# DICOM Conformance Statement

Pinnacle$^3$ Radiotherapy Treatment Planning System R10.0
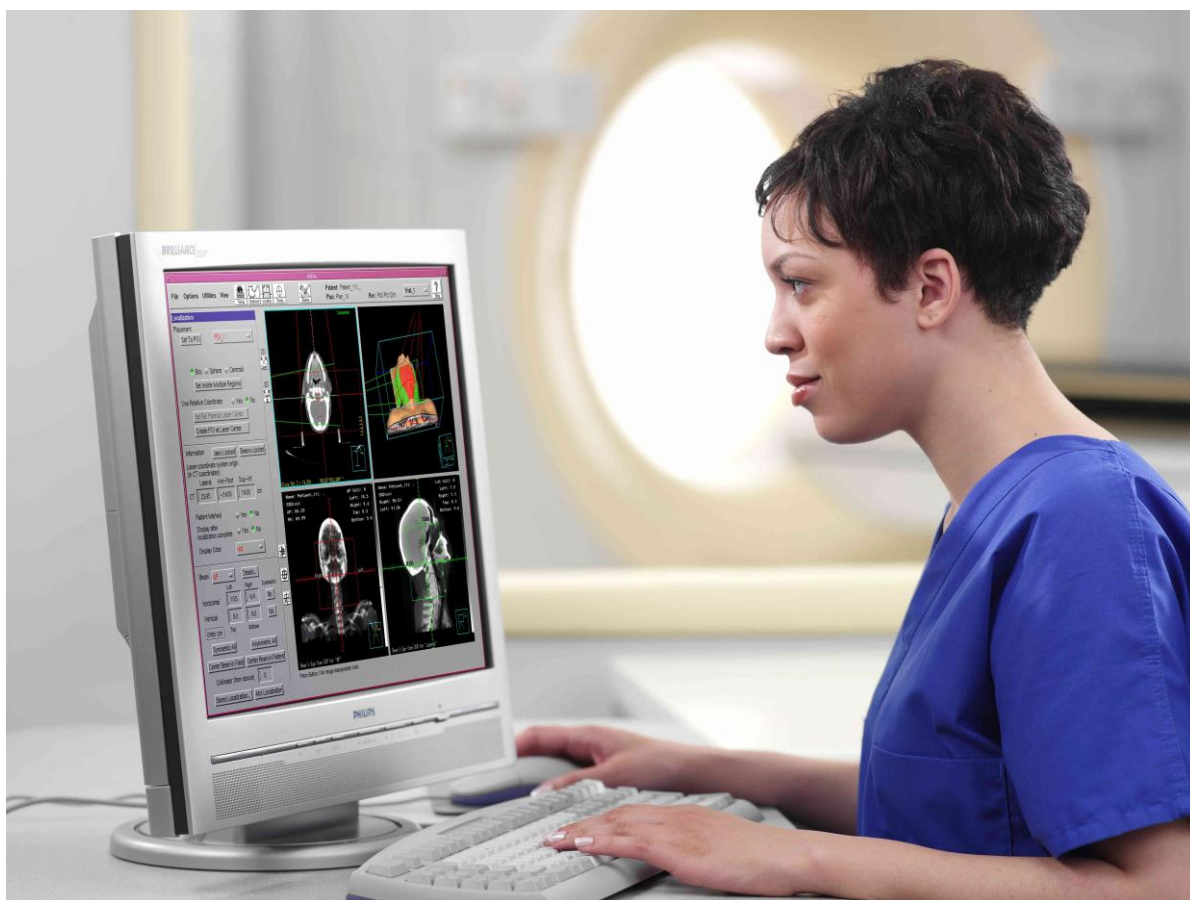
Document Number: DHF158251

**PHILIPS**

# 1. DICOM Conformance Statement Overview

This conformance statement refers to the "Pinnacle[3] Radiation Treatment Planning System" which is used in conjunction with the record and verify (R&V) systems. This version of DICOM Conformance Statement applies to Philips Pinnacle workstation, version 10.0.

Pinnacle[3] sets the standard for 3D treatment planning and visualization systems. As an imaging workstation, Pinnacle[3] 's sophisticated 2D and 3D imaging options, multi-modality image fusion, and treatment simulation tools allow users to accurately localize and delineate target and critical structures. Fully integrated photon, electron, proton, stereotactic radio surgery, and brachytherapy treatment planning allow users to perform all of their treatment planning from a single platform. Finally, accurate 3D dose calculation algorithms and plan evaluation tools facilitate the applications of new treatment techniques.

It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

This application was developed using the MergeCOM-3 Advanced Software Tool Kit for DICOM Services supplied by Merge Technologies Incorporated, Milwaukee, Wisconsin USA.

The following Table presents an overview of all network services and the applicable SOP Classes as provided by the Pinnacle[3].

**Table 1: Network Services**

| SOP Class | | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|---|
| **Name** | **UID** | | |
| **Other** | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| **Print Management** | | | |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | Yes | No |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Yes | No |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No |
| **Transfer** | | | |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 | Yes | Yes |
| CT Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 | Yes | Yes |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 | Yes | Yes |
| MR Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 | Yes | Yes |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | Yes |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 | Yes | Yes |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 | Yes | Yes |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | Yes | Yes |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | Yes | No |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | No | Yes |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | Yes |
| Secondary Capture Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | Yes | Yes |
| Computed Radiography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.1 | Yes | No |

# 2. Table of Contents

# 3. Introduction

The introduction specifies product and relevant disclaimers as well as any general information that the vendor feels is appropriate.

## 3.1.　Revision History

The revision history provides dates and differences of the different releases.

**Table 2: Revision History**

| Document Version | Date of Issue | Status | Description |
|---|---|---|---|
| 00 | 22-August-2013 | Authorized | Final version |

## 3.2.　Audience

This Conformance Statement is intended for:
- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

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

## 3.3.　Remarks

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

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

- **Interoperability**
  Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.
  It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**
  Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery. The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

## 3.4.　Definitions, Terms and Abbreviations

**Table 3: Definitions, Terms and Abbreviations**

| Abbreviation/Term | Explanation |
|---|---|
| AE | Application Entity |
| CD | Compact Disc |

| Abbreviation/Term | Explanation |
|---|---|
| CD-R | CD-Recordable |
| CD-M | CD-Medical |
| CR | Computed Radiography |
| CT | Computed Tomography |
| DICOM | Digital Imaging and Communications in Medicine |
| EBE | Explicit VR Big Endian |
| ELE | DICOM Explicit VR Little Endian |
| FSC | File-set Creator |
| FSR | File-set Reader |
| FSU | File-set Updater |
| ILE | DICOM Implicit VR Little Endian |
| IOD | Information Object Definition |
| MPPS | Modality Performed Procedure Step |
| MR | Magnetic Resonance |
| NEMA | National Electrical Manufacturers Association |
| NM | Nuclear Medicine |
| PDU | Protocol Data Unit |
| RIS | Radiology Information System |
| RT | Radiotherapy |
| RWA | Real-World Activity |
| SC | Secondary Capture |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | Service Object Pair |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |

## 3.5.  References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 18 (NEMA PS 3.1- PS 3.18),
National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17th Street, Suite 1752 Rosslyn, Virginia.
22209, United States of America
Internet: http://medical.nema.org/
Note that at any point in time the official standard consists of the most recent yearly edition of the base standard (currently 2011) plus all the supplements and correction items that have been approved as Final Text.

# 4. Networking

This section contains the networking related services (vs. the media related ones).

## 4.1.  Implementation model

The implementation model consists of three sections:
- The application data flow diagram, specifying the relationship between the Application Entities and the "external world" or Real-World Activities,
- A functional description of each Application Entity, and
- The sequencing constraints among them.

### 4.1.1.  Application Data Flow

The ADACRTP_SCP server application stores received DICOM message information within a standard UNIX directory. This directory is specified on the command line of the application launched at system boot. The messages may then be imported into the Pinnacle[3] database via the Launch Pad application's Import capability.

For DICOM RT messages, import is performed within the Pinnacle[3] application. The Plan or Structure Set information is added to the plan being edited.

ADACRTP_SCP is a daemon, started at system boot, which runs continuously. Launch Pad is a Pinnacle[3] application which utilizes an associated DICOM-to- Pinnacle[3] file format converter to import DICOM image data to the Pinnacle[3] database.

ADACRTP_SCU is the Pinnacle[3] application. (Note that the actual AE Title will be the name of the workstation, capitalized; the default name ADACRTP_SCU will only be used if the workstation name cannot be determined.) ADACRTP_SCU will answer Verification requests only if the application is running. Print and RT transmission requests are submitted as requested by the user. It can also send the received CT, MR, NM, and PET images back to the remote server via the DICOM Image Export feature of Launch Pad or CT images used as the primary dataset of the Pinnacle[3]plan via the DICOM Image Export feature of Pinnacle[3].

The Pinnacle[3] -related Implementation Model is shown in the following figure.
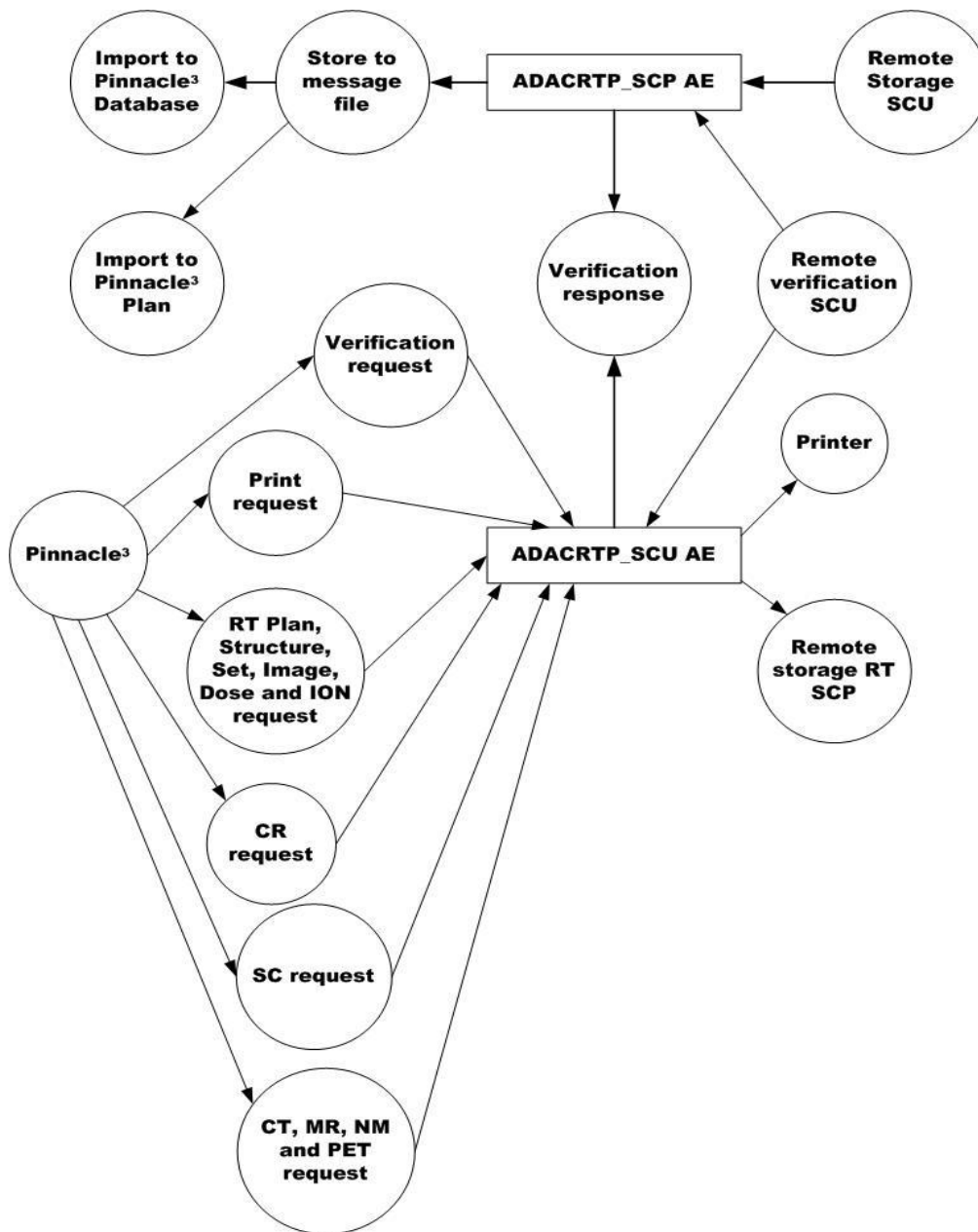
**Figure 1: Pinnacle Implementation Model**

As documented in PS 3.4, the arrows in the diagram have the following meanings:
An arrow pointing to the right indicates the local application entity initiates an association.
An arrow pointing to the left indicates the local application entity accepts an association.

## 4.1.2.   Functional Definition of AE's

This section contains a functional definition for each individual local Application Entity.

### 4.1.2.1.   Functional Definition of ADACRTP_SCP

The ADACRTP_SCP server application waits until it receives a C-STORE request from a remote SCU. Upon receipt it will save the received data to a directory with a unique file name. The server is capable of handling multiple associations.

ADACRTP_SCP is a daemon, started at system boot, which runs continuously.

When invoked, the DICOM-to- Pinnacle[3] file format converter will scan the directory of files for image messages written by ADACRTP_SCP to determine if individual files may be associated. The association criterion is a matching Series Instance UID. If files belong to the same series, they will be imported to Pinnacle[3] as a single data set.

Launch Pad is a Pinnacle[3] application that utilizes the DICOM-to- Pinnacle[3] file format converter to import DICOM image data to the Pinnacle[3] database.

### 4.1.2.2.   Functional Definition of ADACRTP_SCU

Import of RT Plan and RT Structure Set IODs is accomplished within Pinnacle[3]. The user creates a plan, edits it, and invokes the import operation. The message files will be scanned for RT messages and the selections presented to the user. On import the plan will be populated with the information as described in the selected RT Plan and/or RT Structure Set messages.

The Pinnacle[3] application, using the workstation's name as the AE Title or failing that, ADACRTP_SCU, communicates with the remote application using the DICOM protocol. At the user's request an association is established with the AE defined in the printer configuration just prior to sending a print request to that AE. After completion of the transmission the association is closed.

The Pinnacle[3] application also communicates with a remote SCP to transfer RT Plan, RT Structure Set, RT Dose, and RT Image IODs. At the user's request an association is established with an AE defined during installation. After completion of the transmission the association is closed. It is also capable of sending the CT, MR, NM and PET images back to the remote server, via the DICOM Image Export feature of Launch Pad or CT images used as the primary dataset of the Pinnacle[3] plan within the DICOM Image Export feature of Pinnacle[3].

The Pinnacle[3] application also communicates with a remote SCP to transfer computed radiography and secondary capture IODs. At the user's request an association is established with an AE defined during installation. After completion of the transmission the association is closed.

## 4.1.3.   Sequencing of Real World Activities

This section contains description of specific sequencing as well as potential constraints of Real-World Activities, including any applicable user interactions, as performed by the DICOM Server.
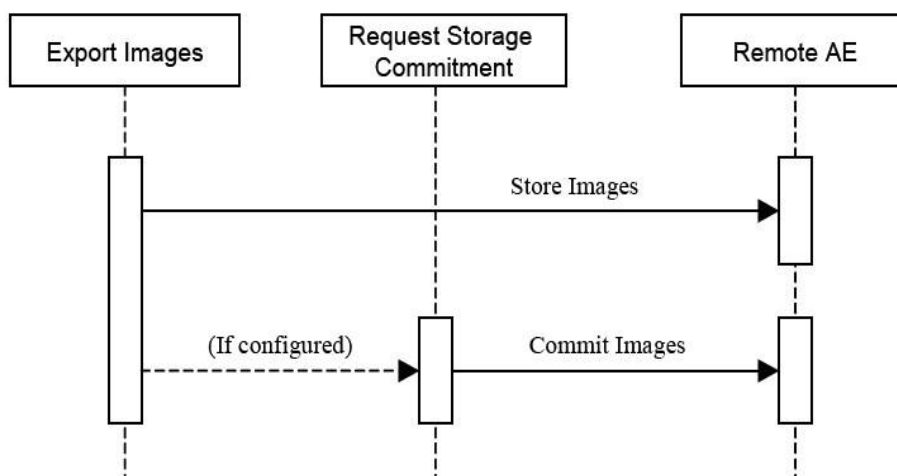


**Figure 2:  RWA Sequencing for Export Images**
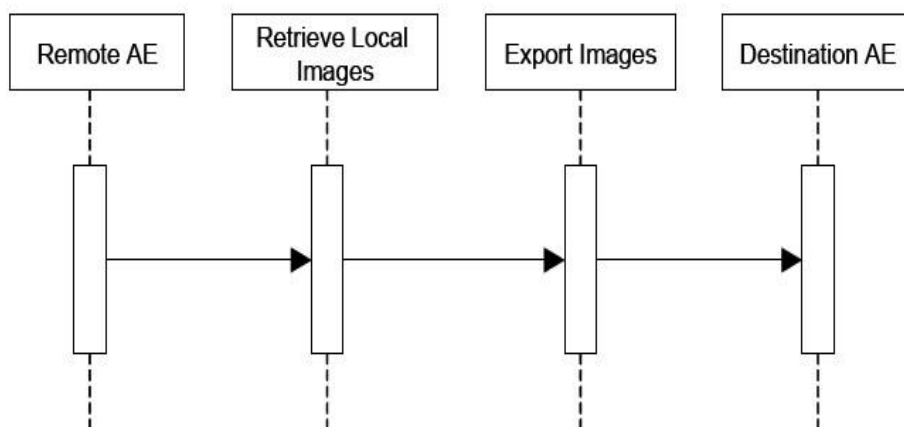
**Figure 3:  RWA Sequencing for Retrieve Local Images**

## 4.2. AE Specifications

The Network capabilities of the system consist of two DICOM Application Entities:

- An Imaging and RT Plan, RT Ion Plan and Structure Set Import Storage AE (ADACRTP_SCP)
- A Send Print, RT Plan, RT Ion Plan, RT Image, Dose, Structure Set, Computed Radiography, Secondary Capture, Spatial Registration, and Imaging AE (ADACRTP_SCU)

Throughout this document ADACRTP_SCU is used to specify the AE Title representing the Pinnacle³ application. In the field the presented AE Title will be the capitalized hostname of the machine sending the message.

### 4.2.1. ADACRTP_SCP

The ADACRTP_SCP Application Entity provides Standard Conformance to the DICOM SOP classes as an SCP specified in next table.

