

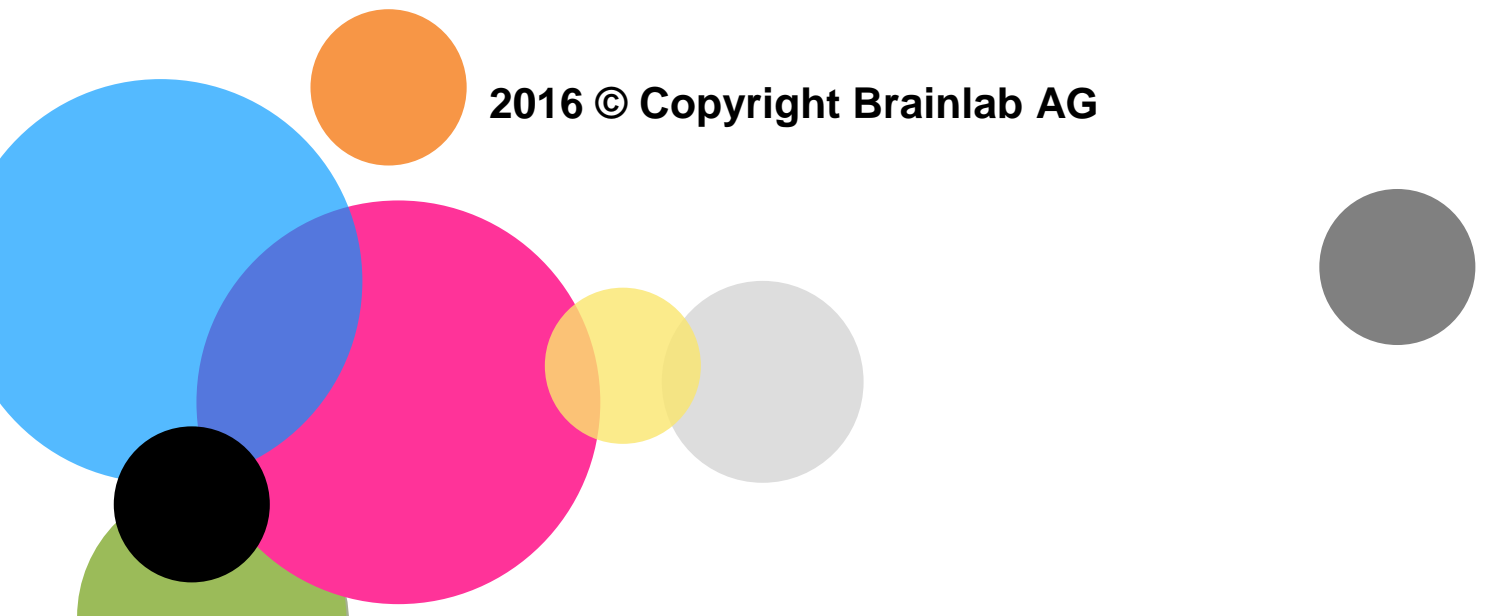
DICOM Conformance Statement

ExacTrac 6.2

Document Revision 3

July 6, 2016

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1 Conformance Statement Overview

This is a conformance statement for the Brainlab software ExacTrac.

The DICOM import part of the application is

- Query remote DICOM archives.
- Retrieve DICOM data from archives.

The DICOM export part of the application is

- Send DICOM data to another DICOM application or archive.
- Write DICOM data to the file system (no media interchange application profile supported so far).

What is not part of ExacTrac:

- There is no direct way e.g. to read DICOM files and send them to a remote system.
- ExacTrac itself has no permanent DICOM Storage SCP to receive data at any time. This feature is provided by the Brainlab DICOM Proxy (see [2]).

| SOP Classes | User Of Service (SCU) | Provider Of Service (SCP) |
|--|-----------------------|---------------------------|
| Transfer | | |
| CT Image Storage | No | Yes |
| RT Structure Set Storage | No | Yes |
| RT Plan Storage | No | Yes |
| RT Image Storage | Yes | No |
| Spatial Registration Storage | Yes | No |
| Query/Retrieve | | |
| Study Root Query/Retrieve Information Model - FIND | Yes | No |
| Study Root Query/Retrieve Information Model - MOVE | Yes | No |

