Instance UID	(0008,0018)	1	
	Specific Character Set	(0008,0005)	1C	
Private Attributes				
Private Attributes	Private Creator	(0019,0010)	3	Reserves tags 0019,1000 through 0019,10FF for use as private tags.
	Import Structured Reports	(0019,1020)	3	Set to “O” or “C” or “CO” if SR options were purchased and SR generation was configured. Otherwise set to “No”. Instructs SCP that it should attempt to import measurements from SR.

8.1.1.6 MPPS: N-CREATE

The Juniper VC10 DICOM Performed Procedure Step SCU informs the remote SCP when the examination of a scheduled procedure step will be performed. The N-CREATE message is sent when the examination is started. The following table describes the supported attributes for a N-CREATE message.

Table 8-6:
MPPS N-CREATE Attributes

Attribute	Tag	Required Type	Notes
Specific Character Set	(0008,0005)	1C	Created from values as defined in Section **Error! Reference source not found.** of this document or as received from MWL
Scheduled Step Attribute Sequence	(0040,0270)	1	
>Study Instance UID	(0020,000D)	1	Value obtained from Modality WorkList; generated by Juniper in some cases
>Referenced Study Sequence	(0008,1110)	2	Populated with contents of Referenced Study Sequence from Modality Worklist if used, created otherwise. See table F.7.2-1 in PS 3.4-2011 for sequence definition.

Attribute	Tag	Required Type	Notes
>>Referenced SOP Class UID	(0008,1150)	1C	Populated with contents of Referenced Study Sequence from Modality Worklist if used, created otherwise. See table F.7.2-1 in PS 3.4-2011 for sequence definition.
>>Referenced SOP Instance UID	(0008,1155)	1C	Populated with contents of Referenced Study Sequence from Modality Worklist if used, created otherwise. See table F.7.2-1 in PS 3.4-2011 for sequence definition.
>Accession Number	(0008,0050)	2	Value obtained from Modality WorkList or user input
>Requested Procedure ID	(0040,1001)	2	Value obtained from Modality WorkList or created
>Requested Procedure Description	(0032,1060)	2	From Modality WorkList or zero length
>Scheduled Procedure Step ID	(0040,0009)	2	From Modality WorkList or zero length
>Scheduled Procedure Step Description	(0040,0007)	2	From Modality WorkList or zero length
>Scheduled Protocol Code Sequence	(0040,0008)	2	From Modality WorkList or zero length
>>Code Value	(0008,0100)	1C	
>>Coding Scheme Designator	(0008,0102)	1C	
>>Coding Scheme Version	(0008,0103)	3	
>>Code Meaning	(0008,0104)	3	Value obtained from Modality WorkList
Patient's Name	(0010,0010)	2	Value obtained from Modality WorkList or user input
Patient ID	(0010,0020)	2	Value obtained from Modality WorkList or user input
Patient's Birth Date	(0010,0030)	2	Value obtained from Modality WorkList or user input
Patient's Sex	(0010,0040)	2	Value obtained from Modality WorkList or user input
Referenced Patient Sequence	(0008,1120)	2	Zero length
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced Instance UID	(0008,1155)	1C	
Performed Station Name	(0040,0242)	2	Own hostname
Performed Location	(0040,0243)	2	From institution name
Performed Procedure Step Start Date	(0040,0244)	1	The start date of the performed procedure step.
Performed Procedure Step Start Time	(0040,0245)	1	The start time of the performed procedure step.
Performed Procedure Step Status	(0040,0252)	1	Always set to "In-Progress".
Performed Procedure Step Description	(0040,0254)	2	Value obtained from Modality WorkList or sent as zero length
Performed Procedure Type Description	(0040,0255)	2	sent as zero length
Procedure Code Sequence	(0008,1032)	3	Populated with contents of Requested Procedure Code Sequence from Modality Worklist if used, empty otherwise. See table F.7.2-1 in PS 3.4-2011 for sequence definition.
>Code Value	(0008,0100)	1C	-
>Coding Scheme Designator	(0008,0102)	1C	-