#### 4.2.1.1. SOP Classes

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

**Table 4: SOP Classes for ADACRTP_SCP**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 | No | Yes |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 | No | Yes |
| CT Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 | No | Yes |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 | No | Yes |
| MR Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 | No | Yes |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 | No | Yes |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 | No | Yes |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 | No | Yes |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | No | Yes |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | No | Yes |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | No | Yes |
| Secondary Capture Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | No | Yes |

**Notes:**
The SCP will accept Secondary Capture Image and RT Image, but Pinnacle does not support it and thus it cannot be imported.
The SCP will accept Ultrasound Image, but Pinnacle does not fully support it and thus it likely will not be importable.
Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

#### 4.2.1.2. Association Policies

Each AE specification contains a description of the general association establishment and acceptance policies of the AE.

##### 4.2.1.2.1. General

The ADACRTP_SCP AE and the ADACRTP_SCU AE always propose the following DICOM Application Context Name (ACN):
1.2.840.10008.3.1.1.1.

The maximum PDU length negotiation is included in all association establishment requests. For all services the maximum PDU size is 28672 bytes.

##### 4.2.1.2.2. Number of Associations

The number of simultaneous associations that will be accepted by ADACRTP_SCP is limited only by system resources. ADACRTP_SCP will spawn a new process to handle each connection request it receives. Therefore, ADACRTP_SCP can support multiple simultaneous connections, and there are no inherent limitations on the total number of simultaneous associations.

The ADACRTP_SCU application entity opens a single association for each request.

### 4.2.1.2.3.    Asynchronous Nature

DICOM asynchronous mode is not supported, meaning that only one transaction may be outstanding over an association at any given point in time.

### 4.2.1.2.4.    Implementation Identifying Information

The value supplied for Implementation Class UID and version name are documented here.

#### Table 5: DICOM Implementation Class and Version for ADACRTP_SCP

| | |
|---|---|
| Implementation Class UID | 2.16.840.1.113669.2.931128.10.0 |
| Implementation Version Name | ADAC_RTP_10 |

### 4.2.1.2.5.    Communication Failure Handling

The behavior of the AE during communication failure is summarized in next table.

#### Table 6: Communication Failure Behavior

| Exception | Behavior | Comment |
|---|---|---|
| ARTIM Timeout | The system stops the ARTIM timer and closes the transport connection. | Configurable, minimum value=1. |
| Association Timeout | A release request is sent in order to close the association. | Configurable, minimum value=1. |

### 4.2.1.3.    Association Initiation Policy

Not applicable.

#### 4.2.1.4.    Association Acceptance Policy

When ADACRTP_SCP accepts an association it will receive supported SOP Instances and store the messages to disk. There is neither limitation on who may connect to the SCP, nor on the number of simultaneous associations it will support.
When ADACRTP_SCP receives a verification request it responds with a success status.

Import of the data into Pinnacle[3] is a separate operation requested by the user. Upon import the attribute values contained in the message will be verified. Import may be performed from the standard directory, written by the SCP, or from CD that conforms to the media interchange format as described in PS3.10.

##### 4.2.1.4.1.    (Real-World) Activity – Verification as SCP

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

The ADACRTP_SCP accepts Associations from configured systems that wish to verify application level communication using the C-ECHO command.
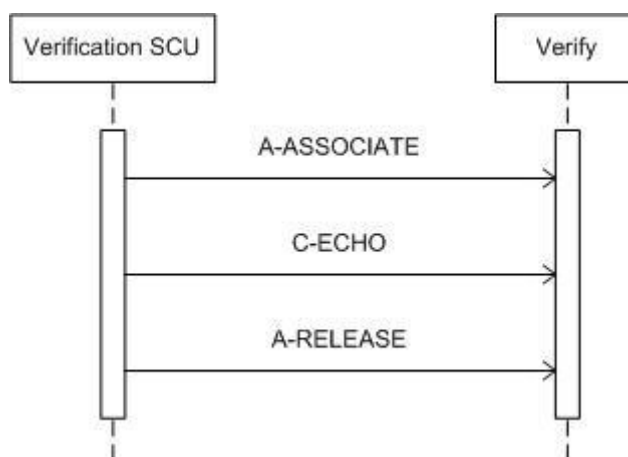


**Figure 4:  Data Flow Diagram – Verify**

###### 4.2.1.4.1.2.    Accepted Presentation Contexts

The presentation contexts are defined in the next table.

**Table 7: Acceptable Presentation Contexts for (Real-World) Activity – Verification as SCP**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

###### 4.2.1.4.1.3.    SOP Specific Conformance for Verification SOP Class

The ADACRTP_SCP server application responds to remote C-ECHO requests with success status.

###### 4.2.1.4.1.3.1.    Dataset Specific Conformance for Verification C-ECHO SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 8: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Confirmation | Confirm the verification request. |

#### 4.2.1.4.2.    (Real-World) Activity – Image Import

##### 4.2.1.4.2.1.    Description and Sequencing of Activities

The ADACRTP_SCP server application will automatically handle requests for image storage and store them on receipt of C-STORE requests. The file will be stored in the directory specified at startup of the daemon.

The timers used for the management of associations and DICOM services (i.e., C-STORE) are specified in the configuration files for the server.

The real world activity associated with the C-STORE operation is the storage of the image in the memory of the system upon which DICOM Server is running in order to make it available for immediate processing by applications. DICOM Server will issue a failure status if it is unable to store the image in the memory.
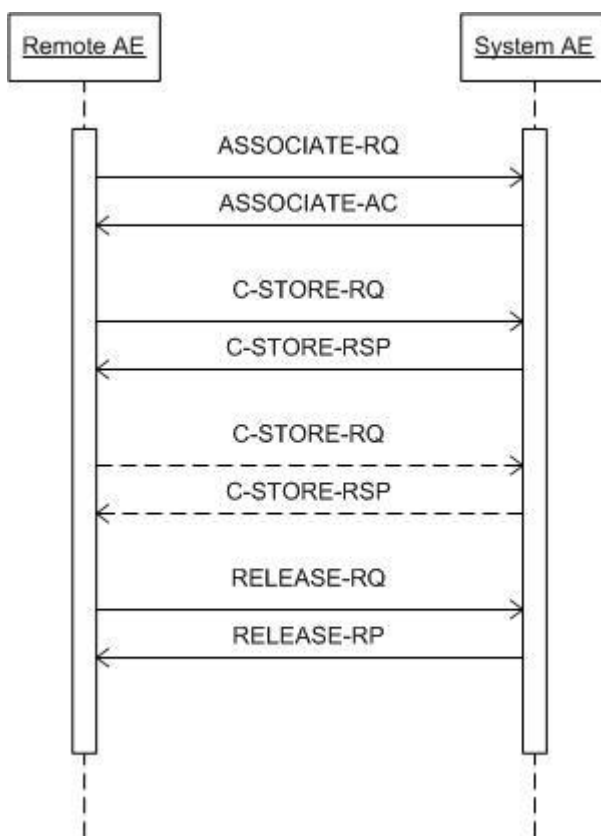
**Figure 5:  (Real World) Activity -  Import**

##### 4.2.1.4.2.2.    Accepted Presentation Contexts

Any of the presentation contexts in next table are acceptable for ADACRTP_SCP to receive images..

**Table 9: Acceptable Presentation Contexts for (Real-World) Activity – Import**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| CT Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| MR Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

**Note:** ILE and ELE is the default  Transfer Syntax. It is possible to configure our DICOM server to additionally handle EBE and IBE but it is not configured as such by default..

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

This section and sub-section includes the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

DICOM Server provides standard conformance to the DICOM V3.0 Storage Service Class as a SCP. DICOM Server conforms to the SOPs of the Storage Service Class at Level 2 (Full). In case of a successful C-STORE, the stored image may be accessed by the processing applications.

### 4.2.1.4.2.3.1.    Dataset Specific Conformance for C-STORE-RSP

ADACRTP_SCP conforms to the SOPs of the Image Storage Service Class at Level 0, meaning a subset of the attributes associated with the image will be stored. All others will be discarded.
Upon receipt of a C-STORE request by ADACRTP_SCP, the message is saved to a file in the directory specified to the process at startup. Upon saving the data to this file, a successful C-STORE-RSP is returned to the sender.
If insufficient resources exist to store the messages, a response indicating such will be transmitted and the association aborted. Images transferred prior to depleting the resources will be preserved. The image in the process of transfer upon depletion of resources will be removed.
Minimal interpretation of the transferred images is performed by the Image Storage SCP. Data consistency and orientation issues are addressed when the data is imported to Pinnacle[3].

Voxel sizing information is required for image data to be used within Pinnacle[3]. If the X, Y, or Z voxel dimensions are missing from the DICOM message, the user will be prompted for proper dimensions on import to Pinnacle[3].

Pinnacle[3] will not accept non-axial data sets for use as a primary data set.
On receipt of Nuclear Medicine data in a multi-image format, each frame of the multi-image is treated as a slice within a volume. The volume is spaced isotropically in the Z dimension.

The following table lists the actions that are performed when an exception occurs. The Service Name Status Responses that are returned by ADACRTP_SCP are given.

<div align="center">

**Table 10: Status Response**

</div>

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0x0000 | Successfully stored | Whenever the store operation succeeded. |
| Error | 0xA700 | Failed | Notification will be sent. Logging will be done and connection will be aborted. |

## 4.2.2. ADACRTP_SCU

### 4.2.2.1. SOP Classes

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

**Table 11: SOP Classes for ADACRTP_SCU**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | No |
| Computed Radiography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.1 | Yes | No |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 | Yes | No |
| CT Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 | Yes | No |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 | Yes | No |
| MR Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 | Yes | No |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | No |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 | Yes | No |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 | Yes | No |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | Yes | No |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | Yes | No |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | No |
| Secondary Capture Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | Yes | No |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No |
| >Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Yes | No |
| >Basic Color Image Box SOP Class | 1.2.840.10008.5.1.1.4.1 | Yes | No |
| >Printer SOP Class | 1.2.840.10008.5.1.1.16 | Yes | No |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Yes | No |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No |
| >Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Yes | No |
| >Basic Grayscale Image Box SOP Class | 1.2.840.10008.5.1.1.4 | Yes | No |
| >Printer SOP Class | 1.2.840.10008.5.1.1.16 | Yes | No |

**Note:** Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

### 4.2.2.2. Association Policies

Each AE specification contains a description of the general association establishment and acceptance policies of the AE.

### 4.2.2.2.1. General

The ADACRTP_SCU Network AE always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1. The maximum PDU length negotiation is included in all association establishment requests. The maximum PDU size is: 28 KB. Note that the actual local AE Title will be the name of the workstation, capitalized: the default name 'ADACRTP_SCU' will only be used if the workstation name cannot be determined.

**Table 12: DICOM Application Context**

| Description | Value |
|---|---|
| Application Context Name | 1.2.840.10008.3.1.1.1 |

#### 4.2.2.2.2. Number of Associations

The ADACRTP_SCU application entity opens a single association for each user requested transfer.

**Table 13: Number of associations as an Association Initiator for this AE**

| Description | Value |
|---|---|
| Maximum number of simultaneous associations | 1 |

#### 4.2.2.2.3. Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be outstanding over an association at any given point in time.

**Table 14: Asynchronous nature as an Association Initiator for this AE**

| Description | Value |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |

#### 4.2.2.2.4. Implementation Identifying Information

The value supplied for Implementation Class UID and version name are documented here.

**Table 15: DICOM Implementation Class and Version for ADACRTP_SCU**

| | |
|---|---|
| Implementation Class UID | 2.16.840.1.113669.2.931128.10.0 |
| Implementation Version Name | ADAC_RTP_10 |

#### 4.2.2.2.5. Communication Failure Handling

Not applicable.

#### 4.2.2.3. Association Initiation Policy

The Application Entity will respond to a received Association rejection as shown in the next table.

**Associated Real-World Activity:**
When transmitting RT IODs, ADACRTP_SCU initiates an association for RT Plan, RT Ion Plan, RT Image, RT Dose, RT Structure Set and Spatial Registration based on the information selected by the user. The association is closed after completion of the transfer. The configuration of the printer in Pinnacle[3] also includes the time-out value to wait for a reply message from the SCP. The default value is 30 seconds. If the time-out is exceeded, ADACRTP_SCU will abort the association.

**Associated Real-World Activity for Storage Operations:**
ADACRTP_SCU initiates associations on request from the user. An association is established with the specified application entity. ADACRTP_SCU sends a C_STORE request for each message to be sent.

**Table 16: Association Rejection response**

| Result | Source | Reason/Diagnosis | Explanation |
|---|---|---|---|
| 1 - rejected-permanent | 1 - DICOM UL service-user | 1 - no-reason-given | The connection is closed. |
| | | 2 - application-context-name-not supported | The connection is closed. |
| | | 3 - calling-AE-title-not-recognized | The connection is closed. |
| | | 7 - called-AE-title-not-recognized | The connection is closed. |
| | 2 - DICOM UL service-provider (ACSE related function) | 1 - no-reason-given | The connection is closed. |
| | | 2 - protocol-version-not-supported | The connection is closed. |
| | 3 - DICOM UL service-provider (Presentation | 1 - temporary-congestion | The connection is closed. |

| Result | Source | Reason/Diagnosis | Explanation |
|---|---|---|---|
|  | related function) | 2 - Local-limit-exceeded | The connection is closed. |
| 2 - rejected-transient | 1 - DICOM UL service-user | 1 - no-reason-given | The connection is closed. |
|  |  | 2 - application-context-name-not-supported | The connection is closed. |
|  |  | 3 - calling-AE-title-not-recognized | The connection is closed. |
|  |  | 7 - called-AE-title-not-recognized | The connection is closed. |
|  | 2 - DICOM UL service-provider (ACSE related function) | 1 - no-reason-given | The connection is closed. |
|  |  | 2 - protocol-version-not-supported | The connection is closed. |
|  | 3 - DICOM UL service-provider (Presentation related function) | 1 - temporary congestion | The connection is closed. |
|  |  | 2 - local-limit-exceeded | The connection is closed. |

The behavior of the AE on receiving an association abort is summarized in next table.

**Table 17: Association Abort Handling**

| Source | Reason/Diagnosis | behavior |
|---|---|---|
| 0 - DICOM UL service-user (initiated abort) | 0 - reason-not-specified | The connection is closed. |
| 2 - DICOM UL service-provider (initiated abort) | 0 - reason-not-specified | The connection is closed. |
|  | 1- unrecognized-PDU | The connection is closed. |
|  | 2 - unexpected-PDU | The connection is closed. |
|  | 4 - unrecognized-PDU parameter | The connection is closed. |
|  | 5 - unexpected-PDU parameter | The connection is closed. |
|  | 6 - invalid-PDU-parameter value | The connection is closed. |

### 4.2.2.3.1.     (Real-World) Activity – Verification as SCU

#### 4.2.2.3.1.1.     Description and Sequencing of Activities

The ADACRTP_SCU implements the Verification service class / Verification SOP class to verify application level communication.
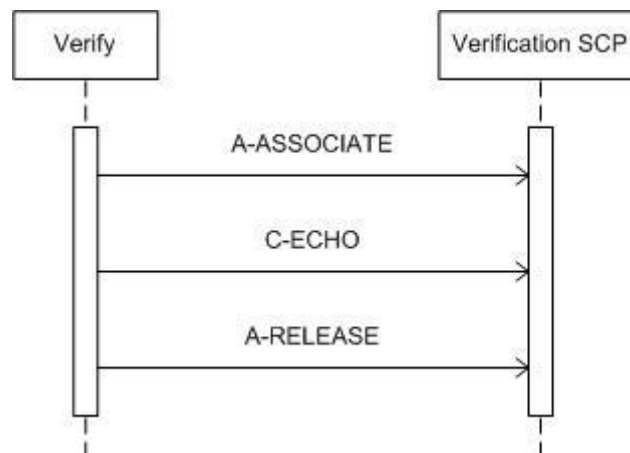


**Figure 6:  Data Flow Diagram – Verification as SCU**

#### 4.2.2.3.1.2.     Proposed Presentation Contexts

The presentation contexts are defined in the next table.

**Table 18: Proposed Presentation Contexts for (Real-World) Activity – Verification as SCU**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |

**Note:** ILE is the Pinnacle SCU default syntax. It is possible to configure Pinnacle SCU to additionally handle ELE and EBE but it is not configured as such by default.

#### 4.2.2.3.1.3.    SOP Specific Conformance for Verification SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.1.3.1.    Dataset Specific Conformance for Verification C-ECHO SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 19: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Confirmation | The SCP has successfully returned a verification response. |

#### 4.2.2.3.2.    (Real-World) Activity – Image Export

#### 4.2.2.3.2.1.    Description and Sequencing of Activities

This section contains a UML sequence diagram, which depicts the Application Entity and Real-World Activities as vertical bars and shows the events exchanged between them as arrows.

**Figure 7: (Real World) Activity - Export**

#### 4.2.2.3.2.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

**Table 20: Proposed Presentation Contexts for (Real-World) Activity – Export**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Computed Radiography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.1 | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Implicit VR Little Endian | 1.2.840.10008.1.2 | | |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| CT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| MR Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

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

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.2.3.1.    Dataset Specific Conformance for C-STORE-RQ

Detail regarding the Dataset Specific response behavior will be reported in this section.
This includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

### Table 21: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Successful stored | |
| Failure | A7xx | Refused: Out of Resources | |
| | A9xx | Error: Data Set does not match SOP Class | |
| | Cxxx | Error: cannot understand | |
| Warning | B000 | Coercion of Data Elements | |
| | B007 | Data Set does not match SOP Class | |
| | B006 | Elements Discarded | |

#### 4.2.2.3.3.    (Real-World) Activity – Print Management as SCU

#### 4.2.2.3.3.1.    Description and Sequencing of Activities

The ADACRTP_SCU application entity initiates an association for the Color or Grayscale print services class based on the configuration of the printer in Pinnacle[3]. The association is closed when the response to the N-ACTION on the Basic Film Session or Basic Film Box SOP classes is received.
The configuration of the printer in Pinnacle[3] also includes the time-out value to wait for a reply message from the SCP. The default value is 30 seconds. If the time-out is exceeded, ADACRTP_SCU will abort the association.

The ADACRTP_SCU application entity initiates associations for the printing of images to a Basic Print SCP. The image to be printed is specified by the user.

When the user requests a print, an association is established with the configured application entity. ADACRTP_SCU sends a Printer, N-GET message to the Basic Print SCP to determine the status of the printer. This is followed by a Basic Film Session N-CREATE message, which in turn is followed by a Basic Film Box N-Create. Depending on the configuration of the printer, ADACRTP_SCU will then transmit a N-SET message on a Basic Grayscale or Color Image Box. Finally, an N-ACTION message is sent to instruct the Basic Print SCP to print either at the Basic Film Session or at the Basic Film Box level, depending on printer configuration.

The below UML sequence diagram depicts the Application Entity and Real-World Activities as vertical bars and shows the events exchanged between them as arrows.