Table 1-1: Network services supported by ExacTrac

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3 Introduction

3.1 Revision History

| Document Version | Date of Issue | Author | Description |
|------------------|-------------------|--------|--------------------------------|
| 1 | November 11, 2011 | | Initial release for ExacTrac 6 |
| 2 | July 25, 2014 | | Update for ExacTrac 6.1 |
| 3 | July 6, 2016 | | Update for ExacTrac 6.2 |

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.3 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [1]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Brainlab and non–Brainlab equipment.
- This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended. An acceptance protocol is available to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements. Brainlab reserves the right to make changes to its products or to discontinue its delivery.

3.4 Abbreviations

There are a variety of terms and abbreviations used in the document that are defined in the DICOM Standard. Abbreviations and terms are as follows:

| | |
|------|---|
| AE | DICOM Application Entity |
| AET | Application Entity Title |
| CD | Compact Disk |
| CD-R | Compact Disk Recordable |
| DVD | Digital Versatile Disc |
| FSC | File-Set Creator |
| FSU | File-Set Updater |
| FSR | File-Set Reader |
| HD | Hard Disk |
| IOD | (DICOM) Information Object Definition |
| ISO | International Standard Organization |
| MOD | Magneto Optical Disk |
| PDU | DICOM Protocol Data Unit |
| Q/R | Query and Retrieve |
| SCU | DICOM Service Class User (DICOM client) |
| SCP | DICOM Service Class Provider (DICOM server) |
| SOP | DICOM Service-Object Pair |
| TPS | Treatment Planning System |

3.5 References

- [1] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-3.18 – 2016
- [2] DICOM Conformance Statement DICOM Proxy, Brainlab AG

4 Networking

4.1 Implementation Model

The Brainlab ExacTrac application is an implementation of:

- A Media File Set Reader to load DICOM data from a file system.
- A Storage SCU that sends DICOM data to a DICOM archive or workstation.
- A Query/Retrieve SCU to query DICOM archives and to initiate a move request for the queried archive.