Attribute	Tag	Required Type	Notes
>Coding Scheme Version	(0008,0103)	3	-
>Code Meaning	(0008,0104)	3	-
Performed Procedure Step End Date	(0040,0250)	2	Always sent as 0 length attribute
Performed Procedure Step End Time	(0040,0251)	2	Always sent as 0 length attribute
Modality	(0008,0060)	1	Always set to US
Study ID	(0020,0010)	2	Populated from Requested Procedure ID (0040,1001) if Modality Worklist is used; created by Juniper otherwise
Performed Protocol Code Sequence	(0040,0260)	2	Obtained from Scheduled Action Item Code Sequence (MWL query) or sent as zero length
Performed Series Sequence	(0040,0340)	2	
>Performing Physician's Name	(0008,1050)	2C	From MWL or user input
>Protocol Name	(0018,1030)	1C	Set to exam type
>Operators' Name	(0008,1070)	2C	Zero length
>Series Instance UID	(0020,000E)	1C	Created
>Series Description	(0008,103E)	3	Zero length
>Retrieve AE Title	(0008,0054)	2C	Zero length
>Referenced Image Sequence	(0008,1140)	2C	Zero length
>>Referenced SOP Class UID	(0008,1150)	1C	-
>>Referenced SOP Instance UID	(0008,1155)	1C	-
>Referenced Standalone SOP Instance Sequence	(0040,0220)	2C	Zero length

8.1.1.7 MPPS: N-SET

The Juniper DICOM Performed Procedure Step SCU informs the remote SCP about the performed examination and its status. The N-SET message is only sent once when the exam is ended with status "COMPLETED" or when the examination could not be completed with status "DISCONTINUED". The following table describes the supported attributes for a N-SET message.

Table 8-7:
MPPS N-SET Attributes

Attribute	Tag	Required Type	Notes
Performed Procedure Step Status	(0040,0252)	3	Set to "Discontinued" or "Completed" based on user selection.
Performed Procedure Step End Date	(0040,0250)	3	Date the procedure step was completed
Performed Procedure Step End Time	(0040,0251)	3	Time the procedure step was completed

Attribute	Tag	Required Type	Notes
Performed Action Item Code Sequence	(0040,0260)	3	From Scheduled Action Item Code Sequence
>Code Value	(0008,0100)	1C	
>Coding Scheme Designator	(0008,0102)	1C	
>Coding Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Performed Series Sequence	(0040,0340)	3	Shall contain only one series
>Performing Physician's Name	(0008,1050)	2C	Zero length
>Protocol Name	(0008,1030)	1C	Exam type specified by the operator.
>Operator's Name	(0008,1070)	2C	Zero length
>Series Instance UID	(0020,000E)	1C	The Instance UID of the series to which the procedure belongs.
>Series Description	(0008,103E)	2	Always sent as 0 length attribute
>Retrieve AE Title	(0008,0054)	2C	Always sent as 0 length attribute
>Referenced Image Sequence	(0008,1140)	2C	List of all the images in the series.
>>Referenced SOP Class UID	(0008,1150)	1C	The SOP class UID can be one of: Ultrasound Multi-Frame Image Storage 1.2.840.10008.5.1.4.1.1.3.1 Ultrasound Multi-Frame Image Storage (Retired) 1.2.840.10008.5.1.4.1.1.3 Ultrasound Image Storage 1.2.840.10008.5.1.4.1.1.6.1 Ultrasound Image Storage (Retired) 1.2.840.10008.5.1.4.1.1.6 Secondary Capture Image Storage 1.2.840.10008.5.1.4.1.1.7
>>Referenced SOP Instance UID	(0008,1155)	1C	The SOP instance UID of the image.
> Referenced Standalone SOP Instance Sequence	(0040,0220)	2C	Always empty

8.1.1.8 Query: C-FIND

The Juniper DICOM Query/Retrieve SCU supports hierarchical queries with all mandatory search keys. The interactive querying of attributes on IMAGE level is not supported by the Query SCU. Though, retrieval of individual Objects is possible. The following table describes the search keys for the different query models that the SCU supports. Matching is either wildcard, which means that the user can supply a string containing wildcards, or universal, which means that the attribute is requested as return value.