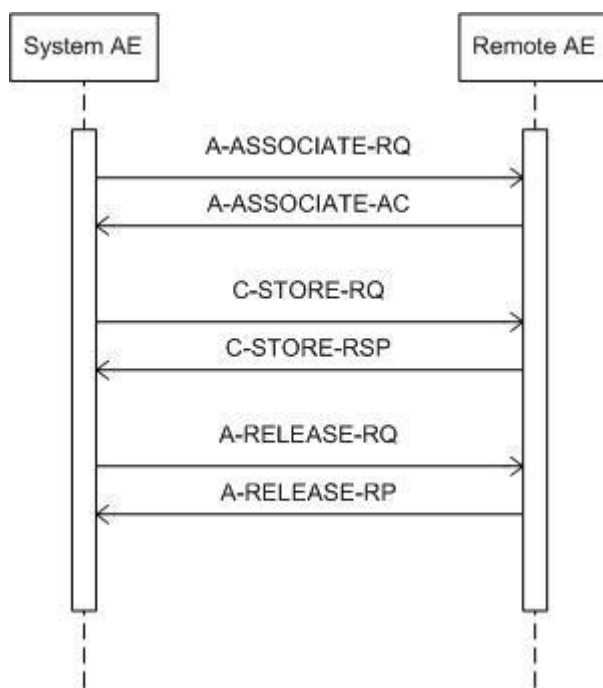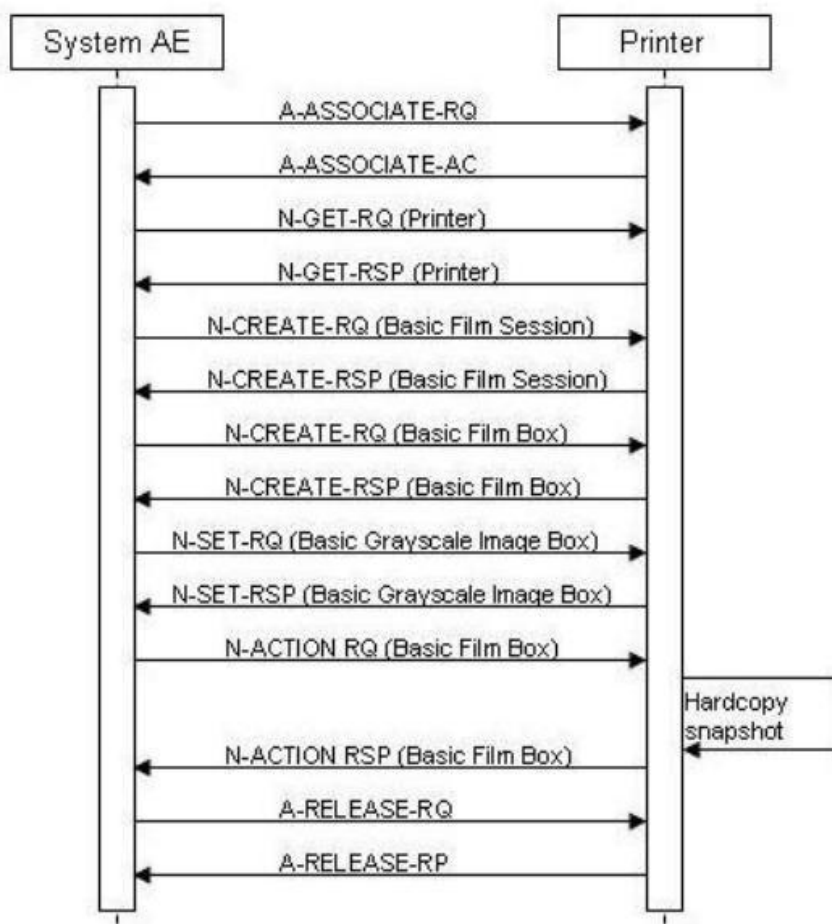

**Figure 8:  (Real World) Activity - Print Management as SCU**

#### 4.2.2.3.3.2.    Proposed Presentation Contexts

The presentation contexts are defined in the next table.

**Table 22: Proposed Presentation Contexts for (Real-World) Activity – Print Management As SCU**

| Presentation Context Table | | | | | | |
|---|---|---|---|---|---|---|
| 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) | | | | | | |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Basic Color Image Box SOP Class | 1.2.840.10008.5.1.1.4.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Printer SOP Class | 1.2.840.10008.5.1.1.16 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| Basic Grayscale Print Management Meta SOP Class (1.2.840.10008.5.1.1.9) | | | | | | |
| >Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Basic Grayscale Image Box SOP Class | 1.2.840.10008.5.1.1.4 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |
| >Printer SOP Class | 1.2.840.10008.5.1.1.16 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None | |

This section specifies each IOD created (including private IOD's).

Abbreviations used in the Module table for the column "Presence of Value" are:

| | |
|---|---|
| ALWAYS | The attribute is always present with a value |
| EMPTY | The attribute is always present without any value (attribute sent zero length) |
| VNAP | The attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present) |
| ANAP | The attribute is present under specified condition – if present then it will always have a value |
| ANAPCV | The attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present) |
| ANAPEV | The attribute is present under specified condition – if present then it will not have any value |

The abbreviations used in the Module table for the column "Source" are:

| | |
|---|---|
| AUTO | The attribute value is generated automatically |
| CONFIG | The attribute value source is a configurable parameter |
| COPY | The attribute value source is another SOP instance |
| FIXED | The attribute value is hard-coded in the application |
| IMPLICIT | The attribute value source is a user-implicit setting |
| MPPS | The attribute value is the same as that use for Modality Performed Procedure Step |
| MWL | The attribute value source is a Modality Worklist |
| USER | The attribute value source is explicit user input |

#### 4.2.2.3.3.3.    SOP Specific Conformance for Basic Film Session SOP Class of the Basic Color Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.3.1.    Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

**Table 23: Basic Film Session Presentation Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Number of Copies | 2000,0010 | IS | 1 | ANAPCV | CONFIG, USER | |

| Print Priority | 2000,0020 | CS | MEDIUM | ANAPCV | CONFIG, USER | MEDIUM |
| Medium Type | 2000,0030 | CS | PAPER, CLEAR FILM, or BLUE FILM | ANAPCV | USER | Default: PAPER |
| Film Destination | 2000,0040 | CS | MAGAZINE, PROCESSOR, BIN_1, BIN_2, BIN_3, BIN_4, BIN_5, BIN_6, BIN_7, or BIN_8 | ANAPCV | USER | Default: MAGAZINE |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 24: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
| --- | --- | --- | --- |
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.3.2.　Dataset Specific Conformance for Basic Film Session SOP Class N-ACTION-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 25: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
| --- | --- | --- | --- |
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.4.　SOP Specific Conformance for Basic Film Session SOP Class of the Basic Grayscale Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.4.1.　Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

**Table 26: Basic Film Session Presentation Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
| --- | --- | --- | --- | --- | --- | --- |
| Number of Copies | 2000,0010 | IS | 1 | ANAPCV | CONFIG, USER | |
| Print Priority | 2000,0020 | CS | MEDIUM | ANAPCV | CONFIG, USER | |
| Medium Type | 2000,0030 | CS | PAPER, CLEAR FILM, BLUE FILM | ANAPCV | USER | Default: PAPER |
| Film Destination | 2000,0040 | CS | MAGAZINE, PROCESSOR, BIN_1, BIN_2, BIN_3, BIN_4, BIN_5, BIN_6, BIN_7, BIN_8 | ANAPCV | USER | Default: MAGAZINE |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 27: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.4.2.    Dataset Specific Conformance for Basic Film Session SOP Class N-ACTION-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 28: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.5.    SOP Specific Conformance for Printer SOP Class of the Basic Color Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.5.1.    Dataset Specific Conformance for Printer SOP Class N-EVENT-REPORT-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 29: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.5.2.    Dataset Specific Conformance for Printer SOP Class N-GET-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

**Table 30: Printer Module***

| Attribute Name | Tag | VR | Value* | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | ANAPCV | COPY | None |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | COPY | None |
| Device Serial Number | 0018,1000 | LO | | ANAPCV | COPY | None |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | COPY | None |
| Printer Status | 2110,0010 | CS | | ANAPCV | COPY | None |
| Printer Status Info | 2110,0020 | CS | | ANAPCV | COPY | None |

The System conforms to the SOPs of the Print Service Class at level 2 (full). No data elements are discarded or coerced by the System.

**Note:** *The actual values depend on the type of printer.

### Table 31: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.6.    SOP Specific Conformance for Printer SOP Class of the Basic Grayscale Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

##### 4.2.2.3.3.6.1.    Dataset Specific Conformance for Printer SOP Class N-EVENT-REPORT-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

### Table 32: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

##### 4.2.2.3.3.6.2.    Dataset Specific Conformance for Printer SOP Class N-GET-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

### Table 33: Printer Module*

| Attribute Name | Tag | VR | Value* | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | ANAPCV | AUTO | None |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | AUTO | None |
| Device Serial Number | 0018,1000 | LO | | ANAPCV | AUTO | None |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | AUTO | None |
| Printer Status | 2110,0010 | CS | | ANAPCV | AUTO | None |
| Printer Status Info | 2110,0020 | CS | | ANAPCV | AUTO | None |

The System conforms to the SOPs of the Print Service Class at level 2 (full). No data elements are discarded or coerced by the System.

**Note:** *The actual values depend on the type of printer.

### Table 34: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.7.    SOP Specific Conformance for Basic Film Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

##### 4.2.2.3.3.7.1.    Dataset Specific Conformance for Basic Film Box SOP Class N-CREATE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

**Table 35: Basic Film Box Presentation Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Display Format | 2010,0010 | ST | STANDARD\1,1 | ALWAYS | CONFIG | |
| Film Orientation | 2010,0040 | CS | PORTRAIT | ANAPCV | CONFIG, USER | |
| Film Size ID | 2010,0050 | CS | 14INX17IN, 14INX14IN, 11INX14IN, 10INX14IN, 10INX12IN, 8INX10IN, 24CMX30CM, or 24CMX24CM | ANAPCV | CONFIG, USER | Default: 14INX17IN |
| Magnification Type | 2010,0060 | CS | CUBIC, BILINEAR, or REPLICATE | ANAPCV | CONFIG | Default: CUBIC |
| Smoothing Type | 2010,0080 | CS | | ANAPCV | CONFIG | |
| Border Density | 2010,0100 | CS | BLACK or WHITE | ANAPCV | CONFIG | Default: WHITE |
| Empty Image Density | 2010,0110 | CS | BLACK or WHITE | ANAPCV | CONFIG | Default: BLACK |
| Max Density | 2010,0130 | US | | ANAPCV | CONFIG | |
| Trim | 2010,0140 | CS | YES or NO | ANAPCV | CONFIG, USER | Default: NO |
| Configuration Information | 2010,0150 | ST | | ANAPCV | CONFIG | |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 36: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.7.2.    Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 37: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.8.    SOP Specific Conformance for Basic Film Box SOP Class of the Basic Color Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.8.1.    Dataset Specific Conformance for Basic Film Box SOP Class N-CREATE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

**Table 38: Basic Film Box Presentation Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Display Format | 2010,0010 | ST | STANDARD\1,1 | ALWAYS | CONFIG | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Film Orientation | 2010,0040 | CS | PORTRAIT | ANAPCV | CONFIG, USER | |
| Film Size ID | 2010,0050 | CS | 14INX17IN, 14INX14IN, 11INX14IN, 10INX14IN, 10INX12IN, 8INX10IN, 24CMX30CM, or 24CMX24CM | ANAPCV | CONFIG, USER | Default: 14INX17IN |
| Magnification Type | 2010,0060 | CS | CUBIC, BILINEAR, or REPLICATE | ANAPCV | CONFIG | Default: CUBIC |
| Smoothing Type | 2010,0080 | CS | | ANAPCV | CONFIG | |
| Border Density | 2010,0100 | CS | BLACK or WHITE | ANAPCV | CONFIG | Default: WHITE |
| Empty Image Density | 2010,0110 | CS | BLACK or WHITE | ANAPCV | CONFIG | Default: BLACK |
| Max Density | 2010,0130 | US | | ANAPCV | CONFIG | |
| Trim | 2010,0140 | CS | YES or NO | ANAPCV | CONFIG, USER | Default: NO |
| Configuration Information | 2010,0150 | ST | | ANAPCV | CONFIG | |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

#### Table 39: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.8.2. Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

#### Table 40: Status Response

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.9. SOP Specific Conformance for Basic Grayscale Image Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.9.1. Dataset Specific Conformance for Basic Grayscale Image Box SOP Class N-SET-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

#### Table 41: Image Box Pixel Presentation Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Box Position | 2020,0010 | US | 1 | ALWAYS | AUTO | |
| Polarity | 2020,0020 | CS | NORMAL or REVERSE | ANAPCV | AUTO | |
| Requested Image Size | 2020,0030 | DS | | ANAPCV | AUTO | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Basic Grayscale Image Sequence | 2020,0110 | SQ | | ALWAYS | AUTO | |
| >Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO | |
| >Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | AUTO | |
| >Rows | 0028,0010 | US | | ALWAYS | AUTO | |
| >Columns | 0028,0011 | US | | ALWAYS | AUTO | |
| >Pixel Aspect Ratio | 0028,0034 | IS | | ANAP | AUTO | Value required only if not 1:1. |
| >Bits Allocated | 0028,0100 | US | 8 | ALWAYS | AUTO | |
| >Bits Stored | 0028,0101 | US | 8 | ALWAYS | AUTO | |
| >High Bit | 0028,0102 | US | 7 | ALWAYS | AUTO | |
| >Pixel Representation | 0028,0103 | US | 0x0000 | ALWAYS | AUTO | |
| >Pixel Data | 7FE0,0010 | OW/OB | | ALWAYS | AUTO | |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

<div align="center">

**Table 42: Status Response**

</div>

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

#### 4.2.2.3.3.10. SOP Specific Conformance for Basic Color Image Box SOP Class of the Basic Color Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

#### 4.2.2.3.3.10.1. Dataset Specific Conformance for Basic Color Image Box SOP Class N-SET-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

<div align="center">

**Table 43: Image Box Pixel Presentation Module**

</div>

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Box Position | 2020,0010 | US | 1 | ALWAYS | AUTO | |
| Polarity | 2020,0020 | CS | NORMAL or REVERSE | ANAPCV | AUTO | |
| Requested Image Size | 2020,0030 | DS | | ANAPCV | AUTO | |
| Basic Color Image Sequence | 2020,0111 | SQ | | ALWAYS | AUTO | |
| >Samples per Pixel | 0028,0002 | US | 3 | ALWAYS | AUTO | |
| >Photometric Interpretation | 0028,0004 | CS | RGB | ALWAYS | AUTO | |
| >Planar Configuration | 0028,0006 | US | 0 | ALWAYS | AUTO | |
| >Rows | 0028,0010 | US | | ALWAYS | AUTO | |
| >Columns | 0028,0011 | US | | ALWAYS | AUTO | |
| >Pixel Aspect Ratio | 0028,0034 | IS | 1\1 | ANAP | AUTO | |
| >Bits Allocated | 0028,0100 | US | 8 | ALWAYS | AUTO | |
| >Bits Stored | 0028,0101 | US | 8 | ALWAYS | AUTO | |
| >High Bit | 0028,0102 | US | 7 | ALWAYS | AUTO | |
| >Pixel Representation | 0028,0103 | US | 0x0000 | ALWAYS | AUTO | |
| >Pixel Data | 7FE0,0010 | OW/OB | | ALWAYS | AUTO | |

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 44: Status Response**

| Service Status | Error Code | Further Meaning | Behavior |
|---|---|---|---|
| Success | 0000 | Matching is complete | The SCU has successfully returned all matching information |

## 4.2.2.4. Association Acceptance Policy

Not applicable.

## 4.3.  Network Interfaces

### 4.3.1.  Physical Network Interfaces

The System provides only DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard.
TCP/IP is the only protocol stack supported.
Supported physical medium include:
IEEE 802.3-1995, 10BASE-T
IEEE 802.3-1995, 100BASE-TX (Fast Ethernet)
IEEE 802.3, 1000BASE-X (Fiber Optic Gigabit Ethernet).

The TCP/IP Stack as supported by the underlying Operating System.
The API is the WinSock 2 interface as supported by the underlying Operating System.

### 4.3.2.  Additional Protocols

Additional protocols such as used for network management are not applicable.

## 4.4.  Configuration

Any implementation's DICOM conformance may be dependent upon configuration, which takes place at the time of installation.
Issues concerning configuration are addressed in this section.

### 4.4.1.  AE Title/Presentation Address Mapping

#### 4.4.1.1.  Local AE Titles

**DICOM Port:** The port number combined with the application entity title identifying ADACRTP_SCP to DICOM clients on the network (default: 104).

**Application Entity Title:** The name of ADACRTP_SCP by which, combined with the DICOM Port number, DICOM clients may address the server (default: ADACRTP_SCP).

The local AE title mapping and configuration are specified as:
**Table 45: AE Title configuration table**

| Application Entity | Default AE Title | Default TCP/IP Port |
|---|---|---|
| DICOM Server | <hostname>; <hostname><local folder>; SCU: ADACRTP_SCU; SCP: ADACRTP_SCP | 104 (Configurable) |
| Print | ADACRTP_SCU | Configurable |

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

One or more remote AEs can be configured.
The following AE specific information must be available to configure a remote AE:
- AE title.
- Hostname or IP address (or both).
- Port number.

### 4.4.2.  Parameters

The specification of important operational parameters, their default value and range (if configurable) is specified here.

**Table 46: Configuration Parameters Table**

| General Parameter | Configurable | Default Value |
|---|---|---|
| Association Release Time-out | Yes | 15 seconds |
| Association Reply Time-out | Yes | 15 seconds |
| Association Time-out | Yes | 30 seconds |
| Port-Number | Yes | 104 |
| TCP/IP Listen Port | Yes | 104 |
| Maximum PDU size the AE can receive | Yes | 28672 bytes |
| Maximum PDU size the AE can send | Yes | 28672 bytes |
| Connection Time-out | Yes | 15 seconds |
| Inactivity Time-out | Yes | 15 seconds |

These configurations may be performed by Customer Support.

# 5. Media Interchange

## 5.1.   Implementation model

### 5.1.1.   Application Data Flow Diagram

Not applicable, Pinnacle[3] does not support any Media for image Import/Export.

### 5.1.2.   Functional Definitions of AE's

Not applicable.

### 5.1.3.   Sequencing of Real World Activities

Not applicable.

## 5.2.   AE Specifications

Not applicable.

### 5.2.1.   Media AE Media - Specification

Not applicable.

#### 5.2.1.1.   File Meta Information for the Media AE

Not applicable.

#### 5.2.1.2.   Real-World Activities

Not applicable.

##### 5.2.1.2.1.   RWA - Read File-set

Not applicable.

###### 5.2.1.2.1.1.   Media Storage Application Profile

Not applicable.

###### 5.2.1.2.1.1.1.   Options

Not applicable.

##### 5.2.1.2.2.   RWA - Create File-set

Not applicable.

###### 5.2.1.2.2.1.   Media Storage Application Profile

Not applicable.

###### 5.2.1.2.2.1.1.   Options

Not applicable.

## 5.3.   Augmented and Private Application Profiles

Not applicable

## 5.4.   Media Configuration

Not applicable.