4.1.1 Application Data Flow Diagram

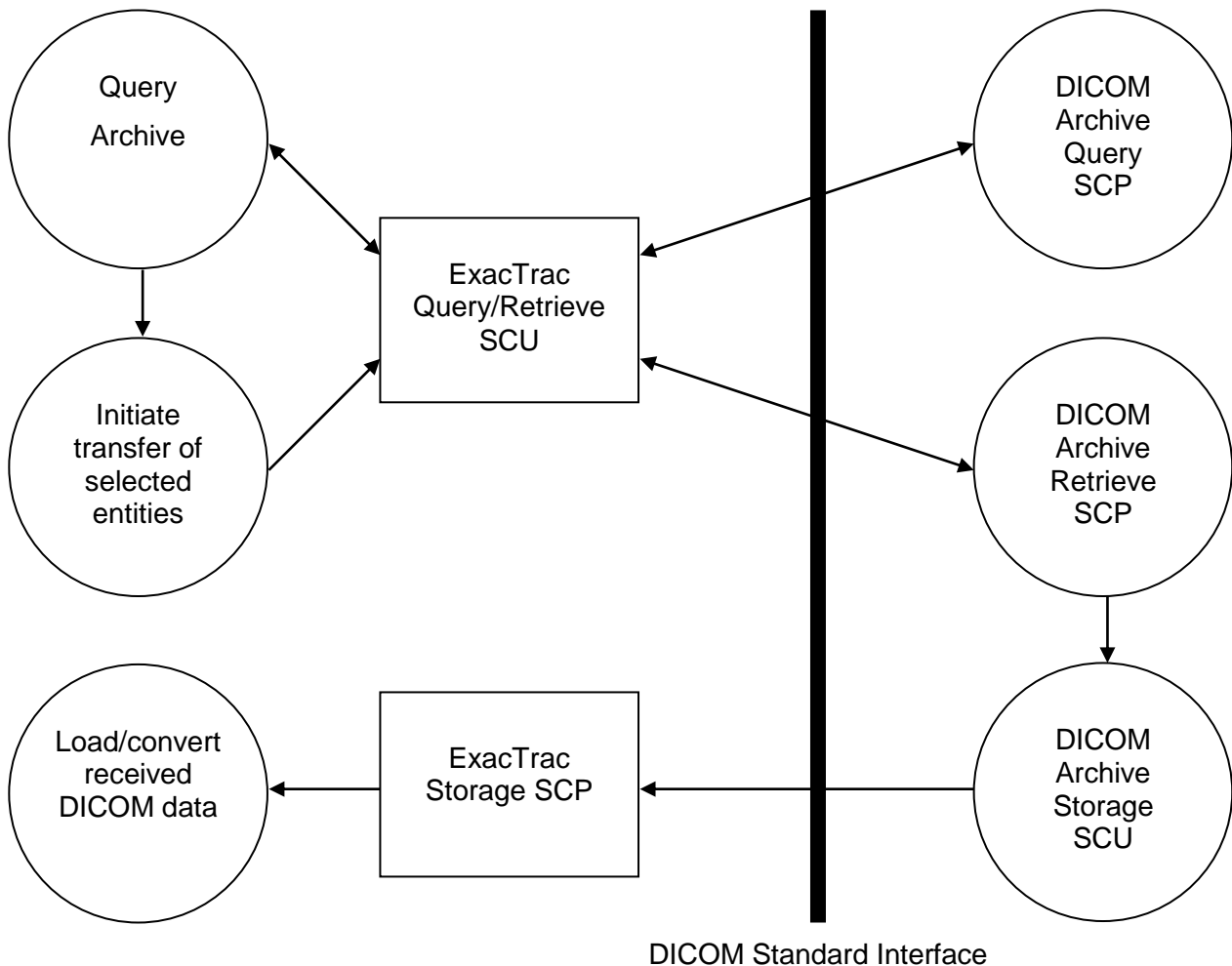


Figure 4-1: The Query/Retrieve SCU and Storage SCP application flow diagram

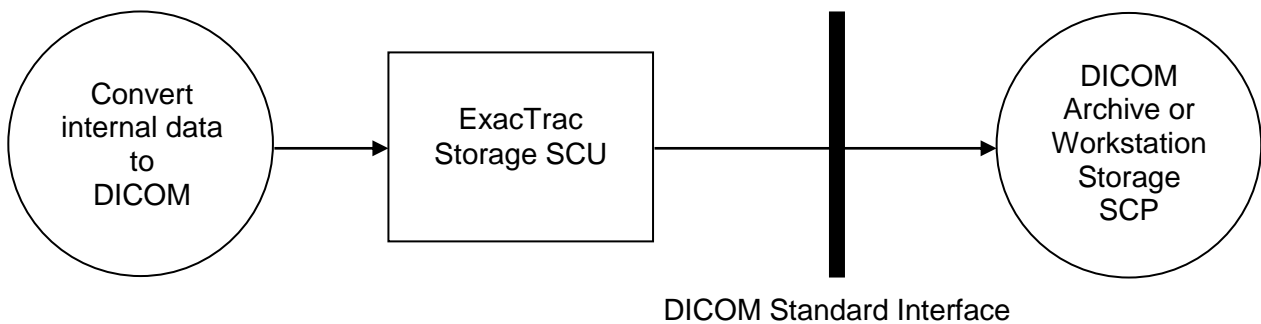


Figure 4-2: The Storage SCU application flow diagram

4.1.2 Functional Definition of Application Entity (AE)

Some communications and data transfer with remote AEs are accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

- **Query and Retrieve:**
The application wants to find a certain dataset in a DICOM archive. ExacTrac initiates an association as a Q/R SCU negotiating all models. The find request can be performed (depending on the negotiated models) on the DICOM levels study, series or instance. For a selected DICOM entity (study, series or instance) a move request can be performed. The application supplies all unique keys for the requested level. The move response, indicating the storage-progress, is graphically evaluated.
- **Storage SCP¹:**
During a move operation a DICOM Storage SCP is invoked. ExacTrac accepts an association with a Storage SCU negotiating any of the SOP Classes listed in Table 4-2.
- **Storage SCU:**
ExacTrac loads data from the Brainlab file format, converts it to DICOM and initiates an association with a Storage SCP negotiating all SOPs listed in Table 4-2. The converted DICOM data is then sent to the remote DICOM Storage SCP.