Table 8-8:
C-FIND Attributes

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
Study Level					
Patient Name	(0010,0010)	R	Wildcard[(a)]	enter value	yes
Patient ID	(0010,0020)	R	Wildcard[(a)]	enter value	yes

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
Patient's Birth date	(0010,0030)	O	universal (Null)		yes
Patient's Sex	(0010,0040)	O	universal (Null)		yes
Study Instance UID	(0020,000D)	U	universal (Null)		no
Study ID	(0020,0010)	R	universal (Null)		no
Study Date	(0008,0020)	R	universal (Null)	enter value	yes
Study Time	(0008,0030)	R	universal (Null)	-	yes
Accession Number	(0008,0050)	R	universal (Null)	enter value	yes
Study Description	(0008,1030)	O	universal (Null)		yes
Referring Physician's Name	(0008,0090)	O	universal (Null)	enter value	no
Name of Physician Reading Study	(0008,1060)	O	universal (Null)		no
Modalities in Study	(0008,0061)	O	universal (Null)	enter value	no
Storage Media File-Set ID	(0008,0130)	O	universal (Null)		no
Retrieve AE Title	(0008,0054)	O	universal (Null)		no
Number of Study related Series	(0020,1206)	O	universal (Null)		no
Number of Study related Instances	(0020,1208)	O	universal (Null)		no
Series Level					
Series Instance UID	(0020,000E)	U	universal (Null)		no
Series Number	(0020,0011)	R	universal (Null)		yes
Modality	(0008,0060)	R	universal (Null)		yes
Series Description	(0008,103E)	O	universal (Null)		no
Body Part Examined	(0018,0015)	O	universal (Null)		no
Performing Physician	(0008,1050)	O	universal (Null)		no
Storage Media File-Set ID	(0008,0130)	O	universal (Null)		no
Retrieve AE Title	(0008,0054)	O	universal (Null)		no
Protocol Name	(0018,1030)	O	universal (Null)		yes
Perf. Procedure Step Start Date	(0040,0244)	O	universal (Null)		no
Perf. Procedure Step Start Time	(0040,0245)	O	universal (Null)		no
Requested Attribute Sequence	(0040,0275)	O	universal (Null)		no
> Requested Procedure ID	(0040,1001)	O	universal (Null)		no
> Scheduled Procedure ID	(0040,0009)	O	universal (Null)		no
Number of Series related Instances	(0020,1209)	O	universal (Null)		yes
Image Level					
SOP Instance UID	(0008,0018)	U	single value		no
Image Number	(0020,0013)	R	universal (Null)		no
Storage Media File-Set ID	(0008,0130)	O	universal (Null)		no
Retrieve AE Title	(0008,0054)	O	universal (Null)		no
Instance Date	(0008,0023)	O	universal (Null)		no
Instance Time	(0008,0033)	O	universal (Null)		no
Number of Frames	(0028,0008)	O	universal (Null)		no

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
Content Date	(0008,0023)	O	single value, range matching, universal		no
Content Time	(0008,0033)	O	single value, range matching, universal		no
Referenced Request Sequence	(0040,A370)	O	sequence matching		no
>Accession Number	0008,0050)	O	single value, universal		no
>Requested Procedure ID	(0040,1000)	O	single value, universal		no
Concept Name Code Sequence	(0040,A043)	O	sequence matching		no
>Code Value	(0008,0100)	O	single value, universal, wildcard		no
>Coding Scheme Designator	(0008,0102)	O	single value, universal, wildcard		no
>Coding Scheme Version	(0008,0103)	O	single value, universal, wildcard		no
>Code Meaning	(0008,0104)	O	single value, universal, wildcard		no
Template Identifier	(0040,DB00)	O	single value, universal, wildcard		no
Completion Flag	(0040,A491)	O	single value, universal, wildcard		no
Verification Flag	(0040,A493)	O	single value, universal, wildcard		no
Verifying Observer Sequence	(0040,A073)	O	sequence matching		no
>Verifying Organization	(0040,A027)	O	single value, universal, wildcard		no
>Verifying DateTime	(0040,A030)	O	single value, range matching, universal		no
>Verifying Observer Name	(0040,A075)	O	single value, universal, wildcard		no
>Verifying Observer Identification Code Sequence	(0040,A088)	O	sequence matching		no

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
>>Code Value	(0008,0100)	O	single value, universal, wildcard		no
>>Coding Scheme Designator	(0008,0102)	O	single value, universal, wildcard		no
>>Coding Scheme Version	(0008,0103)	O	single value, universal, wildcard		no
>>Code Meaning	(0008,0104)	O	single value, universal, wildcard		no

Note:
(a) A '*" is always appended to the user-supplied string

8.2 Data Dictionary of private Attributes

The Juniper system creates various private tags that contain proprietary information. These private tags may or may not be present on any given object type depending on the system state. The below table contains the Private Creator of private tag ranges that can be created by the system. Specific tags are listed here for reference purpose if the value shall be known externally.