# 6. Support of Character Sets

Any support for character sets in Network and Media services is described here.

**Table 47: Supported DICOM Character Sets**

| Character Set Description | Defined Term | ESC Sequence | ISO Registration Number | Code Element | Character Set |
|---|---|---|---|---|---|
| Latin alphabet No. 1 | ISO_IR 100 | - | ISO-IR 6 | G0 | ISO 646 |
| | | - | ISO-IR 100 | G1 | Supplementary set of ISO 8859 |

# 7. Security

## 7.1.　Security Profiles

Not applicable.

### 7.1.1.　Security use Profiles

Not applicable.

### 7.1.2.　Security Transport Connection Profiles

Not applicable.

### 7.1.3.　Digital Signature Profiles

Not applicable.

### 7.1.4.　Media Storage Security Profiles

Not applicable.

### 7.1.5.　Attribute Confidentiality Profiles

Not applicable.

### 7.1.6.　Network Address Management Profiles

Not applicable.

### 7.1.7.　Time Synchronization Profiles

Not applicable.

### 7.1.8.　Application Configuration Management Profiles

Not applicable.

### 7.1.9.　Audit Trail Profiles

Not applicable.

## 7.2.　Association Level Security

Not applicable.

## 7.3.　Application Level Security

Not applicable.

# 8. Annexes of application "Pinnacle"

## 8.1. IOD Contents

### 8.1.1. Created SOP Instance

This section specifies each IOD created by this application.

This section specifies each IOD created (including private IOD's). It should specify the attribute name, tag, VR, and value. The value should specify the range and source (e.g. user input, Modality Worklist, automatically generated, etc.). For content items in templates, the range and source of the concept name and concept values should be specified. Whether the value is always present or not shall be specified.

Abbreviations used in the IOD tables for the column "Presence of Module" are:

| | |
|---|---|
| ALWAYS | The module is always present |
| CONDITIONAL | The module is used under specified condition |

Abbreviations used in the Module table for the column "Presence of Value" are:

| | |
|---|---|
| ALWAYS | The attribute is always present with a value |
| EMPTY | The attribute is always present without any value (attribute sent zero length) |
| VNAP | The attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present) |
| ANAP | The attribute is present under specified condition – if present then it will always have a value |
| ANAPCV | The attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present) |
| ANAPEV | The attribute is present under specified condition – if present then it will not have any value |

The abbreviations used in the Module table for the column "Source" are:

| | |
|---|---|
| AUTO | The attribute value is generated automatically |
| CONFIG | The attribute value source is a configurable parameter |
| COPY | The attribute value source is another SOP instance |
| FIXED | The attribute value is hard-coded in the application |
| IMPLICIT | The attribute value source is a user-implicit setting |
| MPPS | The attribute value is the same as that use for Modality Performed Procedure Step |
| MWL | The attribute value source is a Modality Worklist |
| USER | The attribute value source is explicit user input |

#### 8.1.1.1. List of created SOP Classes

**Table 48: List of created SOP Classes**

| SOP Class Name | SOP Class UID |
|---|---|
| Computed Radiography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.1 |
| RT Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.1 |
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 |
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 |
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Secondary Capture Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 |

### 8.1.1.2.  Computed Radiography Image Storage SOP Class

#### Table 49: IOD of Created Computed Radiography Image Storage SOP Class Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | General Series Module | ALWAYS |
| Series | CR Series Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Image | General Image Module | ALWAYS |
| Image | CR Image Module | ALWAYS |
| Image | VOI LUT Module | ALWAYS |
| Image | SOP Common Module | ALWAYS |

#### Table 50: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

#### Table 51: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from the Primary Image set, if transferred via DICOM, else it is generated |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

#### Table 52: General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | CR | ALWAYS | AUTO, FIXED, COPY | |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated on Export. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Series Number | 0020,0011 | IS | | VNAP | COPY | Empty. |
| Laterality | 0020,0060 | CS | | ANAPCV | COPY | Empty. |

**Table 53: CR Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Body Part Examined | 0018,0015 | CS | | VNAP | COPY | Empty. |
| View Position | 0018,5101 | CS | | VNAP | COPY | Empty. |

**Table 54: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle³ | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle³ which transmits the data. |

**Table 55: General Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ANAPCV | AUTO | Date the transfer was performed. |
| Content Time | 0008,0033 | TM | | ANAPCV | AUTO | Time the transfer was performed. |
| Instance Number | 0020,0013 | IS | 1 | VNAP | FIXED | |
| Patient Orientation | 0020,0020 | CS | | ANAPCV | COPY | Empty |

**Table 56: CR Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Imager Pixel Spacing | 0018,1164 | DS | | ANAPCV | AUTO, COPY | Multivalve X\Y resolution of the image pixels. |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | COPY | |

**Table 57: VOI LUT Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Window Center | 0028,1050 | DS | | ANAP | AUTO, COPY | The default window center value for the image, for display purposes. |
| Window Width | 0028,1051 | DS | | ANAP | AUTO, COPY | The default window width value for the image, for display purposes. |

**Table 58: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.1 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | |

#### 8.1.1.3.    RT Image Storage SOP Class

**Table 59: IOD of Created RT Image Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Image | General Image Module | ALWAYS |
| Image | Image Pixel Module | ALWAYS |
| Image | RT Image Module | ALWAYS |
| Image | Modality LUT Module | ALWAYS |
| Image | VOI LUT Module | ALWAYS |
| Image | SOP Common Module | ALWAYS |

**Table 60: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

**Table 61: General Study Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM else it is generated. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

**Table 62: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTIMAGE | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from DICOM Export Window. |

**Table 63: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | AUTO | Matches the Frame of Reference UID for the primary image set if the patient position has not been altered on import. If the patient position was altered on import, a new Frame of Reference UID will be generated. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | COPY | |

**Table 64: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle[3] | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle[3] which transmits the data. |

**Table 65: General Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ANAPCV | AUTO | Date the transfer was performed. |
| Content Time | 0008,0033 | TM | | ANAPCV | AUTO | Time the transfer was performed. |
| Instance Number | 0020,0013 | IS | | VNAP | AUTO | A unique number for each IOD instance sent in a single transfer operation. |
| Patient Orientation | 0020,0020 | CS | | ANAPCV | COPY | Empty |

**Table 66: Image Pixel Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Rows | 0028,0010 | US | | ALWAYS | AUTO, COPY | Number of rows in the image. |
| Columns | 0028,0011 | US | | ALWAYS | AUTO, COPY | Number of columns in the image. |
| Pixel Data | 7FE0,0010 | OW/ OB | | ALWAYS | COPY | Pixel data. |

**Table 67: RT Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Type | 0008,0008 | CS | DERIVED, SECONDARY, DRR | ALWAYS | AUTO | |
| Conversion Type | 0008,0064 | CS | WSD | VNAP | AUTO, COPY | |
| Operators' Name | 0008,1070 | PN | | VNAP | COPY, USER | Dosimetrist Name as entered in Launch Pad. |
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO, COPY | |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | COPY | |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | COPY | Number of bits allocated for each pixel sample.('16') |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | COPY | Number of bits stored for each pixel sample. ('16') |
| High Bit | 0028,0102 | US | 15 | ALWAYS | COPY | Most significant bit for pixel sample data. ('15') |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | COPY | Data representation of the pixel samples. ('0') |
| RT Image Label | 3002,0002 | SH | | ALWAYS | AUTO, COPY | Beam Name appended with BEV. |
| RT Image Plane | 3002,000C | CS | NORMAL | ALWAYS | COPY | |
| X-Ray Image Receptor Translation | 3002,000D | DS | 0.0\0.0\0.0 | ANAPCV | COPY | |
| X-Ray Image Receptor Angle | 3002,000E | DS | | VNAP | COPY | If Image Type (0008, 0008) is DRR, set to 0. Else it is equivalent to the collimator angle of the beam. |
| Image Plane Pixel Spacing | 3002,0011 | DS | | VNAP | COPY | Pixel size in the format X\Y in mm. |
| RT Image Position | 3002,0012 | DS | | VNAP | COPY | Coordinate of the center of the first pixel transmitted. |
| Radiation Machine Name | 3002,0020 | SH | | VNAP | COPY | The name of the machine assigned to the beam corresponding to this image. |
| Radiation Machine SAD | 3002,0022 | DS | | VNAP | COPY | Distance from source to gantry rotation axis for the beam in mm. |
| Radiation Machine SSD | 3002,0024 | DS | | ANAPCV | COPY | Distance from source to patient surface for the beam in mm. |
| RT Image SID | 3002,0026 | DS | | VNAP | COPY | SAD for the beam in mm. |
| Primary Dosimeter Unit | 300A,00B3 | CS | MU | VNAP | COPY | |
| Gantry Angle | 300A,011E | DS | | ANAPCV | COPY | The gantry angle of the beam for this control point. Control point zero will always represent the starting angle for the beam. |
| Beam Limiting Device Angle | 300A,0120 | DS | | ANAPCV | COPY | The collimator angle for the beam. |
| Patient Support Angle | 300A,0122 | DS | | ANAPCV | COPY | The couch angle for the beam. |
| Table Top Eccentric Angle | 300A,0125 | DS | 0.0 | ANAPCV | COPY | |
| Referenced RT Plan Sequence | 300C,0002 | SQ | | ANAPCV | COPY | The sequence is included only if the export of an RT Plan is performed within the same association as RT Image instance. |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.5.1.4.1.1.481.5 | ANAPCV | COPY | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAPCV | COPY | Instance UID of RT plan object exported in the same association as this RT Image instance. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Referenced Beam Number | 300C,0006 | IS | | ANAPCV | COPY | Identifies the beam number of this beam within that RT Plan instance exported simultaneously with the RT Image instance. |

**Table 68: Modality LUT Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Rescale Intercept | 0028,1052 | DS | 0.0 | ANAP | COPY | |
| Rescale Slope | 0028,1053 | DS | 1.0 | ANAP | COPY | |
| Rescale Type | 0028,1054 | LO | US | ANAP | COPY | |

**Table 69: VOI LUT Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Window Center | 0028,1050 | DS | | ANAP | AUTO | The default window center value for the image, for display purposes. |
| Window Width | 0028,1051 | DS | | ANAP | AUTO | The default window width value for the image, for display purposes. |

**Table 70: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.1 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | Generated. |

### 8.1.1.4.    RT Dose Storage SOP Class

**Table 71: IOD of Created RT Dose Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Dose | General Image Module | ALWAYS |
| Dose | Image Plane Module | ALWAYS |
| Dose | Multi-Frame Module | ALWAYS |
| Dose | RT Dose Module | ALWAYS |
| Dose | SOP Common Module | ALWAYS |

**Table 72: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

**Table 73: General Study Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from the Primary Image set, if transferred via DICOM, else it is generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

**Table 74: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTDOSE | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from DICOM Export Window. |

**Table 75: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | AUTO | Matches the Frame of Reference UID for the primary image set if the patient position has not been altered on import. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | COPY | |

**Table 76: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle³ | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle³ which transmits the data. |

**Table 77: General Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ANAPCV | AUTO | Date the transfer was performed. |
| Content Time | 0008,0033 | TM | | ANAPCV | AUTO | Time the transfer was performed. |
| Instance Number | 0020,0013 | IS | | VNAP | AUTO | A unique number for each IOD instance sent in a single transfer operation. |

**Table 78: Image Plane Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Slice Thickness | 0018,0050 | DS | | VNAP | AUTO | The spacing, in mm, between slices of the dose grid planes. |
| Image Position (Patient) | 0020,0032 | DS | | ALWAYS | AUTO | The x, y, and z coordinates of the upper left hand corner (center of the first voxel transmitted) of the image, in mm. |
| Image Orientation (Patient) | 0020,0037 | DS | | ALWAYS | AUTO | The direction cosines of the first row and the first column with respect to the patient. Matches the orientation of the Primary Image Set. |
| Pixel Spacing | 0028,0030 | DS | | ALWAYS | AUTO | Physical distance in the patient between the center of each voxel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. |

**Table 79: Image Pixel Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO, COPY | |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | COPY | |
| Rows | 0028,0010 | US | | ALWAYS | AUTO, COPY | Number of rows in the image. |
| Columns | 0028,0011 | US | | ALWAYS | AUTO, COPY | Number of columns in the image. |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | COPY | |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | COPY | |
| High Bit | 0028,0102 | US | 15 | ALWAYS | COPY | |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | COPY | '0' designates unsigned integer |

**Table 80: Multi-Frame Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Number of Frames | 0028,0008 | IS | | ALWAYS | COPY | Number of frames in a Multi-frame Image. See of the DICOM Part3 specification PS3.3 for explanation. |

| Frame Increment Pointer | 0028,0009 | AT | | ALWAYS | FIXED, COPY | Contains the Data Element Tag of the attribute that is used as the frame increment in Multi-frame pixel data. Points to Grid Frame Offset Vector (300C,0004). See C.7.6.6.1.1 for further explanation. |

**Table 81: RT Dose Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Dose Units | 3004,0002 | CS | Gy(RBE) | ALWAYS | COPY | Units used to describe dose: 'Gy'(Gray RBE) |
| Dose Type | 3004,0004 | CS | PHYSICAL or EFFECTIVE | ALWAYS | COPY | PHYSICAL (physical dose). EFFECTIVE if it is a PROTON Dose. |
| Normalization Point | 3004,0008 | DS | | ANAPCV | AUTO | If specified for the plan, the position of the dose normalization point in the patient coordinates system. |
| Dose Summation Type | 3004,000A | CS | PLAN, FRACTION, BEAM, or CONTROL_POINT | ALWAYS | AUTO, COPY | PLAN = dose calculated for the entire trial. FRACTION = dose calculated for a selected prescription. BEAM = dose calculated for one or more beams in each selected prescription. CONTROL_POINT = dose calculated for one or more control points for each beam in the selected prescription. BRACHY and MULTI_PLAN are not supported. |
| Grid Frame Offset Vector | 3004,000C | DS | | ANAP | AUTO | An array which contains the z coordinates (in mm) of the image frames in a multi-frame dose. All coordinates are relative to Image Position (Patient) (0020,0032). |
| Dose Grid Scaling | 3004,000E | DS | | ALWAYS | AUTO | Scaling factor that when multiplied by the dose grid data found in the Pixel Data (7FE0,0010) attribute of the Image Pixel Module, yields grid doses in the dose units as specified by Dose Units (3004,0002). |
| Tissue Heterogeneity Correction | 3004,0014 | CS | IMAGE, ROI_OVERRIDE, or WATER | ANAPCV | AUTO | IMAGE = image data. ROI_OVERRIDE = one or more ROI densities override image or water values where they exist. WATER = entire volume treated as water equivalent. |
| Referenced RT Plan Sequence | 300C,0002 | SQ | | ANAP | COPY | Introduces sequence of one Class/Instance pair describing the RT Plan associated with the dose. |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.5.1.4.1.1.481.5, 1.2.840.10008.5.1.4.1.1.481.8 | ANAP | AUTO | RT Plan Storage RT Ion Plan Storage |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Unique identifier of the referenced RT Plan SOP Instance. |
| Pixel Data | 7FE0,0010 | OW/OB | | ALWAYS | COPY | Pixel data. |

**Table 82: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.2 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | Generated. |

### 8.1.1.5. RT Structure Set Storage SOP Class

**Table 83: IOD of Created RT Structure Set Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Structure Set | Structure Set Module | ALWAYS |
| Structure Set | ROI Contour Module | ALWAYS |
| Structure Set | RT ROI Observations Module | ALWAYS |
| Structure Set | SOP Common Module | ALWAYS |

**Table 84: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

**Table 85: General Study Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM. |

| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM. |
|---|---|---|---|---|---|---|
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Study UID of the data set from which this image was defined. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM, else it is generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the dataset the structures are assigned to, if transferred via DICOM. |

**Table 86: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTSTRUCT | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from the DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from the DICOM Export Window. |

**Table 87: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle³ | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle³ which transmits the data. |

**Table 88: Structure Set Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Structure Set Label | 3006,0002 | SH | | ALWAYS | AUTO | The name of the plan. |
| Structure Set Name | 3006,0004 | LO | POIandROIandBolus | ANAPCV | FIXED | |
| Structure Set Date | 3006,0008 | DA | | VNAP | AUTO | Date of transfer |
| Structure Set Time | 3006,0009 | TM | | VNAP | AUTO | Time of transfer. |
| Referenced Frame of Reference Sequence | 3006,0010 | SQ | | ANAPCV | AUTO | Introduces the sequence describing the frame of reference for the data set. |
| >Frame of Reference UID | 0020,0052 | UI | | ANAP | AUTO | Duplicated from the image data set the structure is assigned to, as transferred via DICOM. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >RT Referenced Study Sequence | 3006,0012 | SQ | | ANAPCV | AUTO | Introduces the sequence describing studies referenced by this structure set. |
| >>RT Referenced Series Sequence | 3006,0014 | SQ | | ANAP | AUTO | Introduces the sequence describing the series referenced by this structure set. |
| >>>Series Instance UID | 0020,000E | UI | | ANAP | AUTO | The Series UID duplicated from the image data set as transferred via DICOM. |
| >>>Contour Image Sequence | 3006,0016 | SQ | | ANAP | AUTO | Introduces the list of Image Class and Instance UIDs within the data set series. There will be 1 entry per slice. |
| >>>>Referenced SOP Class UID | 0008,1150 | UI | | ANAP | AUTO | The Image Class UID duplicated from the image data set as transferred via DICOM. |
| >>>>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | The instance UID duplicated from the image instance for the contour as transferred via DICOM. |
| >>Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | The Study UID duplicated from the image data set as transferred via DICOM. |
| Structure Set ROI Sequence | 3006,0020 | SQ | | ANAPCV | AUTO | Introduces the sequence of structures. One entry per ROI or POI. |
| >ROI Number | 3006,0022 | IS | | ANAP | AUTO | A unique number for POIs and ROIs within the message. |
| >Referenced Frame of Reference UID | 3006,0024 | UI | | ANAP | AUTO | The Frame of Reference UID for each instance UID, duplicated from the image. |
| >ROI Name | 3006,0026 | LO | | ANAPCV | AUTO | The name of the ROI or POI as entered in Pinnacle[3] |
| >ROI Volume | 3006,002C | DS | | ANAPCV | AUTO | The volume of the ROI in cubic cm. |
| >ROI Generation Algorithm | 3006,0036 | CS | SEMIAUTOMATIC | ANAPCV | FIXED | |

**Table 89: ROI Contour Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| ROI Contour Sequence | 3006,0039 | SQ | | ALWAYS | AUTO | Introduces the sequence of Contour Sequences defining ROIs or POIs. |
| >ROI Display Color | 3006,002A | IS | | ANAPCV | AUTO | The color of the ROI. |
| >Contour Sequence | 3006,0040 | SQ | | ANAPCV | AUTO | Introduces the sequence of Contours defining an ROI. |
| >>Contour Image Sequence | 3006,0016 | SQ | | ANAPCV | AUTO | Introduces the sequence of image UIDs to which this contour corresponds. The sequence will contain 1 item. |
| >>>Referenced SOP Class UID | 0008,1150 | UI | | ANAP | AUTO | Image class UID duplicated from the DICOM transfer of the assigned data set. Requires that the image data set has been transferred via DICOM. |
| >>>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Image instance UID duplicated from the DICOM transfer of the data set. Requires that the image data set has been transferred via DICOM. |
| >>Contour Geometric Type | 3006,0042 | CS | POI or CLOSED_PLANAR | ANAP | AUTO | For POIs: POINT. For ROIs: CLOSED_PLANAR. |
| >>Number of Contour Points | 3006,0046 | IS | | ANAP | AUTO | 1 for a POI; otherwise, the number of points describing the contour in the Contour Data attribute (3006,0050). |

| >>Contour Data | 3006,0050 | DS | | ANAP | AUTO | The (x, y, z) triplets describing the vertices of the ROI or point of the POI. |
| >Referenced ROI Number | 3006,0084 | IS | | ALWAYS | AUTO | Unique identifier of POI or ROI within this message instance. |

**Table 90: RT ROI Observations Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| RT ROI Observations Sequence | 3006,0080 | SQ | | ALWAYS | AUTO | Introduces a sequence of ROI observations. 1 per beam. |
| >Observation Number | 3006,0082 | IS | | ALWAYS | AUTO | Unique identifier of POI or ROI within this message instance. |
| >Referenced ROI Number | 3006,0084 | IS | | ALWAYS | AUTO | Unique identifier of POI or ROI within this message instance. |
| >RT ROI Interpreted Type | 3006,00A4 | CS | EXTERNAL, PTV, CTV, GTV, TREATED_VOLUME, IRRAD_VOLUME, AVOIDANCE, ORGAN, CAVITY, SUPPORT, FIXATION, DOSE_REGION, CONTROL, BOLUS or MARKER | VNAP | AUTO | Type of ROI or POI. |
| >ROI Interpreter | 3006,00A6 | PN | | VNAP | COPY | Empty |

**Table 91: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.3 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | Generated. |

### 8.1.1.6.   RT Plan Storage SOP Class

**Table 92: IOD of Created RT Plan Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Plan | RT General Plan Module | ALWAYS |
| Plan | RT Tolerance Tables Module | ALWAYS |
| Plan | RT Patient Setup Module | ALWAYS |
| Plan | RT Fraction Scheme Module | ALWAYS |
| Plan | RT Beams Module | ALWAYS |
| Plan | SOP Common Module | ALWAYS |
| | Extended Dicom and Private attributes (Refer | ALWAYS |

| section 8.5) | | |
|---|---|---|

### Table 93: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

*This date will be in yyyymmdd format. If entered or imported in yyyy-mm-dd format, the date will be converted automatically upon export. Other date formats will not be exported.