4.1.3 Sequencing Of Real World Activities

ExacTrac Query/Retrieve SCU performs a sequencing of real world activities as follows:

1. Query Archive:
 - a. Send DICOM Query/Retrieve C-FIND request.
 - b. Receive DICOM Query/Retrieve C-FIND responses.
2. Application selects data to retrieve.
3. Transfer of selected entities is initiated:
 - a. Start the DICOM Storage SCP
 - b. Send a DICOM Query/Retrieve C-MOVE request
 - c. Receive DICOM C-STORE requests with the requested SOP instances.

¹ The Storage SCP is only available during a DICOM Query/Retrieve Move session. ExacTrac itself provides no permanent Storage SCP to receive data at any time. If you need this feature the Brainlab DICOM Proxy has to be installed (see [2])

- d. Receive DICOM Query/Retrieve C-MOVE responses
 - e. Stop the DICOM Storage SCP
4. Convert received DICOM data to Brainlab Advanced file format.

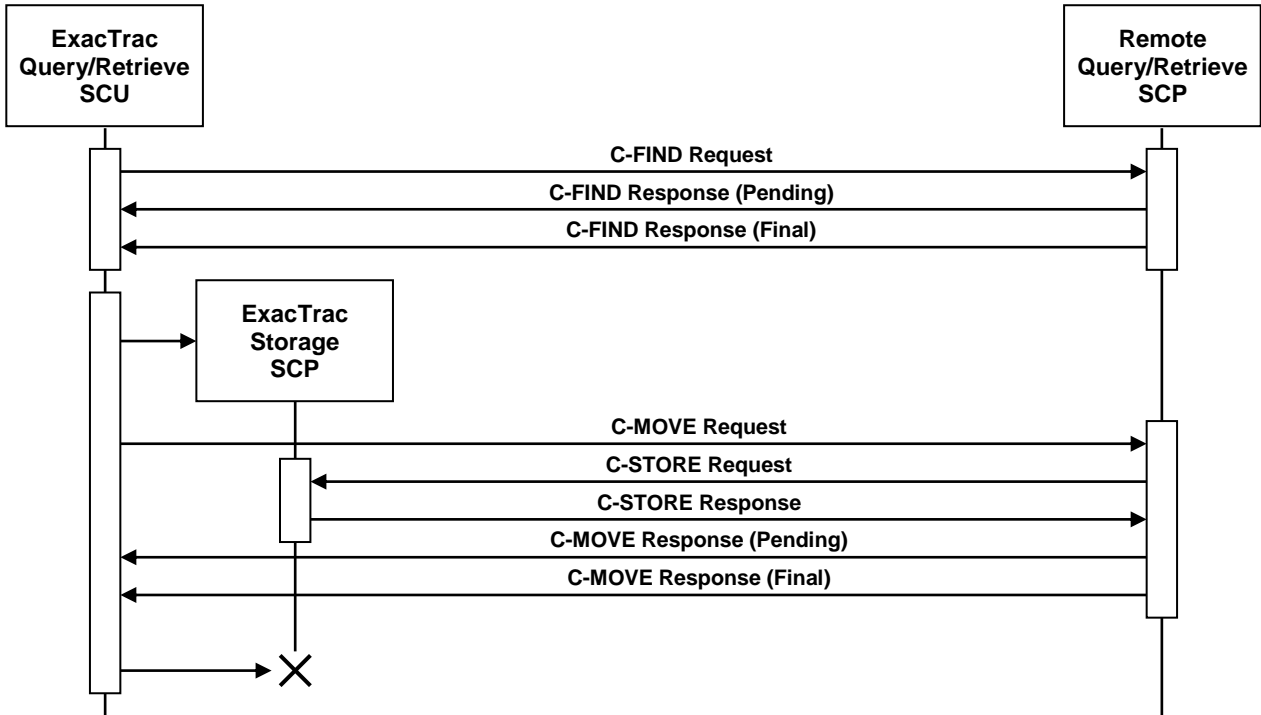


Figure 4-3: Sequencing of Query/Retrieve SCU and Storage SCP

4.2 Application Entity Specifications

4.2.1 ExacTrac Specification

4.2.1.1 SOP Classes and Transfer Syntaxes

ExacTrac sends or receives a C-ECHO request in order to test the connection to a remote AE. It provides standard conformance to the following DICOM V3.0 SOP Classes:

| SOP Class Name | SOP Class UID | SCU | SCP |
|------------------------|-------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |

Table 4-1: Supported Verification SOP Classes

ExacTrac imports and exports DICOM image data. It provides Standard Conformance to the following DICOM V3.0 SOP Classes:

| SOP Class Name | SOP Class UID | SCU | SCP |
|------------------------------|-------------------------------|-----|-----|
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | No | Yes |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | No | Yes |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | No | Yes |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | No |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | No |

Table 4-2: Supported Storage SOP Classes

ExacTrac is able to query a remote archive. It provides Standard Conformance to the following DICOM V3.0 SOP Classes:

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|-----------------------------|-----|-----|
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | No |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | No |

Table 4-3: Supported Query/Retrieve SOP Classes

ExacTrac supports the following transfer syntaxes. In an association negotiation the syntaxes are proposed in the order of appearance in the list.