Table 8-9:
US Sigle-frame Image IOD – Private Attributes

Module	Attribute	Tag	Notes
Private Attributes	(a)Private Creator	(0011,0010)	Reserves tags 0011,1000 through 0011,10FF for use as private tags.
	(a)Siemens Medical Solutions Model Name	(0011,1010)	Always set to "<Product Name>".
	(a)PIMS Software Version	(0011,1011)	Set to version of PIMS software installed.
	(a)Private Data	(0011,1020)	For internal Juniper use only.
	(a)Private Data	(0011,1021)	For internal Juniper use only.
	(a)Private Creator	(0013,0010)	Reserves tags 0013, 1000 through 0013, 10FF for use as private tags.
	(a)Siemens Medical Solutions Model Name	(0013,1010)	Always set to "<Product Name>".
	(a)PIMS Software Version	(0013,1011)	Set to version of PIMS software installed.
	(a)Private Data	(0013,1020)	For internal Juniper use only.
	(a)Private Creator	(0015,0010)	This group is populated only if data is available. Reserves tags 0015, 1000 through 0015, 10FF for use as private tags.

Module	Attribute	Tag	Notes
	[a]Siemens Medical Solutions Model Name	(0015,1010)	Always set to "<Product Name>".
	[a]PIMS Software Version	(0015,1011)	Set to version of PIMS software installed.
	[a]Private Data	(0015,1020)	For internal Juniper use only.
	[a]Private Creator	(0017,0010)	This group is populated only if data is available. Reserves tags 0017, 1000 through 0017, 10FF for use as private tags.
	[a]Siemens Medical Solutions Model Name	(0017,1010)	Always set to "<Product Name>".
	[a]PIMS Software Version	(0017,1011)	Set to version of PIMS software installed.
	[a]Private Data	(0017,1020)	For internal Juniper use only.
	Private Creator	(0019,0010)	Reserves tags 0019, 1000 through 0019, 10FF for use as private tags.
	Import Structured Reports	(0019,1020)	Set to "O" or "C" or "CO" if Obstetric or cardiac SR options was purchased and SR generation was configured. Otherwise set to "No". Instructs SCP that it should attempt to import measurements from SR.

[a] The Attribute is only provided if the image is written to media.

Table 8-10:
US Multi-frame Image IOD – Private Attributes

Module	Attribute	Tag	Notes
Private Attributes	[b]Private Creator	(0011,0010)	Reserves tags 0011, 1000 through 0011, 10FF for use as private tags.
	[b]Siemens Medical Solutions Model Name	(0011,1010)	Always set to "<Product Name>".
	[b]PIMS Software Version	(0011,1011)	Set to version of PIMS software installed.
	[b]Private Data	(0011,1020)	For internal Juniper use only.
Private Attributes	[b]Private Data	(0011,1021)	For internal Juniper use only.
	[b]Private Creator	(0013,0010)	Reserves tags 0013, 1000 through 0013, 10FF for use as private tags.
	[b]Siemens Medical Solutions Model Name	(0013,1010)	Always set to "<Product Name>".
	[b]PIMS Software Version	(0013,1011)	Set to version of PIMS software installed.
	[b]Private Data	(0013,1020)	For internal Juniper use only.

Module	Attribute	Tag	Notes
	[b]Private Creator	(0015,0010)	This group is populated only if data is available. Reserves tags 0015, 1000 through 0015,10FF for use as private tags.
	[b]Siemens Medical Solutions Model Name	(0015,1010)	Always set to "<Product Name>".
	[b]PIMS Software Version	(0015,1011)	Set to version of PIMS software installed.
	[b]Private Data	(0015,1020)	For internal Juniper use only.
	[b]Private Creator	(0017,0010)	This group is populated only if data is available. Reserves tags 0017, 1000 through 0017,10FF for use as private tags.
	[b]Siemens Medical Solutions Model Name	(0017,1010)	Always set to "<Product Name>".
	[b]PIMS Software Version	(0017,1011)	Set to version of PIMS software installed.
	[b]Private Data	(0017,1020)	For internal Juniper use only.
	Private Creator	(0019,0010)	Reserves tags 0019, 1000 through 0019, 10FF for use as private tags.
	Import Structured Reports	(0019,1020)	Set to "O" or "C" or "CO" if SR options were purchased and SR generation was configured. Otherwise set to "No". Instructs SCP that it should attempt to import measurements from SR.
	[a]B-mode Tint Index(used for routing the image to B&W or Color printer)	(0019,102D)	
	Private Creator	(7FDF,0010)	Reserved tags 7FDF,1000 through 7FDF,FE00 for use as private tags
	Private Creator	(7FDF,0011)	
	Microseconds in unit timestamp	(7FDF,1083)	Set to 20 microsecond
	Acoustic Frame Timestamp	(7FDF,1085)	Time corresponding to the end of ultrasound data collection at the end of each acoustic frame.
	[a]Private Creator	(0119,0010)	Set to "SIEMENS Ultrasound Juniper"
	[a]Stage Timer Time	(0119,1011)	

[a] The Attribute is provided for Stress Echo Images, the waveform sequence attribute is provided for single layout images with physio stream, too.