### Table 94: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Study UID of the data set from which this image was defined. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

### Table 95: RT Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTPLAN | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from DICOM Export Window. |

**Table 96: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | AUTO | |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | AUTO | |

**Table 97: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle³ | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle³ which transmits the data. |

**Table 98: RT General Plan Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Operators' Name | 0008,1070 | PN | | VNAP | AUTO, USER | The Dosimetrist name as entered in Launch Pad. |
| RT Plan Label | 300A,0002 | SH | | ALWAYS | AUTO, USER | The plan name as entered in Launch Pad concatenated with the Trial Number (i.e., <planName>-<Trial#>). |
| RT Plan Name | 300A,0003 | LO | | ANAPCV | AUTO, USER | The plan name as entered in Launch Pad. |
| RT Plan Description | 300A,0004 | ST | | ANAPCV | AUTO, USER | The comment as entered in Launch Pad. |
| RT Plan Date | 300A,0006 | DA | | VNAP | AUTO | The date that the message was created. |
| RT Plan Time | 300A,0007 | TM | | VNAP | AUTO | The time that the message was created. |
| RT Plan Geometry | 300A,000C | CS | | ALWAYS | AUTO | Set to PATIENT if the primary data set coordinate system is valid and Structure Sets are being exported with the plan. Else the value is TREATMENT_DEVICE. Note: The coordinate system is considered valid if it's a valid DICOM format (not Pinnacle format), and the dataset has not been modified in the Volume Editor. |
| Referenced Structure Set Sequence | 300C,0060 | SQ | | ANAP | AUTO | Sent if RT Plan Geometry is PATIENT. |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.5.1.4.1.1.481.3 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Indicates the structure set that references the patient's coordinate system frame of reference. |

**Table 99: RT Tolerance Tables Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Tolerance Table Sequence | 300A,0040 | SQ | | ANAPCV | AUTO | Introduces sequence of tolerance tables to be used for delivery of treatment plan. One or more items may be included in sequence. |
| >Tolerance Table Number | 300A,0042 | IS | | ANAP | AUTO | Identification number of the Tolerance Table as defined in the physics machine. The value of Tolerance Table Number (300A,0042) shall be unique within the RT Plan in which it is created. Required if Tolerance Table Sequence (300A,0040) is sent. |
| >Tolerance Table Label | 300A,0043 | SH | | ANAPCV | AUTO | User-defined label for Tolerance Table. Defined as part of the tolerance table in the physics machine. |

**Table 100: RT Patient Setup Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient Setup Sequence | 300A,0180 | SQ | | ALWAYS | COPY | Introduces the sequence of patient setup data. |
| >Patient Position | 0018,5100 | CS | | ANAP | COPY | The treatment position defined by the CT scan. Duplicated from the Primary data set on which the plan was created. |
| >Patient Setup Number | 300A,0182 | IS | 1 | ALWAYS | FIXED | |

**Table 101: RT Fraction Scheme Module***

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Fraction Group Sequence | 300A,0070 | SQ | | ALWAYS | AUTO, COPY | Introduces sequence of Fraction Groups in current Fraction Scheme. Each Fraction Group is translated to a Prescription in Pinnacle[3]. |
| >Fraction Group Number | 300A,0071 | IS | | ALWAYS | AUTO, COPY | Prescription number in Pinnacle. |
| >Number of Fractions Planned | 300A,0078 | IS | | VNAP | AUTO, COPY | The number of fractions for the selected prescription. |
| >Number of Beams | 300A,0080 | IS | | ALWAYS | AUTO, COPY | The number of beams using this prescription. The number will include 2 additional beams if setup beams are being exported. |
| >Number of Brachy Application Setups | 300A,00A0 | IS | 0 | ALWAYS | FIXED | |
| >Referenced Beam Sequence | 300C,0004 | SQ | | ANAP | AUTO, COPY | Introduces the sequence of treatment beams in the current Fraction Group. |
| >>Beam Dose Specification Point | 300A,0082 | DS | | ANAPCV | AUTO, COPY | The location of the Dose Reference Point for the beam, as specified in the Monitor Units window. |
| >>Beam Dose | 300A,0084 | DS | | ANAPCV | AUTO, COPY | The dose in Gy, to the reference point, calculated for this beam. This will be a value of '0' for setup beams. |
| >>Beam Meterset | 300A,0086 | DS | | ANAPCV | AUTO, COPY | The monitor units calculated for this beam. This will be a value of '0' for setup beams. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >>Referenced Beam Number | 300C,0006 | IS | | ANAP | AUTO, COPY | Specifies the Beam Number (300A,00C0) of the beam using this prescription. |

*Attributes related to brachytherapy treatments are not supported

### Table 102: RT Beams Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Beam Sequence | 300A,00B0 | SQ | | ALWAYS | AUTO | Introduces the sequence of treatment beams for this RT Plan. There will be 1 entry per beam. |
| >Manufacturer | 0008,0070 | LO | | ANAPCV | AUTO | The manufacturer of the machine assigned to this beam. |
| >Institution Name | 0008,0080 | LO | | ANAPCV | AUTO | The name of the institution in Pinnacle[3]. |
| >Treatment Machine Name | 300A,00B2 | SH | | VNAP | AUTO | The name of the machine assigned to this beam. |
| >Primary Dosimeter Unit | 300A,00B3 | CS | MU | ANAPCV | AUTO | |
| >Source-Axis Distance | 300A,00B4 | DS | | ANAPCV | AUTO | The SAD of the machine assigned to this beam in mm. |
| >Beam Limiting Device Sequence | 300A,00B6 | SQ | | ALWAYS | AUTO | Introduces the sequence of beam limiting devices (collimator) jaw or leaf (element) sets. |
| >>RT Beam Limiting Device Type | 300A,00B8 | CS | | ALWAYS | AUTO | As appropriate: X = symmetric jaw pair in X direction Y = symmetric jaw pair in Y direction ASYMX = asymmetric jaw pair in X direction ASYMY = asymmetric jaw pair in Y direction MLCX = multileaf jaw pair in X direction MLCY = multileaf jaw pair in Y direction. |
| >>Source to Beam Limiting Device Distance | 300A,00BA | DS | | ANAPCV | AUTO | The Source to Beam Limiting Device distance in mm. As entered for the device in the machine definition. (Note that this is suppressible via script. See our latest DICOM RT Release Note for more detail.) |
| >>Number of Leaf/Jaw Pairs | 300A,00BC | IS | | ALWAYS | AUTO | 1 for jaws or the number of leaf pairs for an MLC. |
| >>Leaf Position Boundaries | 300A,00BE | DS | | ANAPCV | AUTO | The position of the edges of the leaf boundaries with respect to the central axis. There will be the number of leaf pairs + 1 entries. |
| >Beam Number | 300A,00C0 | IS | | ALWAYS | AUTO | The ordinal representing the position of the beam in the beam list as displayed in Pinnacle[3]. |
| >Beam Name | 300A,00C2 | LO | | ANAPCV | AUTO | If the Field ID is specified for the beam, its value is exported in this attribute and the Pinnacle[3] Beam Name is exported in the Beam Description attribute (300A,00C3). If the Field ID is not specified this attribute contains the name of the beam as specified in Pinnacle[3]. |
| >Beam Description | 300A,00C3 | ST | | ANAPCV | AUTO | If Field ID is specified for the beam, this attribute contains the Pinnacle[3] Beam Name. |

| | | | | | | |
|---|---|---|---|---|---|---|
| >Beam Type | 300A,00C4 | CS | STATIC or DYNAMIC | ALWAYS | AUTO | 'DYNAMIC' for a beam in which treatment geometry or characteristics are modified during delivery. 'STATIC' for a fixed field, fixed beam. (Note that there is a method to override this field. See our latest DICOM RT Release Note for more detail.) |
| >Radiation Type | 300A,00C6 | CS | PHOTON or ELECTRON | VNAP | AUTO, FIXED | |
| >Referenced Patient Setup Number | 300C,006A | IS | | ANAPCV | AUTO, COPY | References the Patient Setup number (300A,0182) as defined in the Patient Setup Module. |
| >High-Dose Technique Type | 300A,00C7 | CS | SRS | ANAP | FIXED | For photon and stereo beams if the computed MU value of a beam exceeds the MU threshold specified in the High-Dose Technique configuration of the treatment machine  the attribute is set to "SRS" and is exported with the beam module of the RT plan.  The attribute will not be exported when the MU value does not exceed the threshold. |
| >Treatment Delivery Type | 300A,00CE | CS | TREATMENT or SETUP | ANAPCV | AUTO | |
| >Number of Wedges | 300A,00D0 | IS | 0 or 1 | ALWAYS | AUTO | |
| >Wedge Sequence | 300A,00D1 | SQ | | ANAP | AUTO | Introduces sequence of treatment wedges. Required if Number of Wedges is non-zero. |
| >>Wedge Number | 300A,00D2 | IS | 0 | ANAP | FIXED | |
| >>Wedge Type | 300A,00D3 | CS | STANDARD, DYNAMIC, or MOTORIZED | ANAPCV | AUTO | As appropriate:<br>STANDARD = standard (static) wedge<br>DYNAMIC = moving beam limiting device jaw simulating wedge<br>MOTORIZED = single wedge that can be removed from beam remotely. |
| >>Wedge ID | 300A,00D4 | SH | | ANAPCV | AUTO | The Manufacturer code of the wedge assigned to the beam. |
| >>Wedge Angle | 300A,00D5 | IS | | ANAPCV | AUTO | The angle of the wedge for the beam. |
| >>Wedge Factor | 300A,00D6 | DS | | ANAPCV | COPY | Empty. |
| >>Wedge Orientation | 300A,00D8 | DS | | ANAPCV | AUTO | The orientation of the wedge. |
| >Number of Compensators | 300A,00E0 | IS | 0 or 1 | ALWAYS | AUTO | |
| >Compensator Sequence | 300A,00E3 | SQ | | ANAP | COPY | Compensators are not currently exported by Pinnacle[3]. |
| >Number of Boli | 300A,00ED | IS | | ALWAYS | AUTO, FIXED | Number of Boli assigned to beam. |
| >Number of Blocks | 300A,00F0 | IS | | ALWAYS | AUTO, FIXED | The number of contours required to describe the block. |
| >Total Block Tray Factor | 300A,00F2 | DS | | ANAPCV | AUTO | The tray factor of the beam. |
| >Block Sequence | 300A,00F4 | SQ | | ANAP | AUTO | Introduces sequence of blocks associated with Beam. Required if Number of Blocks is non-zero. |
| >>Material ID | 300A,00E1 | SH | | ANAPCV | COPY | Empty |
| >>Block Tray ID | 300A,00F5 | SH | | ANAPCV | AUTO | The tray number, if any, otherwise UNKNOWN TRAY ID. |
| >>Source to Block Tray Distance | 300A,00F6 | DS | | ANAPCV | AUTO | The Source to Tray Distance as defined for the machine. |
| >>Block Type | 300A,00F8 | CS | SHIELDING or APERTURE | ANAP | AUTO | |

| >>Block Divergence | 300A,00FA | CS | PRESENT | ANAPCV | FIXED | |
|---|---|---|---|---|---|---|
| >>Block Number | 300A,00FC | IS | | ANAP | AUTO | The identifying number for this contour. |
| >>Block Thickness | 300A,0100 | DS | | ANAPCV | COPY | Empty |
| >>Block Transmission | 300A,0102 | DS | | ANAPCV | AUTO | The block and tray factor of the beam. |
| >>Block Number of Points | 300A,0104 | IS | | ANAPCV | AUTO | The number of points used to describe the contour. |
| >>Block Data | 300A,0106 | DS | | ANAPCV | AUTO | Data containing the (x, y) pairs describing the edge of the contour. |
| >Applicator Sequence | 300A,0107 | SQ | | ANAPCV | AUTO | Introduces the sequence of Applicators. Only a single item shall be permitted in this sequence. |
| >>Accessory Code | 300A,00F9 | LO | | ANAP | AUTO | If an Accessory Code is provided in the stereo collimator definition of the machine, the Accessory Code is exported in this attribute. If an accessory code is not provided in the Stereo Collimator definition of the machine, this attribute is not exported. |
| >>Applicator ID | 300A,0108 | SH | | ANAP | AUTO | The user name assigned to the applicator or circular collimator. For a stereo beam, send the name of the circular collimator. For electron beams, send the electron applicator name. |
| >>Applicator Type | 300A,0109 | CS | STEREOTACTIC, ELECTRON_SQUARE, or ELECTRON_RECT | ANAP | AUTO | For a stereo beam, set to 'STEREOTACTIC'. For an electron beam the dimensions of the applicator will be checked, if length = height 'ELECTRON_SQUARE' will be sent. Otherwise 'ELECTRON_RECT'. |
| >Final Cumulative Meterset Weight | 300A,010E | DS | 1 | ANAP | AUTO | |
| >Number of Control Points | 300A,0110 | IS | | ALWAYS | AUTO | The number of control points used to describe the beam behavior during treatment. (Setup beams will each use 2 control points.) |
| >Control Point Sequence | 300A,0111 | SQ | | ALWAYS | AUTO | Introduces the sequence of machine configurations describing this treatment beam. |
| >>Control Point Index | 300A,0112 | IS | | ANAP | AUTO | Sequentially numbered starting at 0. |
| >>Nominal Beam Energy | 300A,0114 | DS | | ANAPCV | AUTO | The selected machine energy for this beam. |
| >>Dose Rate Set | 300A,0115 | DS | | ANAPCV | AUTO | Dose rate of the control point. |
| >>Wedge Position Sequence | 300A,0116 | SQ | | ANAPCV | AUTO | Introduces sequence of Wedge positions and identities for this control point. |
| >>>Wedge Position | 300A,0118 | CS | IN or OUT | ANAP | FIXED | |
| >>>Referenced Wedge Number | 300C,00C0 | IS | | ANAP | AUTO, COPY | The Wedge Number (300A,00D2) assigned to the selected wedge for this control point. |
| >>Beam Limiting Device Position Sequence | 300A,011A | SQ | | ANAP | AUTO | Introduces the sequence of beam limiting device (collimator) jaw or leaf (element) positions. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >>>RT Beam Limiting Device Type | 300A,00B8 | CS | | ANAP | AUTO | Assigned as appropriate:<br>X = symmetric jaw pair in X direction<br>Y = symmetric jaw pair in Y direction<br>ASYMX = asymmetric jaw pair in X direction<br>ASYMY = asymmetric jaw pair in Y direction<br>MLCX = multileaf jaw pair in X direction<br>MLCY = multileaf jaw pair in Y direction. |
| >>>Leaf/Jaw Positions | 300A,011C | DS | | ANAP | AUTO | The jaw or MLC leaf positions for this control point in mm. |
| >>Gantry Angle | 300A,011E | DS | | ANAP | AUTO | The gantry angle of the beam for this control point. Control point zero will always represent the starting angle for the beam. |
| >>Gantry Rotation Direction | 300A,011F | CS | CW, CC, or NONE | ANAP | AUTO | If an arc is being described, this will represent the direction of the gantry rotation ('CW' or 'CC'). If this is a fixed treatment the value will be 'NONE'. |
| >>Beam Limiting Device Angle | 300A,0120 | DS | | ANAP | AUTO | The collimator angle for the beam. |
| >>Beam Limiting Device Rotation Direction | 300A,0121 | CS | NONE | ANAP | FIXED | |
| >>Patient Support Angle | 300A,0122 | DS | | ANAP | AUTO | The couch angle for the beam. |
| >>Patient Support Rotation Direction | 300A,0123 | CS | NONE | ANAP | FIXED | |
| >>Table Top Eccentric Angle | 300A,0125 | DS | 0 | ANAP | FIXED | |
| >>Table Top Eccentric Rotation Direction | 300A,0126 | CS | NONE | ANAP | FIXED | |
| >>Table Top Vertical Position | 300A,0128 | DS | | ANAPCV | COPY | Empty |
| >>Table Top Longitudinal Position | 300A,0129 | DS | | ANAPCV | COPY | Empty |
| >>Table Top Lateral Position | 300A,012A | DS | | ANAPCV | COPY | Empty |
| >>Isocenter Position | 300A,012C | DS | PATIENT or empty | ANAPCV | AUTO | Sent in mm in the DICOM Patient coordinate system, if RT Plan Geometry (300A, 000C) is PATIENT. Empty, if RT Plan Geometry is TREATMENT_DEVICE. |
| >>Source to Surface Distance | 300A,0130 | DS | | ANAPCV | AUTO | SSD of the beam in mm. |
| >>Cumulative Meterset Weight | 300A,0134 | DS | | ANAPCV | AUTO | For control point 0, this is 0.0. For each subsequent control point this represents the weight of the MU delivered during this control point, expressed as a percentage. The final value will be 1. |
| >Referenced Tolerance Table Number | 300C,00A0 | IS | | ANAPCV | AUTO | The number associated with the Tolerance Table in the DICOM Export Window as defined in your physics machine. |
| >Referenced Bolus Sequence | 300C,00B0 | SQ | | ANAP | AUTO | Introduces the sequence of boluses associated with the beam. |
| >>Referenced ROI Number | 3006,0084 | IS | | ANAP | AUTO | Indicates that bolus is specified for the beam. |

**Table 103: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Instance Creation Date | 0008,0012 | DA | | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.5 | | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | | ALWAYS | AUTO | Generated. |

## 8.1.1.7. RT Ion Plan Storage

### Table 104: IOD of Created RT Ion Plan Storage Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Plan | RT General Plan Module | ALWAYS |
| Plan | RT Patient Setup Module | CONDITIONAL |
| Plan | RT Fraction Scheme Module | CONDITIONAL |
| Plan | RT Ion Beams Module | CONDITIONAL |
| Plan | SOP Common Module | ALWAYS |
| | Extended Dicom and Private attributes (Refer section 8.5) | ALWAYS |

### Table 105: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

*This date will be in yyyymmdd format. If entered or imported in yyyy-mm-dd format, the date will be converted automatically upon export. Other date formats will not be exported.