| Transfer Syntax Name | Transfer Syntax UID | SCU | SCP | Extended Negotiation |
|---------------------------------|---------------------|-----|-----|----------------------|
| DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | Yes | Yes | None |
| DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | Yes | Yes | None |
| DICOM Explicit VR Big Endian | 1.2.840.10008.1.2.2 | Yes | Yes | None |

Table 4-4: Supported Transfer Syntaxes (association negotiation)

4.2.1.2 Association Policies

4.2.1.2.1 General

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

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

4.2.1.2.2 Number of Associations

For both association initiation and acceptance:

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

4.2.1.2.3 Asynchronous Nature

The ExacTrac does not support asynchronous communication (multiple outstanding transactions over a single association).

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

4.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

| | |
|-----------------------------|---------------------------|
| Implementation Class UID | 1.2.276.0.20.1.1.11.6.2.0 |
| Implementation Version Name | ExacTrac |

4.2.1.3 Association Initiation Policy

ExacTrac initiates an association in these cases:

1. Find: The application tries to find a specific entity in a remote DICOM archive.
2. Retrieve: The application wants to retrieve a specific entity from the remote DICOM archive and wants to convert it to the Brainlab advanced file format.
3. Store: The user wants to send image registration information to a remote DICOM node.

4.2.1.3.1 Activity – Find

4.2.1.3.1.1 Description and Sequencing of Activities

A DICOM Query/Retrieve C-FIND request is performed when the user queries the remote DICOM archive for patients, studies, series or instances.

4.2.1.3.1.2 Proposed Presentation Contexts

| Presentation Context Table | | | |
|---|--|------|-----------|
| Abstract Syntax | Transfer Syntax | Role | Ext. Neg. |
| All SCU SOP Classes listed in Table 4-1 and all FIND SCU SOP Classes as listed in Table 4-3 | All SCU Transfer Syntaxes as listed in Table 4-4 | SCU | None |
| | | SCU | None |
| | | SCU | None |

Table 4-5: Proposed Presentation Contexts for Activity Find.

4.2.1.3.1.3 SOP Specific Conformance

ExacTrac provides standard conformance to the DICOM Verification Service Class and to the DICOM Query/Retrieve FIND SOP Classes. No extended negotiation is implemented.