[b] The Attribute is only provided if the image is written to media.

Table 8-11: 3D Bookmark Data

Module	Attribute	Tag	Notes
Private Attributes	Private Creator	(0039,0010)	SIEMENS MED SMS USG Antares 3D VOLUME
	Release Version	(0039,1000)	3.0.3
	VolumeRawDataType	(0039,1004)	Data Type (Cartesian/Scan-Converted/PreScanConverted Format
	ScanType	(0039,1005)	
	ZlateralMin	(0039,1006)	Minimum span along the depth (wobble min.)
	ZlateralSpan	(0039,1007)	Span along the depth (wobble span)
	ZRadiusOfCurvature	(0039,1008)	Radius of curvature, in (wobble)
	WobbleCorrection	(0039,1009)	Wobbling shear correction factor (0.0 to 1.0)
	ScaleAlongWidth	(0039,1010)	Width scaling mm/pixel
	ScaleAlongHeight	(0039,1011)	Height scaling mm/pixel
	ScaleAlongDepth	(0039,1012)	Depth scaling mm/pixel
	BufferSize	(0039,1013)	
	AcquisitionRate	(0039,1014)	Time required to acquire one volume
	DepthMinCm	(0039,1015)	The min/start depth for the BImage
	IsLeftRightFlippedEn	(0039,1016)	Whether the acquired images were Left/Right flipped
	IsUpDownFlippedEn	(0039,1017)	Whether the acquired images were up/down flipped
	IsVolumeGeomAccurate	(0039,1018)	Is the volume passed is geometrically accurate (In order to display ruler)
	BByteMaskOffset	(0039,1019)	Bytemasks is the offset fro Mask data which is used for space leaping optimization in renderer
	BByteMaskSize	(0039,1020)	Size of the byte mask data
	DepthMaxCm	(0039,1021)	The max/end depth for the BImage
	AcqPlaneRotationDeg	(0039,1022)	Angle by which the volume is to be rotated around, normal to the Aquisition plane (Z axis) (in degrees)
	BeamAxialSpan	(0039,1023)	beam span, in mm
	BeamLateralMin	(0039,1024)	Min lateral angle
	BeamLateralSpan	(0039,1025)	Angular span
	BeamAxialMin	(0039,1026)	Axial min or radius of curvature in 2d
	NumDisplaySamples	(0039,1027)	Number of actual samples along each beam
	DVolumeWidth	(0039,1028)	Volume Width of the Power/Doppler Volume
	DVolumeDepth	(0039,1029)	Volume Depth of the Power/Doppler Volume
	DVolumeHeight	(0039,1030)	Volume Height of the Power/Doppler Volume
	DVolumePosX	(0039,1031)	