### Table 106: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Study UID of the data set from which this image was defined. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from Primary image set, if transferred via DICOM. Else it is generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

**Table 107: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTPLAN | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from DICOM Export Window. |

**Table 108: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | AUTO | Uniquely identify the Frame of Reference for the series. For CT and MR data must be the same for every image in the series. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | AUTO | |

**Table 109: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle[3] | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle[3] which transmits the data. |

**Table 110: RT General Plan Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Operators' Name | 0008,1070 | PN | | VNAP | AUTO, USER | The Dosimetrist name as entered in Launch Pad. |
| RT Plan Label | 300A,0002 | SH | | ALWAYS | AUTO, USER | The plan name as entered in Launch Pad concatenated with the Trial Number (i.e., <planName>-<Trial#>). |
| RT Plan Name | 300A,0003 | LO | | ANAPCV | AUTO, USER | The plan name as entered in Launch Pad. |
| RT Plan Description | 300A,0004 | ST | | ANAPCV | AUTO, USER | The comment as entered in Launch Pad. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| RT Plan Date | 300A,0006 | DA | | VNAP | AUTO | The date that the message was created. |
| RT Plan Time | 300A,0007 | TM | | VNAP | AUTO | The time that the message was created. |
| RT Plan Geometry | 300A,000C | CS | | ALWAYS | AUTO | Set to PATIENT if the primary data set was transferred via DICOM. If the primary data set was not transferred via DICOM, the value is TREATMENT_DEVICE. |
| Referenced Structure Set Sequence | 300C,0060 | SQ | | ANAP | AUTO | Sent if RT Plan Geometry is PATIENT. |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.5.1.4.1.1.481.3 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Indicates the structure set that references the patient's coordinate system frame of reference. |

**Table 111: RT Patient Setup Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient Setup Sequence | 300A,0180 | SQ | | ALWAYS | COPY | Introduces the sequence of patient setup data. |
| >Patient Position | 0018,5100 | CS | | ANAP | COPY | 'The treatment position defined by the CT scan. Duplicated from the Primary data set on which the plan was created. |
| >Patient Setup Number | 300A,0182 | IS | 1 | ALWAYS | FIXED | |

**Table 112: RT Fraction Scheme Module***

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Fraction Group Sequence | 300A,0070 | SQ | | ALWAYS | AUTO, COPY | Introduces sequence of Fraction Groups in current Fraction Scheme. Each Fraction Group is translated to a Prescription in Pinnacle[3]. |
| >Fraction Group Number | 300A,0071 | IS | | ALWAYS | AUTO, COPY | Prescription number in Pinnacle. |
| >Number of Fractions Planned | 300A,0078 | IS | | VNAP | AUTO, COPY | The number of fractions for the selected prescription. |
| >Number of Beams | 300A,0080 | IS | | ALWAYS | AUTO, COPY | The number of beams using this prescription. The number will include 2 additional beams if setup beams are being exported. |
| >Number of Brachy Application Setups | 300A,00A0 | IS | 0 | ALWAYS | FIXED | |
| >Referenced Beam Sequence | 300C,0004 | SQ | | ANAP | AUTO, COPY | Introduces the sequence of treatment beams in the current Fraction Group. |
| >>Beam Dose Specification Point | 300A,0082 | DS | | ANAPCV | AUTO, COPY | The location of the Dose Reference Point for the beam, as specified in the Monitor Units window. |
| >>Beam Dose | 300A,0084 | DS | | ANAPCV | AUTO, COPY | The dose in Gy, to the reference point, calculated for this beam. This will be a value of '0' for setup beams. |
| >>Beam Meterset | 300A,0086 | DS | | ANAPCV | AUTO, COPY | The monitor units calculated for this beam. This will be a value of '0' for setup beams. |
| >>Referenced Beam Number | 300C,0006 | IS | | ANAP | AUTO, COPY | Specifies the Beam Number (300A,00C0) of the beam using this prescription. |

*Attributes related to brachytherapy treatments are not supported

**Table 113: RT Ion Beams Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Ion Beam Sequence | 300A,03A2 | SQ | | ALWAYS | AUTO | |
| >Manufacturer | 0008,0070 | LO | | ANAPCV | AUTO | |
| >Institution Name | 0008,0080 | LO | | ANAPCV | AUTO | |
| >Treatment Machine Name | 300A,00B2 | SH | | VNAP | AUTO | |
| >Primary Dosimeter Unit | 300A,00B3 | CS | MU | ALWAYS | AUTO | |
| >Beam Number | 300A,00C0 | IS | | ALWAYS | AUTO | Sequentially numbered starting at 1. |
| >Beam Name | 300A,00C2 | LO | | ALWAYS | AUTO | If the Field ID is specified for the beam, its value is exported in this attribute and the Pinnacle[3] Beam Name is exported in the Beam Description attribute (300A,00C3). If the Field ID is not specified this attribute contains the name of the beam as specified in Pinnacle[3]. |
| >Beam Description | 300A,00C3 | ST | | ANAPCV | AUTO | If Field ID is specified for the beam, this attribute contains the Pinnacle[3] Beam Name. |
| >Beam Type | 300A,00C4 | CS | STATIC | ALWAYS | AUTO, FIXED | |
| >Radiation Type | 300A,00C6 | CS | PROTON | ALWAYS | AUTO, FIXED | |
| >Treatment Delivery Type | 300A,00CE | CS | TREATMENT | ALWAYS | AUTO | |
| >Number of Wedges | 300A,00D0 | IS | 0 | ALWAYS | AUTO | |
| >Number of Compensators | 300A,00E0 | IS | 0 or 1 | ALWAYS | AUTO | |
| >Number of Boli | 300A,00ED | IS | 0 | ALWAYS | AUTO, FIXED | Number of Boli assigned to beam. |
| >Number of Blocks | 300A,00F0 | IS | 1 | ALWAYS | AUTO, FIXED | |
| >Final Cumulative Meterset Weight | 300A,010E | DS | 100 or 1 | ANAP | AUTO | |
| >Number of Control Points | 300A,0110 | IS | 2 | ALWAYS | AUTO | |
| >Ion Range Compensator Sequence | 300A,02EA | SQ | | ANAP | AUTO | |
| >>Material ID | 300A,00E1 | SH | | VNAP | AUTO | |
| >>Compensator Number | 300A,00E4 | IS | 1 | ALWAYS | AUTO | If Compensator is present, it will be 1. |
| >>Compensator ID | 300A,00E5 | SH | | ANAPCV | AUTO, USER | It is a max 16 character ID provided by the user as ID for the compensator. |
| >>Compensator Rows | 300A,00E7 | IS | | ALWAYS | AUTO | |
| >>Compensator Columns | 300A,00E8 | IS | | ALWAYS | AUTO | |
| >>Compensator Pixel Spacing | 300A,00E9 | DS | | ALWAYS | AUTO | |
| >>Compensator Position | 300A,00EA | DS | | ALWAYS | AUTO | |
| >>Compensator Thickness Data | 300A,00EC | DS | | ALWAYS | AUTO | |
| >>Compensator Divergence | 300A,02E0 | CS | ABSENT | ALWAYS | AUTO, FIXED | |
| >>Compensator Mounting Position | 300A,02E1 | CS | SOURCE_SIDE | ALWAYS | AUTO, FIXED | |
| >>Isocenter to Compensator Tray Distance | 300A,02E4 | FL | | ANAP | AUTO | |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>Compensator Column Offset | 300A,02E5 | FL | | ANAP | AUTO | It will be 0 for continues milling method. For plunge milling method, it will be a non zero value for each even numbered row. |
| >>Compensator Relative Stopping Power Ratio | 300A,02E7 | FL | | ANAPCV | AUTO | |
| >>Compensator Milling Tool Diameter | 300A,02E8 | FL | | ANAP | AUTO | It will be exported only if the milling method for the compensator is plunge. |
| >Scan Mode | 300A,0308 | CS | NONE or UNIFORM | ALWAYS | AUTO, FIXED | None - Double Scattering UNIFORM - Uniform Scanning |
| >Virtual Source-Axis Distances | 300A,030A | FL | | ALWAYS | AUTO | |
| >Snout Sequence | 300A,030C | SQ | | ANAP | AUTO | |
| >>Snout ID | 300A,030F | SH | | ALWAYS | AUTO | |
| >Number of Range Shifters | 300A,0312 | IS | 0 | ALWAYS | AUTO, FIXED | |
| >Number of Lateral Spreading Devices | 300A,0330 | IS | 0 or 2 | ALWAYS | AUTO, FIXED | This will be 0 for delivery technique of type Uniform Scanning (i.e. Scan Mode is "UNIFORM"). And 2 for delivery technique of type Double Scattering (i.e. Scan Mode is "NONE"). |
| >Number of Range Modulators | 300A,0340 | IS | 1 | ALWAYS | AUTO, FIXED | 1 |
| >Ion Block Sequence | 300A,03A6 | SQ | | ANAP | AUTO | |
| >>Material ID | 300A,00E1 | SH | | VNAP | AUTO | |
| >>Isocenter to Block Tray Distance | 300A,00F7 | FL | | ALWAYS | AUTO | |
| >>Block Type | 300A,00F8 | CS | APERTURE | ALWAYS | AUTO, FIXED | |
| >>Block Divergence | 300A,00FA | CS | ABSENT | ALWAYS | AUTO, FIXED | |
| >>Block Mounting Position | 300A,00FB | CS | SOURCE_SIDE | ALWAYS | AUTO, FIXED | |
| >>Block Number | 300A,00FC | IS | 1 | ALWAYS | FIXED | |
| >>Block Name | 300A,00FE | LO | | ANAPCV | AUTO | It is a max 16 character string provided by the user as ID for the aperture. |
| >>Block Thickness | 300A,0100 | DS | | ALWAYS | AUTO | |
| >>Block Number of Points | 300A,0104 | IS | | ALWAYS | AUTO | |
| >>Block Data | 300A,0106 | DS | | ALWAYS | AUTO | |
| >Ion Control Point Sequence | 300A,03A8 | SQ | | ALWAYS | AUTO | |
| >>Control Point Index | 300A,0112 | IS | | ALWAYS | AUTO | Sequentially numbered starting at 0. |
| >>Nominal Beam Energy | 300A,0114 | DS | | ANAP | AUTO | |
| >>Gantry Angle | 300A,011E | DS | | ANAP | AUTO | |
| >>Gantry Rotation Direction | 300A,011F | CS | NONE | ANAP | FIXED | |
| >>Beam Limiting Device Angle | 300A,0120 | DS | 0.0 | ANAP | AUTO, FIXED | |
| >>Beam Limiting Device Rotation Direction | 300A,0121 | CS | NONE | ANAP | FIXED | |
| >>Patient Support Angle | 300A,0122 | DS | | ANAP | AUTO | |
| >>Patient Support Rotation Direction | 300A,0123 | CS | NONE | ANAP | FIXED | |
| >>Table Top Vertical Position | 300A,0128 | DS | | ANAPCV | AUTO, FIXED | It will be Empty. |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>Table Top Longitudinal Position | 300A,0129 | DS | | ANAPCV | AUTO, FIXED | It will be Empty. |
| >>Table Top Lateral Position | 300A,012A | DS | | ANAPCV | AUTO, FIXED | It will be Empty. |
| >>Cumulative Meterset Weight | 300A,0134 | DS | 0 or 100 or 1 | VNAP | AUTO | If Varian Patch is enabled, it will have a value of 1 , else 100 for second control point.First Control point will have value 0. |
| >>Table Top Pitch Angle | 300A,0140 | FL | 0 | ANAPCV | AUTO, FIXED | |
| >>Table Top Pitch Rotation Direction | 300A,0142 | CS | NONE | ANAPCV | AUTO, FIXED | |
| >>Table Top Roll Angle | 300A,0144 | FL | 0 | ANAPCV | AUTO, FIXED | |
| >>Table Top Roll Rotation Direction | 300A,0146 | CS | NONE | ANAPCV | AUTO, FIXED | |
| >>Snout Position | 300A,030D | FL | | ANAPCV | AUTO | |
| >>Isocenter Position | 300A012C | DS | | ANAPCV | AUTO | |
| >Patient Support Type | 300A,0350 | CS | TABLE | ALWAYS | AUTO, FIXED | |
| >Lateral Spreading Device Sequence | 300A,0332 | SQ | | ALWAYS | AUTO | |
| >>Lateral Spreading Device Number | 300A,0334 | IS | 1 or 2 | ALWAYS | AUTO | Sequentially Numbered starting from 1. |
| >>Lateral Spreading Device ID | 300A,0336 | SH | | ALWAYS | AUTO, USER | |
| >>Lateral Spreading Device Type | 300A,0338 | CS | SCATTERER | ALWAYS | AUTO | |
| >Range Modulator Sequence | 300A,0342 | SQ | | ALWAYS | AUTO | |
| >>Range Modulator Number | 300A,0344 | IS | 1 | ALWAYS | AUTO | |
| >>Range Modulator ID | 300A,0346 | SH | | ALWAYS | AUTO, USER | |
| >>Range Modulator Type | 300A,0348 | CS | WHL_FIXEDWEIGHTS | ALWAYS | AUTO | |

**Table 114: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.8 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | Generated. |

#### 8.1.1.8. Spatial Registration Storage

**Table 115: IOD of Created Spatial Registration Storage Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |

| | | |
|---|---|---|
| Equipment | General Equipment Module | ALWAYS |
| Spatial Registration | Spatial Registration Module | ALWAYS |
| | SOP Common Module | ALWAYS |

**Table 116: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

*This date will be in yyyymmdd format. If entered or imported in yyyy-mm-dd format, the date will be converted automatically upon export. Other date formats will not be exported.

**Table 117: General Study Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Referenced Study Sequence | 0008,1110 | SQ | | ANAPCV | COPY | Introduces the sequence describing the study containing the data set for which this set of ROIs was defined. |
| >Referenced SOP Class UID | 0008,1150 | UI | 1.2.840.10008.3.1.2.3.2 | ANAP | AUTO | |
| >Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | AUTO | Study UID of the data set from which this image was defined. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from the Primary Image Set, if transferred via DICOM, else it is generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

**Table 118: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | REG | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY, USER | Series Description from the DICOM Export Window. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated. |
| Series Number | 0020,0011 | IS | | VNAP | AUTO, COPY | Series Number from the DICOM Export Window. |

**Table 119: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | AUTO | Matches the Frame of Reference UID for the primary image set if the patient position has not been altered on import. If the patient position was altered on import, a new Frame of Reference UID will be generated. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | COPY | |

**Table 120: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle[3] | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle[3] which transmits the data. |

**Table 121: Spatial Registration Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ALWAYS | COPY | Copied from Plan. |
| Content Time | 0008,0033 | TM | | ALWAYS | COPY | Copied from Plan. |
| Registration Sequence | 0070,0308 | SQ | | ALWAYS | AUTO | Introduces two registration sequences. |
| >Frame of Reference UID | 0020,0052 | UI | | ANAP | AUTO | Identifies the dataset's Frame of Reference. |
| >>Referenced SOP Class UID | 0008,1150 | UI | | ALWAYS | AUTO | The SOP Class UID of each image in the dataset. |
| >>Referenced SOP Instance UID | 0008,1155 | UI | | ALWAYS | AUTO | The SOP Instance UID of each image in the dataset. |
| >Matrix Registration Sequence | 0070,0309 | SQ | | ALWAYS | AUTO | Introduces a single matrix registration sequence. |
| >>Registration Type Code Sequence | 0070,030D | SQ | | VNAP | COPY | Empty. |
| >>Matrix Sequence | 0070,030A | SQ | | ALWAYS | AUTO | Introduces a single matrix registration. |
| >>>Frame of Reference Transformation Matrix | 3006,00C6 | DS | | ALWAYS | AUTO | A 4x4 homogeneous transformation matrix that registers the secondary dataset to the primary dataset. Matrix elements shall be listed in row-major order. The primary dataset must be an identity matrix. |
| Instance Number | 0020,0013 | IS | 1 | ALWAYS | FIXED | |
| Content Label | 0070,0080 | CS | | ALWAYS | AUTO | Current time/date stamp. |

**Table 122: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |

| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
|---|---|---|---|---|---|---|
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.66.1 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | Generated. |

### 8.1.1.9.    Secondary Capture Image Storage SOP Class

#### Table 123: IOD of Created Secondary Capture Image  Storage SOP Class Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | General Series Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Equipment | SC Equipment Module | ALWAYS |
| Image | General Image Module | ALWAYS |
| Image | VOI LUT Module | ALWAYS |
| Image | SOP Common Module | ALWAYS |

#### Table 124: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY, USER | Patient's full legal name, as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY, USER | The patient's Medical Record Number, as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY, USER | The patient's Birth date, as entered in Launch Pad. |
| Patient's Sex | 0010,0040 | CS | M, F, or O | VNAP | COPY, USER | As appropriate based on Launch Pad entry. |

#### Table 125: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Time | 0008,0030 | TM | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Accession Number | 0008,0050 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Referring Physician's Name | 0008,0090 | PN | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |
| Study Description | 0008,1030 | LO | | ANAPCV | COPY, USER | Comment as entered in Launch Pad. |
| Physician of Record | 0008,1048 | PN | | ANAPCV | COPY, USER | Physician as entered in Launch Pad. |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO, COPY | Copied from the Primary Image set, if transferred via DICOM, else it is generated. |
| Study ID | 0020,0010 | SH | | VNAP | COPY | Copied from the Primary Image set, if transferred via DICOM. |

**Table 126: General Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | Generated on Export. |
| Series Number | 0020,0011 | IS | | VNAP | COPY | Empty. |
| Laterality | 0020,0060 | CS | | ANAPCV | COPY | Empty. |

**Table 127: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | ADAC | VNAP | AUTO, COPY | |
| Station Name | 0008,1010 | SH | | ANAPCV | CONFIG, COPY | The host name of the workstation which transmits the data. |
| Manufacturer's Model Name | 0008,1090 | LO | Pinnacle³ | ANAPCV | AUTO, COPY | |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | FIXED | Current version of Pinnacle³ which transmits the data. |

**Table 128: SC Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | OT | ALWAYS | AUTO | |
| Conversion Type | 0008,0064 | CS | WSD | ALWAYS | AUTO | |

**Table 129: General Image Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ANAPCV | AUTO | Date the transfer was performed. |
| Content Time | 0008,0033 | TM | | ANAPCV | AUTO | Time the transfer was performed. |
| Instance Number | 0020,0013 | IS | 1 | VNAP | AUTO | |
| Patient Orientation | 0020,0020 | CS | | ANAPCV | COPY | Empty |

**Table 130: VOI LUT Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Window Center | 0028,1050 | DS | | ANAP | AUTO, COPY | The default window center value for the image, for display purposes. |
| Window Width | 0028,1051 | DS | | ANAP | AUTO, COPY | The default window width value for the image, for display purposes. |

**Table 131: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 100 | ANAP | AUTO, COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | AUTO | The date the message was created. |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | AUTO | The time the message was created. |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.7 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | |

## 8.1.2. Usage of Attributes from Received IOD

### 8.1.2.1. Usage of the Functionality CT, MR, NM and PET Image Storage IODs

The following table lists the supported SOP Classes which can be used by these applications.