For the study-root model, the application restricts the patient/study query by the following attributes:

| Description | Tag |
|----------------|-------------|
| Patient's Name | (0010,0010) |
| Patient ID | (0010,0020) |

4.2.1.3.2 Activity – Retrieve

4.2.1.3.2.1 Description and Sequencing of Activities

On a successful find operation for a specific instance the application will automatically perform a move request. The storage target for receiving the DICOM data (the AET with which the move-request is equipped) is the ExacTrac application itself.

The Move operation only can be invoked after a Find operation. See chapter 4.1.3 for a detailed sequencing diagram.

4.2.1.3.2.2 Proposed Presentation Contexts

| Presentation Context Table | | | |
|---|--|------|-----------|
| Abstract Syntax | Transfer Syntax | Role | Ext. Neg. |
| All SCU SOP Classes listed in Table 4-1 and all SCU MOVE SOP Classes as listed in Table 4-3 | All SCU Transfer Syntaxes as listed in Table 4-4 | SCU | None |
| | | SCU | None |
| | | SCU | None |

Table 4-6: Proposed Presentation Contexts for Activity Move.

4.2.1.3.2.3 SOP Specific Conformance

ExacTrac provides standard conformance to the DICOM Verification Service Class and to the DICOM Query/Retrieve MOVE SOP Classes. No extended negotiation is implemented.

4.2.1.3.3 Activity – Store

4.2.1.3.3.1 Associated Real-World Activity

After successful conversion of the selected Brainlab data to DICOM a storage request is performed to send the DICOM data to a remote Storage SCP. The remote Storage SCP must be one of the AETs known by ExacTrac.

4.2.1.3.3.2 Proposed Presentation Contexts

| Presentation Context Table | | | |
|--|--|------|-----------|
| Abstract Syntax | Transfer Syntax | Role | Ext. Neg. |
| All SCU SOP Classes as listed in Table 4-1 and Table 4-2 | All SCU Transfer Syntaxes as listed in Table 4-4 | SCU | None |
| | | SCU | None |
| | | SCU | None |

Table 4-7: Proposed Presentation Contexts for Activity Store.

4.2.1.3.3.3 SOP Specific Conformance

ExacTrac provides standard conformance to the DICOM Verification Service Class and to the DICOM Storage SOP Classes. No extended negotiation is implemented.

4.2.1.4 Association Acceptance Policy

ExacTrac accepts an association in this case:

1. Retrieve: The application wants to retrieve a specific entity from the remote DICOM archive.

4.2.1.4.1 Activity – Retrieve

4.2.1.4.1.1 Associated Real-World Activity

On user selection of a specific DICOM entity a move request is performed. To receive the requested SOP instances a Storage SCP is invoked. The Storage SCP is only active during a DICOM Query/Retrieve C-MOVE request and automatically stopped after receive of the final C-MOVE response.

4.2.1.4.1.2 Proposed Presentation Contexts

| Presentation Context Table | | | |
|--|--|------|----------|
| Abstract Syntax | Transfer Syntax | Role | Ext. Neg |
| All SCP SOP Classes as listed in Table 4-1 and Table 4-2 | All SCP Transfer Syntaxes as listed in Table 4-4 | SCU | None |
| | | SCU | None |
| | | SCU | None |

Table 4-8: Storage SCP Presentation Contexts.

4.2.1.4.1.3 SOP Specific Conformance

ExacTrac provides standard conformance to the DICOM Verification Service Class and to the DICOM Storage SOP Classes. No extended negotiation is implemented.

4.2.1.4.1.4 Presentation Context Acceptance Criterion

ExacTrac accepts multiple presentation contexts containing the same abstract syntax.

4.2.1.4.1.5 Transfer Syntax Selection Policy

The first Transfer Syntax encountered in the configuration file, which matches a Transfer Syntax offered for a given Presentation Context, will be selected as the accepted Transfer Syntax for that Presentation Context.

4.3 Network Interfaces

4.3.1 Physical Network Interface

ExacTrac supports the DICOM upper layer using TCP/IP. ExacTrac is indifferent to the physical medium over which TCP/IP executes. It inherits this from the operating system upon which it executes.