Module	Attribute	Tag	Notes
Private Attributes	DVolumePosY	(0039,1032)	
	DVolumePosZ	(0039,1033	
	DBeamAxialMin	(0039,1034)	Axial min or radius of curvature in 2d for Power/Doppler
	DBeamAxialSpan	(0039,1035)	
	DBeamLateralMin	(0039,1036)	Min lateral angle for Power/Doppler
	DBeamLateralSpan	(0039,1037)	Angular span from Power/Doppler
	NumOfVolumesInSequence	(0039,1038)	Number Of Volumes In Sequence
	DByteMaskOffset	(0039,1039)	Bytemasks is the offset for the mask data which is used for space leaping optimization in renderer when in Power/Doppler
	DByteMaskSize	(0039,1040)	Size of the byte mask data when in Power/Doppler
	PrivateCreatorVersionOfBookmark	(0039,1050)	3.6.0
	BCutPlaneEnable	(0039,1051)	Cut-plane volume rendering for B data
	BMprColorMapIndex	(0039,1052)	Index of the tint colormap for MPR B data
	BMprDynamicRangeDb	(0039,1053)	dB value of dynamic range curve for MPR B data
	BMprGrayMapIndex	(0039,1054)	Index of the image enhancement LUT for the MPR B data
	BVolumeRenderMode	(0039,1055)	Volume rendering mode for B data
	BVrBrightness	(0039,1056)	Brightness value for the volume rendered B data
	BVrContrast	(0039,1057)	Contrast value for the volume rendered B data
	BVrColorMapIndex	(0039,1058)	Index of the tint colormap for the volume rendered B data
	BVrDynamicRangeDb	(0039,1059)	dB value of dynamic range curve for the volume rendered B data
	BVrGrayMapIndex	(0039,105a)	Index of the image enhancement LUT for the volume rendered B data
	BVrOpacity	(0039,105b)	Opacity percentage of the opacity curve used for the volume rendered B data
	BVrThresholdHigh	(0039,105c)	High threshold of the opacity curve used for the volume rendered B data
	BVrThresholdLow	(0039,105d)	Low threshold of the opacity curve used for the volume rendered B data
	BPreProcessFilterMix	(0039,105e)	Mix percentage used for mixing filtered data for the volume rendered B data
	CCutPlaneEnable	(0039,105f)	Cut-plane volume rendering for B data
	CFrontClipMode	(0039,1060)	Flag indicating whether Niche and Parallel Cut edit operation will clip power data.
	CMprColorMapIndex	(0039,1061)	Index of the tint colormap for MPR power data
	CMprColorFlowPriorityIndex	(0039,1062)	Threshold representing amount of power data cut from the MPR power data

Module	Attribute	Tag	Notes
Private Attributes	CVolumeRenderMode	(0039,1063)	Volume rendering mode for power data
	CVrColorMapIndex	(0039,1064)	Index of the tint colormap for the volume rendered power data
	CVrColorFlowPriorityIndex	(0039,1065)	Threshold representing amount of power data cut from the volume rendered power data
	CVrOpacity	(0039,1066)	Opacity percentage of the opacity curve used for the volume rendered power data
	CVrThresholdHigh	(0039,1067)	High threshold of the opacity curve used for the volume rendered power data
	CVrThresholdLow	(0039,1068)	Low threshold of the opacity curve used for the volume rendered power data
	VoiMode	(0039,1069)	Flag indicating whether VOI is on or off
	VoiRotationOffsetDeg	(0039,106a)	Fixed rotation applied to VOI
	VoiSizeRatioX	(0039,106b)	Width of VOI in relative units
	VoiSizeRatioY	(0039,106c)	Length of VOI in relative units
	VoiSizeRatioZ	(0039,106d)	Height of VOI in relative units
	VoiSyncPlane	(0039,106e)	Plane synced to the VOI
	VoiViewMode	(0039,106f)	Type indicating whether the rendering is synced to the front or back of the VOI
	VrOrientationA	(0039,1070)	Matrix representing the oritentation of the volume rendered image
	MprOrientationA	(0039,1071)	Matrix representing the oritentation of the MPRs
	VrOffsetVector	(0039,1072	Vector representing the vertical and horizontal offset of the volume on the display
	BlendingRatio	(0039,1073)	Value indicating the amount of blending between B and power data when blend is on
	FusionBlendMode	(0039,1074)	Mode for fusing in one display power and B volume rendered data
	QualityFactor	(0039,1075)	Factor determining the volume rendering quality
	RendererType	(0039,1076)	Type of the rendererer engine used
	SliceMode	(0039,1077)	Mode for displaying the textured map MPRs in the 3D quadrant
	ActiveQuad	(0039,1078)	Value indicating which quadrant in the display is active
	ScreenMode	(0039,1079)	Value indicating which screen layout is applied
	CutPlaneSide	(0039,107a)	Value indicating which half space of the cut-plane is used for volume rendering
	WireframeMode	(0039,107b)	Flag indicating whether wireframe around rendered data is on or off
	CrossmarkMode	(0039,107c)	Flag indicating whether crossmark is shown on the display