#### Table 132: Supported SOP Classes for functionality CT, MR, NM and PET Image Storage IODs

| SOP Class name | SOP Class UID |
|---|---|
| CT Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.2 |
| MR Image  Storage SOP Class | 1.2.840.10008.5.1.4.1.1.4 |
| Nuclear Medicine Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.20 |
| Positron Emission Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.128 |

#### Table 133: Used attributes from CT, MR, NM and PET Image SOP Class Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Study | General Study Module | ALWAYS |
| Series | General Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | CONDITIONAL |
| Equipment | General Equipment Module | ALWAYS |
| Image | General Image Module | ALWAYS |
| Image | Image Plane Module | ALWAYS |
| Image | Image Pixel Module | ALWAYS |
| Image | CT Image Module* | ALWAYS |
| Image | MR Image Module* | ALWAYS |
| Image | NM Image Pixel Module* | ALWAYS |
| Image | NM Reconstruction Module* | CONDITIONAL |
| Image | PET Image Module* | ALWAYS |
|  | SOP Common Module | CONDITIONAL |

**Note:** * Modules are only present per imaging modality.

#### Table 134: Supported attributes of functionality CT, MR, NM and PET SOP Class Instances

| Attribute Name | Tag | VR | Value | Comment |
|---|---|---|---|---|
| SOP Instance UID | (0008,0018) | UI |  | Used in identifying the SOP Instance. |
| SOP Class UID | (0008,0016) | UI |  | Used in identifying the SOP class. |
| Patient's Name | (0010,0010) | PN |  | Displayed to user. |
| Patient ID | (0010,0020) | LO |  | Patient ID. Used in the "Medical Record Number" part of the Patient Demographics feature of AcQSim[3]. |
| Patient's Birth Date | (0010,0030) | DA |  | Birth date of the patient. Used in the Patient Demographics feature of AcQSim[3]. |
| Patient's Sex | (0010,0040) | CS |  | Displayed to user. |
| Pixel Spacing | (0028,0030) | DS |  | Physical distance in the patient between the center of each pixel. |

| Image Orientation (Patient) | (0020,0037) | DS | | Used to find out how the image is stored (how it is reconstructed as compared to the original patient scan orientation). In combination with information from "Patient Position" (0018, 5100) field, this is used to properly import the images in the original orientation of the patient scan. |
|---|---|---|---|---|
| Slice Location | (0020,1041) | DS | | Position of slice relative to an unspecified implementation-specific reference point. Used to represent horizontal couch position in Philips scanners only. |
| Slice Thickness | (0018,0050) | DS | | Nominal slice thickness, in mm. |
| Image Position (Patient) | (0020,0032) | DS | | The x, y, and z coordinates of the upper left corner (center of first voxel transmitted) of the image in mm. Used to properly position each slice in the dataset. |
| Rows | (0028,0010) | US | | Number of rows in the image. |
| Columns | (0028,0011) | US | | Number of columns in the image. |
| Pixel Representation | (0028,0103) | US | | Data representation of the pixel samples. |
| Pixel Data | (7FE0,0010) | OW/OB | | Pixel data. |
| Study Date | (0008,0020) | DA | | Displayed to user. Need to contain same value throughout the study or null. |
| Study Time | (0008,0030) | TM | | Displayed to user. Need to contain same value throughout the study or null. |
| Referring Physician's Name | (0008,0090) | PN | | Patient's referring physician. Used in the Patient Demographics feature of AcQSim[3]. |
| Study Instance UID | (0020,000D) | UI | | Used to associate multiple images into a single Pinnacle[3] data file. |
| Study Description | (0008,1030) | LO | | Study description. Used in the "Comments" field of the Patient Demographics feature of AcQSim3. |
| Patient Position | (0018,5100) | CS | HFS, HFP, HFDL, HFDR, FFS, FFP, FFDL, or FFDR | Used to determine the patient's original position/orientation at the scanner. Although this is a type 2 attribute in DICOM Standards, it is important that this info is provided to be used in Pinnacle[3]. |
| Series Instance UID | (0020,000E) | UI | | Used to associate multiple images into a single Pinnacle[3] data file. |
| Modality | (0008,0060) | CS | | Determine special processing required for interpretation of the image data. |
| Instance Number | (0020,0013) | IS | | Used as slice number. If no value exists or values are the same throughout the dataset, Pinnacle[3] uses its own slice numbering mechanism. |
| Manufacturer | (0008,0070) | LO | | |
| Pixel Padding Value | (0028,0120) | US/SS | | Value of pixels added to non-rectangular image to pad to rectangular format. |
| Manufacturer's Model Name | (0008,1090) | LO | | Manufacturer's model name. |
| Frame of Reference UID | (0020,0052) | UI | | Uniquely identify the Frame of Reference for the series. For CT and MR data must be the same for every image in the series. |
| Image Type | (0008,0008) | CS | | Image identification characteristics. |
| Table Height | (0018,1130) | DS | | Couch height. |

| | | | | |
|---|---|---|---|---|
| Bits Stored | (0028,0101) | US | | Number of bits stored for each pixel sample. |
| Rescale Slope | (0028,1053) | DS | | Used to scale data to Hounsfield Units. |
| Bits Allocated | (0028,0100) | US | | Number of bits allocated for each pixel sample. |
| High Bit | (0028,0102) | US | | Most significant bit for pixel sample data. For CT, NM and PT, value is one less than the value in Bits Stored. |
| Rescale Intercept | (0028,1052) | DS | | Used to scale data to appropriate units. Always zero for PET images. |
| Photometric Interpretation | (0028,0004) | CS | MONOCHROME2 | |
| Gantry/Detector Tilt | (0018,1120) | DS | | If present, must be zero. |
| Samples per Pixel | (0028,0002) | US | 1 | |
| Spacing Between Slices | (0018,0088) | DS | | Used to determine the spacing of the slices for rendering. |

## 8.1.2.2.　Usage of the Functionality RT Structure Set Storage SOP Class

The following table lists the supported SOP Classes which can be used by this application.

**Table 135: Supported SOP Classes for functionality RT Structure Set Storage SOP Class**

| SOP Class name | SOP Class UID |
|---|---|
| RT Structure Set Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.3 |

**Table 136: Used attributes from RT Structure Set Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Structure Set | Structure Set Module | ALWAYS |
| Structure Set | ROI Contour Module | ALWAYS |
| Structure Set | RT ROI Observations Module | ALWAYS |
| Structure Set | SOP Common Module | ALWAYS |

**Table 137: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the patient name as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the medical record number as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY | Not used. |
| Patient's Sex | 0010,0040 | CS | | VNAP | COPY | Used to verify the patient plan matches with the data. |

**Table 138: RT Series Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTSTRUCT | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY | Not used. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | COPY | Written to transfer log. |
| Series Number | 0020,0011 | IS | | VNAP | COPY | Not used. |

**Table 139: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | VNAP | COPY | Written to transfer log. |
| Station Name | 0008,1010 | SH | | ANAPCV | COPY | Written to transfer log. |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | COPY | Written to transfer log. |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | COPY | Written to transfer log. |

**Table 140: Structure Set Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Structure Set Label | 3006,0002 | SH | | ALWAYS | COPY | Not used. |
| Structure Set Name | 3006,0004 | LO | | ANAPCV | COPY | Not used. |
| Structure Set Date | 3006,0008 | DA | | VNAP | COPY | Not used. |
| Structure Set Time | 3006,0009 | TM | | VNAP | COPY | Not used. |
| Referenced Frame of Reference Sequence | 3006,0010 | SQ | | ANAPCV | COPY | Introduces the sequence describing the frame of reference for the data set. Data must have been transferred to Pinnacle[3] via DICOM. |
| >Frame of Reference UID | 0020,0052 | UI | | ANAP | COPY | Must equal the Frame of Reference UID of the plan data set. |
| >RT Referenced Study Sequence | 3006,0012 | SQ | | ANAPCV | COPY | Introduces the sequence describing studies referenced by this structure set. In Pinnacle[3] this identifies the data set used by the plan. |
| >>RT Referenced Series Sequence | 3006,0014 | SQ | | ANAP | COPY | Introduces the sequence describing the series referenced by this structure set. In Pinnacle[3] this identifies the data set. |
| >>>Series Instance UID | 0020,000E | UI | | ANAP | COPY | Used to verify that the structure set corresponds to the current plan. If not the discrepancy is logged and the user warned. |
| >>>Contour Image Sequence | 3006,0016 | SQ | | ANAP | COPY | Introduces the list of Image Class and Instance UIDs within the data set series. May include images that have no contours assigned. |
| >>>>Referenced SOP Class UID | 0008,1150 | UI | | ANAP | COPY | Used to verify that images used to define contours are of the correct class. If not the discrepancy is logged and the user warned. |
| >>>>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | COPY | Used to verify that the image to which the contour is assigned has been transferred to Pinnacle[3]. If not the discrepancy is logged and the user warned. |
| >>Referenced SOP Class UID | 0008,1150 | UI | | ANAP | COPY | Not used. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | COPY | Used to verify that the structure set corresponds to the current plan. If not the discrepancy is logged and the user warned. |
| Structure Set ROI Sequence | 3006,0020 | SQ | | ANAPCV | COPY | Introduces the sequence of structures. One entry per ROI. |
| >ROI Number | 3006,0022 | IS | | ANAP | COPY | Uniquely identifies an ROI when referenced by an ROI Contour and RT ROI Observations modules. |
| >Referenced Frame of Reference UID | 3006,0024 | UI | | ANAP | COPY | Must match the Frame of Reference UID for the data set. If not the discrepancy is logged and the user notified. |
| >ROI Name | 3006,0026 | LO | | ANAPCV | COPY | Used as the ROI or POI name in Pinnacle³. If the name is not a valid Pinnacle³ name or duplicates an existing name, a new unique name will be generated, the action logged, and the user warned. |
| >ROI Volume | 3006,002C | DS | | ANAPCV | COPY | Not used. |
| >ROI Generation Algorithm | 3006,0036 | CS | | ANAPCV | COPY | Not used. |

**Table 141: ROI Contour Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| ROI Contour Sequence | 3006,0039 | SQ | | ALWAYS | COPY | Introduces the sequence of Contour Sequences defining ROIs. |
| >ROI Display Color | 3006,002A | IS | | ANAPCV | COPY | Used to assign a color to the ROI. |
| >Contour Sequence | 3006,0040 | SQ | | ANAPCV | COPY | Introduces the sequence of Contours defining an ROI. |
| >>Contour Image Sequence | 3006,0016 | SQ | | ANAPCV | COPY | Introduces the sequence of image UIDs to which this contour corresponds. The sequence will contain 1 item. |
| >>>Referenced SOP Class UID | 0008,1150 | UI | | ANAP | COPY | Required that all Class UIDs are the same. If not the discrepancy will be logged. |
| >>>Referenced SOP Instance UID | 0008,1155 | UI | | ANAP | COPY | If present, and if the contour is transverse, the contour is assigned to the image identified by this UID, ignoring the z coordinate specified in the contour data. |
| >>Contour Geometric Type | 3006,0042 | CS | POINT or CLOSED_PLANAR | ANAP | COPY | If POINT, the contour represents a POI. If CLOSED_PLANAR, the contour represents an ROI. |
| >>Number of Contour Points | 3006,0046 | IS | | ANAP | COPY | The number of points describing the contour in the Contour Data attributes. |
| >>Contour Data | 3006,0050 | DS | | ANAP | COPY | The (x, y, z) coordinates of the vertices of a single contour in the ROI. |
| >Referenced ROI Number | 3006,0084 | IS | | ALWAYS | COPY | Used to match the contours with the ROI data in the Structure Set. |

**Table 142: RT ROI Observations Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| RT ROI Observations Sequence | 3006,0080 | SQ | | ALWAYS | COPY | Introduces a sequence of ROI observations. 1 per beam. |

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| >Observation Number | 3006,0082 | IS | | ALWAYS | COPY | Not used. |
| >Referenced ROI Number | 3006,0084 | IS | | ALWAYS | COPY | Not used. |
| >RT ROI Interpreted Type | 3006,00A4 | CS | EXTERNAL, PTV, CTV, GTV, TREATED_VOLUME, IRRAD_VOLUME, AVOIDANCE, ORGAN, CAVITY, SUPPORT, FIXATION, DOSE_REGION, CONTROL, BOLUS or MARKER | VNAP | COPY | Type of ROI or POI. |

**Table 143: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | | ANAP | COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | COPY | |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | COPY | |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.3 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | COPY | |

#### 8.1.2.3.    Usage of the Functionality RT Plan Storage SOP Class

The following table lists the supported SOP Classes which can be used by this application.

**Table 144: Supported SOP Classes for functionality RT Plan Storage SOP Class**

| SOP Class name | SOP Class UID |
|---|---|
| RT Plan Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.5 |

**Table 145: Used attributes from RT Plan Storage SOP Class Instances**

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Plan | RT General Plan Module | ALWAYS |
| Plan | RT Fraction Scheme Module | ALWAYS |
| Plan | RT Beams Module | ALWAYS |
| Plan | SOP Common Module | ALWAYS |

**Table 146: Patient Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the patient name as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the medical record number as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY | Not used. |
| Patient's Sex | 0010,0040 | CS | | VNAP | COPY | Used to verify the patient plan matches with the data. |

### Table 147: RT Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | | ALWAYS | COPY | RTPLAN |
| Series Description | 0008,103E | LO | | ANAPCV | COPY | User defined description for this series. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | COPY | Written to transfer log. |
| Series Number | 0020,0011 | IS | | VNAP | COPY | A number that identifies this series. |

### Table 148: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | VNAP | COPY | Written to transfer log. |
| Station Name | 0008,1010 | SH | | ANAPCV | COPY | Written to transfer log. |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | COPY | Written to transfer log. |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | COPY | Written to transfer log. |

### Table 149: RT General Plan Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Operators' Name | 0008,1070 | PN | | VNAP | COPY | Not used. |
| RT Plan Label | 300A,0002 | SH | | ALWAYS | COPY | Not used. |
| RT Plan Name | 300A,0003 | LO | | ANAPCV | COPY | Not used. |
| RT Plan Description | 300A,0004 | ST | | ANAPCV | COPY | Not used. |
| RT Plan Date | 300A,0006 | DA | | VNAP | COPY | Not used. |
| RT Plan Time | 300A,0007 | TM | | VNAP | COPY | Not used. |
| RT Plan Geometry | 300A,000C | CS | | ALWAYS | COPY | Not used. |

### Table 150: RT Fraction Scheme Module*

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Fraction Group Sequence | 300A,0070 | SQ | | ALWAYS | COPY | Introduces sequence of Fraction Groups in current Fraction Scheme. Each Fraction Group is translated to a Prescription in Pinnacle³. |
| >Fraction Group Number | 300A,0071 | IS | | ALWAYS | COPY | Identifies the fraction scheme for a beam. |
| >Number of Fractions Planned | 300A,0078 | IS | | VNAP | COPY | The number of fractions for a prescription. |
| >Number of Beams | 300A,0080 | IS | | ALWAYS | COPY | Used to verify the consistency of the transmitted plan. If this does not match the actual number of beams using this plan, the discrepancy is logged and the user warned. |
| >Number of Brachy Application Setups | 300A,00A0 | IS | | ALWAYS | COPY | Not used. |
| >Referenced Beam Sequence | 300C,0004 | SQ | | ANAP | COPY | Introduces the sequence of treatment beams in the current Fraction Group. |
| >>Beam Dose | 300A,0084 | DS | | ANAPCV | COPY | Not used. |
| >>Beam Meterset | 300A,0086 | DS | | ANAPCV | COPY | Not used. |
| >>Referenced Beam Number | 300C,0006 | IS | | ANAP | COPY | Associates a prescription with a beam. |

Note: * Attributes related to brachytherapy treatments are not supported.