4.3.2 Additional Protocols

The usage of DNS and DHCP is possible and is based on the network configuration of the operating system upon which ExacTrac executes.

4.4 Configuration

4.4.1 AE Title / Presentation Address Mapping

Configuration of remote and local DICOM nodes can be performed in the export configuration settings of ExacTrac.

ExacTrac can configure several nodes representing Storage SCPs, but only one representing a remote Q/R Server.

4.4.1.1 Local AE Titles

The local AET for the Query/Retrieve SCU is an application-wide global parameter. The local AET for the Storage SCP defaults to the one of the Query/Retrieve SCU. But for each specified node you may define an own Storage SCP AET.

The listening port is an application-wide global parameter.

| Application Entity | Default AE Title | Default TCP/IP Port |
|--------------------|------------------|---------------------|
| ExacTrac | EXACTRAC | 104 |

4.4.1.2 Remote AE Title/Presentation Address Mapping

In ExacTrac you can specify several nodes for export. The IP address/hostname, AET and listening port may be configured for each DICOM network node separately.

4.4.2 Parameters

Additional a timeout may be specified for each DICOM network archive separately.

| Parameter | Configurable | Default Value |
|------------------|--------------|---------------|
| Timeout | Yes | 30 |
| Maximum PDU Size | No | 64234 |

5 Media Interchange

ExacTrac does not support DICOM media interchange.

For import ExacTrac scans a given file system located on any media (e.g. HD, MOD, CD, DVD, Tapes) for any kind of DICOM files.

For export the files are simply stored to the file system, grouped by patient. For both cases the supported SOP Classes are as defined in Table 4-2 for SCU or SCP respectively.

6 Support of Extended Character Sets

ExacTrac supports the

- ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

7 Security Profiles

No security profiles are supported.

8 Annexes

8.1 IOD Contents

8.1.1 Supported IODs

8.1.1.1 Imported IODs

8.1.1.1.1 Computed Tomography Image

| IE | Module | Reference | Support |
|--------------------|------------------------|------------|---------------|
| Patient | Patient | Table 8-6 | |
| | Clinical Trial Subject | - | Not supported |
| Study | General Study | Table 8-7 | |
| | Patient Study | Table 8-8 | |
| | Clinical Trial Study | - | Not supported |
| Series | General Series | Table 8-9 | |
| | Clinical Trial Series | - | Not supported |
| Frame of Reference | Frame of Reference | Table 8-11 | |
| Equipment | General Equipment | Table 8-12 | |
| Image | General Image | Table 8-13 | |
| | Image Plane | Table 8-18 | |
| | Image Pixel | Table 8-14 | |
| | Device | Table 8-14 | |
| | CT Image | Table 8-17 | |
| | VOI LUT | Table 8-15 | |
| | SOP Common | Table 8-16 | |

Table 8-1: CT Image Storage IOD

8.1.1.1.2 RT Structure Set

| IE | Module | Reference | Support |
|---------------|------------------------|------------|---------------|
| Patient | Patient | Table 8-6 | |
| | Clinical Trial Subject | - | Not supported |
| Study | General Study | Table 8-7 | |
| | Patient Study | Table 8-8 | |
| | Clinical Trial Study | - | Not supported |
| Series | RT Series | Table 8-10 | |
| | Clinical Trial Series | - | Not supported |
| Equipment | General Equipment | Table 8-12 | |
| Structure Set | Structure Set | Table 8-20 | |
| | ROI Contour | Table 8-21 | |
| | RT ROI Observations | Table 8-22 | |
| | Approval | - | Not supported |
| | SOP Common | Table 8-16 | |