Module	Attribute	Tag	Notes
Private Attributes	MprDisplayType	(0039,107d)	Value indicating whether B or power or B+power data are displayed in the MPRs
	VolumeDisplayType	(0039,107e)	Value indicating whether B or power or B+power data are displayed in the volume rendered image
	LastReset	(0039,107f)	Value indicating the last reset
	LastNonFullScreenMode	(0039,1080)	Value indicating the last active quadrant before entering full screen
	MprToolIndex	(0039,1081)	Index indicating which tool (rotation, pan, resizing) is used on the MPRs
	VoiToolIndex	(0039,1082)	Index indicating which tool (rotation, pan, resizing) is used on the volume rendered image when VOI is on
	ToolLoopMode	(0039,1083)	Value indicating in which loop
	VolumeArbMode	(0039,1084)	Index indicating whether volume or MPR rotation is active on the 3D display window
	MprZoomEn	(0039,1085)	Flag indicating whether zoom is enabled in the MPR
	IsVolumeZoomEn	(0039,1086)	Flag indicating whether zoom is enabled in the rendered volume
	ZoomLevelMpr	(0039,1087)	Value indicating the amount of zoom (in relative units) applied in the MPR
	ZoomLevelVolume	(0039,1088)	Value indicating the amount of zoom (in relative units) applied in the rendered volume
	IsAutoRotateEn	(0039,1089)	Flag indicating whether animation is enabled
	AutoRotateAxis	(0039,108a)	Value indicating the axis of rotation for the animation
	AutoRotateRangeIndex	(0039,108b)	Value indicating the total angle range for the animation
	AutoRotateSpeedIndex	(0039,108c)	Value indicating the speed (in relative units) for the animation
	CVrBrightness	(0039,108d)	Brightness value for the volume rendered power data
	CFlowStateIndex	(0039,108e)	Index for flow state of power data (low, medium, high)
	BSubmodeIndex	(0039,108f)	Index for indicating the B submode (THI, B, etc...)
	CSubmodeIndex	(0039,1090)	Index for indicating the C submode
	DICOMAttrNameCutPlane	(0039,1091	Quadrant used to cut volume when colume cut enabled
	BookmarkChunkId	(0039,1092)	Index of Bookmark
	SequenceMinChunkId	(0039,1093)	Begin range index of volume sequence
	SequenceMaxChunkId	(0039,1094)	End range index of volume sequence
	VolumeRateHz	(0039,1095)	Rate at which volumes are rendered

Module	Attribute	Tag	Notes
Private Attributes	VoiPositionOffsetX	(0039,109a)	Offset in the x dimension between the center of the VOI and center of volume in relative units
	VoiPositionOffsetY	(0039,109b)	Offset in the y dimension between the center of the VOI and center of volume in relative units
	VoiPositionOffsetZ	(0039,109c)	Offset in the z dimension between the center of the VOI and center of volume in relative units
	VrToolIndex	(0039,109d)	Index indicating which tool (rotation, pan, resizing) is used on the volume rendered image
	ShadingPercent	(0039,109e)	Value indicating the amount of shading in the volume rendered image
	VolumeType	(0039,109f)	Value indicating the type of volume (B or B and Power)
	VolumeRateHz	(0039,1095)	Rate at which volumes are rendered
	DICOMAttrNameVrQuadDisplayType	(0039,10a0)	The type of display to show in the volume quadrant
	DICOMAttrNameMprCenterLocation	(0039,10a1)	Offset location of slice centerpoint with respect to quadrant center
	DICOMAttrNameSliceMode	(0039,1077)	Value indicating that system in multislice mode
	DICOMAttrNameSliceRangeType	(0039,10e0)	Value indicating type of slice mode (horizontal/vertical)
	DICOMAttrNameSliceMPRPlane	(0039,10e1)	Value indicating selected MPR for slice mode (Acquisition/Elevation/Coronal)
	DICOMAttrNameSliceLayout	(0039,10e2)	Selected layout for slice mode (2x2, 3x3, 4x4, 6x6)
	DICOMAttrNameSliceSpacing	(0039,10e3)	Value indicates the spacing between MPR slices
	DICOMAttrNameVoiPivotX	(0039,10e6)	Curved TOP VOI pivot x
	DICOMAttrNameVoiPivotY	(0039,10e7)	Curved TOP VOI pivot y
	DICOMAttrNameVoiPivotZ	(0039,10e8)	Curved TOP VOI pivot z
	DICOMAttrNameCTopVoiQuad	(0039,10e9)	Curved TOP VOI Quad

9 APPENDICES

9.1 Appendix A: OB-GYN Structured Report

This appendix lists the DICOM Structured Report (SR) mappings used in the OB-GYN Structured Reports of the Juniper system SR files.

The mappings follow the DICOM SR Template TID 5000: OB-GYN Ultrasound Procedure Report, as described in PS 3.16-2023c of the DICOM Standard, and are organized in a manner similar to TID 5000. All private code values use the Coding Scheme Designator “99SIEMENS”.