### Table 151: RT Beams Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Beam Sequence | 300A,00B0 | SQ | | ALWAYS | COPY | Introduces the sequence of treatment beams for this RT Plan. There will be 1 entry per beam. |
| >Manufacturer | 0008,0070 | LO | | ANAPCV | COPY | The manufacturer of the machine assigned to this beam. |
| >Institution Name | 0008,0080 | LO | | ANAPCV | | Not used. |
| >Treatment Machine Name | 300A,00B2 | SH | | VNAP | COPY | The name of the machine assigned to this beam. |
| >Primary Dosimeter Unit | 300A,00B3 | CS | MU | ANAPCV | COPY | "MINUTE" is not supported. |
| >Source-Axis Distance | 300A,00B4 | DS | | ANAPCV | COPY | The SAD of the machine assigned to this beam in mm. |
| >Beam Limiting Device Sequence | 300A,00B6 | SQ | | ALWAYS | COPY | Introduces the sequence of beam limiting devices (collimator) jaw or leaf (element) sets. |
| >>RT Beam Limiting Device Type | 300A,00B8 | CS | | ALWAYS | COPY | As appropriate:<br>X = symmetric jaw pair in X direction<br>Y = symmetric jaw pair in Y direction<br>ASYMX = asymmetric jaw pair in X direction<br>ASYMY = asymmetric jaw pair in Y direction<br>MLCX = multileaf jaw pair in X direction<br>MLCY = multileaf jaw pair in Y direction. |
| >>Source to Beam Limiting Device Distance | 300A,00BA | DS | | ANAPCV | COPY | The Source to Beam Limiting Device distance in mm. |
| >>Number of Leaf/Jaw Pairs | 300A,00BC | IS | | ALWAYS | COPY | |
| >>Leaf Position Boundaries | 300A,00BE | DS | | ANAPCV | COPY | The position of the edges of the leaf boundaries with respect to the central axis. There will be the number of leaf pairs + 1 entries. |
| >Beam Number | 300A,00C0 | IS | | ALWAYS | COPY | Must be unique within the sequence, and within the plan. |
| >Beam Name | 300A,00C2 | LO | | ANAPCV | COPY | Must be unique. |
| >Beam Description | 300A,00C3 | ST | | ANAPCV | | Not used. |
| >Beam Type | 300A,00C4 | CS | STATIC or DYNAMIC | ALWAYS | COPY | Only 2 control points are supported, so essentially we support a static or arc beam. |
| >Radiation Type | 300A,00C6 | CS | PHOTON or ELECTRON | VNAP | COPY | |
| >Referenced Patient Setup Number | 300C,006A | IS | | ANAPCV | COPY | References the Patient Setup number (300A,0182) as defined in the Patient Setup Module. However Pinnacle only has one primary data set, so there can only be a single sequence. |
| >Treatment Delivery Type | 300A,00CE | CS | TREATMENT or SETUP | ANAPCV | COPY | |
| >Number of Wedges | 300A,00D0 | IS | 0 or 1 | ALWAYS | COPY | |
| >Wedge Sequence | 300A,00D1 | SQ | | ANAP | COPY | Introduces sequence of treatment wedges. Required if Number of Wedges is non-zero. |
| >>Wedge Number | 300A,00D2 | IS | 0 | ANAP | | Not used. |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>Wedge Type | 300A,00D3 | CS | STANDARD, DYNAMIC, or MOTORIZED | ANAPCV | COPY | As appropriate: STANDARD = standard (static) wedge DYNAMIC = moving beam limiting device jaw simulating wedge MOTORIZED = single wedge that can be removed from beam remotely. |
| >>Wedge ID | 300A,00D4 | SH | | ANAPCV | COPY | The Manufacturer code of the wedge assigned to the beam. Must match a code in wedge list. |
| >>Wedge Angle | 300A,00D5 | IS | | ANAPCV | COPY | The angle of the wedge for the beam. |
| >>Wedge Factor | 300A,00D6 | DS | | ANAPCV | COPY | Not used. |
| >>Wedge Orientation | 300A,00D8 | DS | | ANAPCV | COPY | The orientation of the wedge. Must be 0, 90, 180, 270, or 360. |
| >Number of Compensators | 300A,00E0 | IS | | ALWAYS | COPY | Not supported. |
| >Compensator Sequence | 300A,00E3 | SQ | | ANAP | | Not supported. |
| >Number of Boli | 300A,00ED | IS | | ALWAYS | | Not supported. |
| >Number of Blocks | 300A,00F0 | IS | | ALWAYS | COPY | The number of contours required to describe the block. |
| >Total Block Tray Factor | 300A,00F2 | DS | | ANAPCV | COPY | The tray factor of the beam. |
| >Block Sequence | 300A,00F4 | SQ | | ANAP | COPY | Introduces sequence of blocks associated with Beam. Required if Number of Blocks is non-zero. |
| >>Material ID | 300A,00E1 | SH | | ANAPCV | COPY | Not supported. |
| >>Block Tray ID | 300A,00F5 | SH | | ANAPCV | AUTO | Not supported. |
| >>Source to Block Tray Distance | 300A,00F6 | DS | | ANAPCV | COPY | Not supported. |
| >>Block Type | 300A,00F8 | CS | SHIELDING or APERTURE | ANAP | AUTO | Not supported. |
| >>Block Divergence | 300A,00FA | CS | PRESENT | ANAPCV | FIXED | Not supported. |
| >>Block Number | 300A,00FC | IS | | ANAP | AUTO | Not supported. |
| >>Block Thickness | 300A,0100 | DS | | ANAPCV | COPY | Not supported. |
| >>Block Transmission | 300A,0102 | DS | | ANAPCV | AUTO | Not supported. |
| >>Block Number of Points | 300A,0104 | IS | | ANAPCV | AUTO | Not supported. |
| >>Block Data | 300A,0106 | DS | | ANAPCV | AUTO | Not supported. |
| >Applicator Sequence | 300A,0107 | SQ | | ANAPCV | COPY | Introduces the sequence of Applicators. Only a single item shall be permitted in this sequence. |
| >>Accessory Code | 300A,00F9 | LO | | ANAP | AUTO | Supported. |
| >>Applicator ID | 300A,0108 | SH | | ANAP | | Name of the applicator or circular collimator assigned to the beam. For a stereo beam, the name of the circular collimator. For an electron beam, the electron applicator name. Must match an electron applicator or circular collimator in the applicator list. |
| >>Applicator Type | 300A,0109 | CS | STEREOTACTIC, ELECTRON_SQUARE, or ELECTRON_RECT | ANAP | COPY | For a stereo beam, set to 'STEREOTACTIC'. For an electron beam the dimensions of the applicator will be checked, if length = height 'ELECTRON_SQUARE' will be set. Otherwise 'ELECTRON_RECT'. |
| >Final Cumulative Meterset Weight | 300A,010E | DS | | ANAP | COPY | Must be 1. |
| >Number of Control Points | 300A,0110 | IS | 2 | ALWAYS | COPY | Must be 2, else the beam will be rejected. |

| | | | | | | |
|---|---|---|---|---|---|---|
| >Control Point Sequence | 300A,0111 | SQ | | ALWAYS | COPY | Introduces the sequence of machine configurations describing this treatment beam. |
| >>Control Point Index | 300A,0112 | IS | | ANAP | | |
| >>Nominal Beam Energy | 300A,0114 | DS | | ANAPCV | COPY | The selected machine energy for this beam. Pinnacle does not support the import of different energies for multiple control points within the same beam. |
| >>Dose Rate Set | 300A,0115 | DS | | ANAPCV | | Not used. |
| >>Wedge Position Sequence | 300A,0116 | SQ | | ANAPCV | | Not used, since we only support a sequence of 1 wedge. |
| >>>Wedge Position | 300A,0118 | CS | | ANAP | AUTO | If this tag is present, the wedge is presumed to be "IN" since it was defined at all. |
| >>>Referenced Wedge Number | 300C,00C0 | IS | | ANAP | | Not used. |
| >>Beam Limiting Device Position Sequence | 300A,011A | SQ | | ANAP | | Not used. |
| >>>RT Beam Limiting Device Type | 300A,00B8 | CS | | ANAP | | Not used. |
| >>>Leaf/Jaw Positions | 300A,011C | DS | | ANAP | COPY | The jaw or MLC leaf positions for this control point in mm. |
| >>Gantry Angle | 300A,011E | DS | | ANAP | COPY | The gantry angle of the beam for this control point. Control point zero will always represent the starting angle for the beam. |
| >>Gantry Rotation Direction | 300A,011F | CS | CW, CC, or NONE | ANAP | COPY | If an arc is being described, this will represent the direction of the gantry rotation ('CW' or 'CC'). If this is a fixed treatment the value should be 'NONE'. |
| >>Beam Limiting Device Angle | 300A,0120 | DS | | ANAP | COPY | The collimator angle for the beam. |
| >>Beam Limiting Device Rotation Direction | 300A,0121 | CS | NONE | ANAP | FIXED | Pinnacle does not support rotation of the collimator during treatment. |
| >>Patient Support Angle | 300A,0122 | DS | | ANAP | COPY | The couch angle for the beam. |
| >>Patient Support Rotation Direction | 300A,0123 | CS | NONE | ANAP | FIXED | Pinnacle does not support rotation of the couch during treatment. |
| >>Table Top Eccentric Angle | 300A,0125 | DS | | ANAP | | Not used. |
| >>Table Top Eccentric Rotation Direction | 300A,0126 | CS | | ANAP | | Not used. |
| >>Table Top Vertical Position | 300A,0128 | DS | | ANAPCV | | Not used. |
| >>Table Top Longitudinal Position | 300A,0129 | DS | | ANAPCV | | Not used. |
| >>Table Top Lateral Position | 300A,012A | DS | | ANAPCV | | Not used. |
| >>Isocenter Position | 300A,012C | DS | | ANAPCV | COPY | Pinnacle does not support movement of the isocenter during treatment. |
| >>Source to Surface Distance | 300A,0130 | DS | | ANAPCV | | Not imported. Pinnacle computes the SSD. |
| >>Cumulative Meterset Weight | 300A,0134 | DS | | ANAPCV | FIXED | The first control point weight must be 0, and the second must be 1. |
| >Referenced Tolerance Table Number | 300C,00A0 | IS | | ANAPCV | | Not used. |
| >Referenced Bolus Sequence | 300C,00B0 | SQ | | ANAP | | Not used. |
| >>Referenced ROI Number | 3006,0084 | IS | | ANAP | | Not used |

### Table 152: SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | | ANAP | COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | COPY | |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | COPY | |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.5 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | COPY | |

#### 8.1.2.4. Usage of the Functionality Spatial Registration Storage SOP Class

The following table lists the supported SOP Classes which can be used by this application.

### Table 153: Supported SOP Classes for functionality Spatial Registration Storage SOP Class

| SOP Class name | SOP Class UID |
|---|---|
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |

### Table 154: Used attributes from Spatial Registration Storage SOP Class Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Spatial Registration | Spatial Registration Module | ALWAYS |
| | SOP Common Module | ALWAYS |

### Table 155: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the patient name as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the medical record number as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY | Not used. |
| Patient's Sex | 0010,0040 | CS | | VNAP | COPY | Used to verify the patient plan matches with the data. |

### Table 156: RT Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | REG | ALWAYS | COPY | |
| Series Description | 0008,103E | LO | | ANAPCV | COPY | User defined description for this series. |
| Series Instance UID | 0020,000E | UI | | ALWAYS | COPY | Written to transfer log. |
| Series Number | 0020,0011 | IS | | VNAP | COPY | A number that identifies this series. |

**Table 157: Frame of Reference Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | COPY | Not used. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | COPY | Not used. |

**Table 158: General Equipment Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | VNAP | COPY | Written to transfer log. |
| Station Name | 0008,1010 | SH | | ANAPCV | COPY | Written to transfer log. |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | COPY | Written to transfer log. |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | COPY | Written to transfer log. |

**Table 159: Spatial Registration Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Content Date | 0008,0023 | DA | | ALWAYS | COPY | Not used. |
| Content Time | 0008,0033 | TM | | ALWAYS | COPY | Not used. |
| Registration Sequence | 0070,0308 | SQ | | ALWAYS | COPY | Introduces two registration sequences. |
| >Frame of Reference UID | 0020,0052 | UI | | ANAP | COPY | Identifies the dataset's Frame of Reference. |
| >>Referenced SOP Class UID | 0008,1150 | UI | | ALWAYS | COPY | Not used. |
| >>Referenced SOP Instance UID | 0008,1155 | UI | | ALWAYS | COPY | Not used. |
| >Matrix Registration Sequence | 0070,0309 | SQ | | ALWAYS | COPY | Introduces a single matrix registration sequence. |
| >>Frame of Reference Transformation Comment | 3006,00C8 | DS | | ANAPCV | COPY | Not used. |
| >>Registration Type Code Sequence | 0070,030D | SQ | | VNAP | COPY | Not used. |
| >>Matrix Sequence | 0070,030A | SQ | | ALWAYS | COPY | Introduces a single matrix registration. |
| >>>Frame of Reference Transformation Matrix | 3006,00C6 | DS | | ALWAYS | COPY | A 4x4 homogeneous transformation matrix that registers the secondary dataset to the primary dataset. Matrix elements shall be listed in row-major order.  The primary dataset must be an identity matrix. |
| Instance Number | 0020,0013 | IS | | ALWAYS | COPY | Not used. |
| Content Label | 0070,0080 | CS | | ALWAYS | COPY | Not used. |

**Table 160: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | | ANAP | COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | COPY | |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | COPY | |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.66.1 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | COPY | |

### 8.1.2.5.  Usage of the Functionality RT Dose Storage SOP Class

The following table lists the supported SOP Classes which can be used by this application.

### Table 161: Supported SOP Classes for functionality RT Dose Storage SOP Class

| SOP Class name | SOP Class UID |
|---|---|
| RT Dose Storage SOP Class | 1.2.840.10008.5.1.4.1.1.481.2 |

### Table 162: Used attributes from RT Dose Storage Instances

| Information Entity | Module | Presence Of Module |
|---|---|---|
| Patient | Patient Module | ALWAYS |
| Series | RT Series Module | ALWAYS |
| Frame of Reference | Frame of Reference Module | ALWAYS |
| Equipment | General Equipment Module | ALWAYS |
| Dose | Image Plane Module | ALWAYS |
| Dose | Image Pixel Module | ALWAYS |
| Dose | Multi-Frame Module | ALWAYS |
| Dose | RT Dose Module | ALWAYS |
| Dose | SOP Common Module | ALWAYS |

### Table 163: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the patient name as entered in Launch Pad. |
| Patient ID | 0010,0020 | LO | | VNAP | COPY | Used to verify the patient plan matches with the data. Matched with the medical record number as entered in Launch Pad. |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | COPY | Not used. |
| Patient's Sex | 0010,0040 | CS | | VNAP | COPY | Used to verify the patient plan matches with the data. |

### Table 164: RT Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Modality | 0008,0060 | CS | RTDOSE | ALWAYS | COPY | |

### Table 165: Frame of Reference Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Frame of Reference UID | 0020,0052 | UI | | ALWAYS | COPY | Matches the Frame of Reference UID to the image set. If there are multiple Frame of References that match (i.e. gated dataset) then we let the user decide which dataset to assign the dose to upon import. |
| Position Reference Indicator | 0020,1040 | LO | | VNAP | COPY | |

### Table 166: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | | VNAP | COPY | Written to transfer log. |
| Station Name | 0008,1010 | SH | | ANAPCV | COPY | Written to transfer log. |
| Manufacturer's Model Name | 0008,1090 | LO | | ANAPCV | COPY | Written to transfer log. |
| Software Version(s) | 0018,1020 | LO | | ANAPCV | COPY | Written to transfer log. |

**Note:** For DICOM Images (PET, CT, MR, NM) we use the Patient Orientation tag. However, for RT Dose import, we do not use the Patient Orientation.  Therefore for the SCP in the RT Dose IOD, we do not process any General Image Module tags.

**Table 167: Image Plane Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Slice Thickness | 0018,0050 | DS | | ALWAYS | COPY | Nominal slice thickness, in mm. |
| Image Orientation (Patient) | 0020,0037 | DS | | ALWAYS | COPY | Must be axial to import dose, and it will determine the dose coordinate system. |
| Pixel Spacing | 0028,0030 | DS | | ALWAYS | COPY | Physical distance in the patient between the center of each voxel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. |

**Table 168: Image Pixel Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | COPY | |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | COPY | |
| Rows | 0028,0010 | US | | ALWAYS | AUTO, COPY | Number of rows in the image. |
| Columns | 0028,0011 | US | | ALWAYS | AUTO, COPY | Number of columns in the image. |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | COPY | |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | COPY | |
| High Bit | 0028,0102 | US | 15 | ALWAYS | COPY | |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | COPY | '0' designates unsigned integer. |

**Table 169: Multi-Frame Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Number of Frames | 0028,0008 | IS | | ALWAYS | COPY | Number of frames in a Multi-frame Image. See of the DICOM Part3 specification PS3.3 for explanation. |

**Table 170: RT Dose Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Dose Units | 3004,0002 | CS | Gy(RBE) | ALWAYS | COPY | Units used to describe dose: 'Gy'(Gray RBE) |
| Dose Type | 3004,0004 | CS | PHYSICAL or EFFECTIVE | ALWAYS | COPY | |
| Dose Summation Type | 3004,000A | CS | PLAN | ALWAYS | COPY | 'PLAN' (dose calculated for a single Prescription (Fraction Group) within an RT Plan) |
| Grid Frame Offset Vector | 3004,000C | DS | | ANAP | COPY | We accept only grid based dose whose direction is increasing or decreasing, does not change direction, and is not variably spaced. |
| Dose Grid Scaling | 3004,000E | DS | | ALWAYS | COPY | Scaling factor that when multiplied by the dose grid data found in the Pixel Data (7FE0,0010) attribute of the Image Pixel Module, yields grid doses in the dose units as specified by Dose Units (3004,0002). |

**Table 171: SOP Common Module**

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | | ANAP | COPY | |
| Instance Creation Date | 0008,0012 | DA | | ANAPCV | COPY | |
| Instance Creation Time | 0008,0013 | TM | | ANAPCV | COPY | |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.481.2 | ALWAYS | COPY | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | COPY | |

## 8.1.3.   Attribute Mapping

Not applicable.

## 8.1.4.   Coerced/Modified fields

Not applicable.

## 8.2.   Data Dictionary of Private Attributes

Not applicable.

## 8.3.   Coded Terminology and Templates

Not applicable.

## 8.3.1.   Context Groups

Not applicable.

## 8.3.2.   Template Specifications

Not applicable.

## 8.3.3.   Private code definitions

Not applicable.

## 8.4.   Grayscale Image consistency

Not applicable.

## 8.5.   Standard Extended/Specialized/Private SOPs

### 8.5.1.1.   RT Plan Storage SOP Class Instances

**Table 172: Extended DICOM and private attributes for RT Plan Storage SOP Class Instances\***

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Private Creator Code | 3253,0010 | | | ALWAYS | AUTO | - |
| >OBI Field Type Specification | 3253,1000 | | | ANAP | AUTO | - |
| >OBI Information Length | 3253,1001 | | | ANAP | AUTO | - |
| Extended Interface Format | 3253,1002 | | | ANAP | AUTO | - |

\* The Varian Private attributes are only included if Varian OBI support has been enabled and Setup beams are being exported.

### 8.5.1.2.    RT Ion Plan Storage SOP Class Instances

#### Table 173: Extended DICOM and private attributes for RT Ion Plan Storage SOP Class Instances

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Maximum Collimated Field Diameter | 300B,1002 | UN | | ALWAYS | AUTO | The maximum diameter (in mm) of a circle, centered about the beam axis, which contains the collimated field. |
| Planned Distal target distance | 300B,1004 | UN | | ALWAYS | AUTO | It represents the 90% of the distal Bragg peak. |
| Nominal SOPB width | 300B,100E | UN | | ALWAYS | AUTO | Distance (in mm) between maximal Water-Equivalent distance to distal border of target and minimal Water-Equivalent Distance to proximal border of target. |

## 8.6.    Private Transfer Syntaxes

Not applicable.