9.1.1 OB-GYN Structured Report - Patient Characteristics

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Units
Patient Characteristics	Container: Patient Characteristics (DCM, 121118)		
Height	Patient Height (LN, 8302-2)		m
Weight	Patient Weight (LN, 29463-7)		kg
Aborta	Aborta (LN, 11612-9)		1 (no units)
Ectopics	Ectopic Pregnancies (LN, 33065-4)		1 (no units)
Gravida	Gravida (LN, 11996-6)		1 (no units)
Para	Para (LN, 11977-6)		1 (no units)

9.1.2 OB-GYN Structured Report - Specification

For comprehensive details regarding the OB-GYN Structured Report supported by Juniper system, kindly refer to the document “Juniper 3.0 DICOM SR Specification.xlsx” available on the Global website.

9.2 Appendix B: Vascular Structured Report

This appendix lists the DICOM Structured Report (SR) mappings used in the Vascular Structured Reports of the Juniper system SR files.

The mappings follow the DICOM SR Template TID 5100: Vascular Ultrasound Report, as described in PS 3.16-2014 of the DICOM Standard, and are organized in a manner similar to TID 5100. All private code values use the Coding Scheme Designator “99SIEMENS”.

9.2.1 Vascular Structured Report - Patient Characteristics

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Units
Patient Characteristics	Container: Patient Characteristics (DCM, 121118)		
Age	Subject Age (DCM, 121033)		
BP	Diastolic Blood Pressure (SRT, F-008ED)		mm[Hg]
BP	Systolic Blood Pressure (SRT, F-008EC)		mm[Hg]
Sex	Subject Sex (DCM, 121032)		

9.2.2 Vascular Structured Report - Specification

For comprehensive details regarding the Vascular Structured Report supported by Juniper system, kindly refer to the document “Juniper 3.0 DICOM SR Specification.xlsx” available on the Global website.

9.3 Appendix C: Echocardiography Structured Report

This appendix lists the DICOM Structured Report (SR) mappings used in the Cardiac Structured Reports of the Juniper system SR files.

The mappings follow the DICOM SR Template TID 5200: Echocardiography Procedure Report, as described in PS 3.16-2014 of the DICOM Standard, and are organized in a manner similar to TID 5200. The Code Values of the units are listed in the mapping tables. All private code values use the Coding Scheme Designator “99SIEMENS”.

9.3.1 Cardiac Structured Report - Patient Characteristics

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Units
Patient Characteristics	Container: Patient Characteristics (DCM, 121118)		
BP	Diastolic blood pressure (SRT, F-008ED)		mm[Hg]
BP	Systolic blood pressure (SRT, F-008EC)		mm[Hg]
BSA	Body Surface Area (LN, 8277-6)	[Based on BSA (DuBois) = 0.007184*WT^0.425*HT^0.725]	m2

9.3.2 Cardiac Structured Report - Specification

For comprehensive details regarding the Cardiac Structured Report supported by Juniper system, kindly refer to the document “Juniper 3.0 DICOM SR Specification.xlsx” available on the Global website.

9.4 Appendix D: Fetal Echo Structured Report

This appendix lists the DICOM Structured Report (SR) mappings used in the Fetal Echo Structured Reports of the Juniper system SR files.
The mappings follow the DICOM SR Template TID 5220: Pediatric, Fetal and Congenital Cardiac Ultrasound Reports, as described in PS 3.16-2014 of the DICOM Standard, and are organized in a manner similar to TID 5220. All private code values use the Coding Scheme Designator “99SIEMENS”.

9.4.1 Fetal Echo Structured Report - Patient Characteristics

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Units
Patient Characteristics	Container: Patient Characteristics (DCM, 121118)		
Age	Subject Age (DCM, 121033)		
BP	Diastolic Blood Pressure (SRT, F-008ED)		mm[Hg]
BP	Systolic Blood Pressure (SRT, F-008EC)		mm[Hg]
BSA	Body Surface Area (LN, 8277-6)	[Based on BSA (DuBois) = 0.007184*WT^0.425*HT^0.725]	m2
Height	Patient Height (LN, 8302-2)		m
Weight	Patient Weight (LN, 29463-7)		kg

9.4.2 Fetal Echo Structured Report - Specification

For comprehensive details regarding the Fetal Echo Structured Report supported by Juniper system, kindly refer to the document “Juniper 3.0 DICOM SR Specification.xlsx” available on the Global website.