Table 8-2: RT Structure Set Storage IOD

8.1.1.1.3 RT Plan

| IE | Module | Reference | Support |
|--------------------|------------------------|------------|---------------|
| Patient | Patient | Table 8-6 | |
| | Clinical Trial Subject | - | Not supported |
| Study | General Study | Table 8-7 | |
| | Patient Study | Table 8-8 | |
| | Clinical Trial Study | - | Not supported |
| Series | RT Series | Table 8-10 | |
| | Clinical Trial Series | - | Not supported |
| Frame of Reference | Frame of Reference | Table 8-11 | |
| Equipment | General Equipment | Table 8-12 | |
| Plan | RT General Plan Module | Table 8-24 | |
| | RT Prescription Module | Table 8-25 | |
| | RT Tolerance Tables | - | Not supported |
| | RT Patient Setup | Table 8-26 | |
| | RT Fraction Scheme | Table 8-27 | |
| | RT Beams Module | Table 8-28 | |
| | Approval | - | Not supported |
| | SOP Common | Table 8-16 | |

Table 8-3: RT Plan Storage IOD
8.1.1.2 Exported IODs
8.1.1.2.1 RT Image Storage

| IE | Module | Reference | Support |
|--------------------|------------------------|------------|---------------|
| Patient | Patient | Table 8-6 | |
| | Clinical Trial Subject | - | Not supported |
| Study | General Study | Table 8-7 | |
| | Patient Study | Table 8-8 | |
| | Clinical Trial Study | - | Not supported |
| Series | RT Series | Table 8-10 | |
| | Clinical Trial Series | - | Not supported |
| Frame of Reference | Frame of Reference | Table 8-11 | |
| Equipment | General Equipment | Table 8-12 | |
| Image | General Image | Table 8-13 | |
| | Image Pixel | Table 8-14 | |
| | RT Image | Table 8-29 | |
| | VOI LUT | Table 8-15 | |
| | SOP Common | Table 8-16 | |

Table 8-4: RT Image Storage IOD
8.1.1.2.2 Spatial Registration

| IE | Module | Reference | Support |
|---------|------------------------|-----------|---------------|
| Patient | Patient | Table 8-6 | |
| | Clinical Trial Subject | - | Not supported |
| Study | General Study | Table 8-7 | |
| | Patient Study | Table 8-8 | Not supported |
| | Clinical Trial Study | - | Not supported |

| IE | Module | Reference | Support |
|--------------------|---------------------------|------------------|----------------|
| Series | General Series | Table 8-9 | |
| | Clinical Trial Series | - | Not supported |
| Frame of Reference | Frame of Reference | Table 8-11 | |
| Equipment | General Equipment | Table 8-12 | |
| Registration | Spatial Registration | Table 8-30 | |
| | Common Instance Reference | Table 8-31 | |
| | SOP Common | Table 8-16 | |

Table 8-5: Registration IOD

8.1.2 Supported Modules

8.1.2.1 Imported/Exported Modules

8.1.2.1.1 Patient

| Attribute Name | Tag | VR | Import | Export |
|----------------------|-----------|----|---|-----------------------------------|
| Patient's Name | 0010,0010 | PN | Used to create internal patient information | From internal patient information |
| Patient ID | 0010,0020 | LO | Used to create internal patient information | From internal patient information |
| Patient's Birth Date | 0010,0030 | DA | | From imported DICOM data |
| Patient's Sex | 0010,0040 | CS | | From imported DICOM data |

Table 8-6: Patient Module

8.1.2.1.2 General Study

| Attribute Name | Tag | VR | Import | Export |
|----------------------------|-----------|----|--------|--------------------------|
| Study Instance UID | 0020,000D | UI | | From imported DICOM data |
| Study Date | 0008,0020 | DA | | From imported DICOM data |
| Referring Physician's Name | 0008,0090 | PN | | From imported DICOM data |
| Study ID | 0020,0010 | SH | | From imported DICOM data |
| Study Description | 0008,1030 | LO | | From imported DICOM data |

Table 8-7: General Study Module

8.1.2.1.3 Patient Study

| Attribute Name | Tag | VR | Import | Export |
|------------------|-----------|----|--------|--------|
| Patient's Height | 0010,1020 | DS | | |
| Patient's Weight | 0010,1030 | DS | | |

Table 8-8: Patient Study Module

8.1.2.1.4 General Series

| Attribute Name | Tag | VR | Import | Export |
|---------------------|-----------|----|-------------------------------------|---------------|
| Modality | 0008,0060 | CS | | |
| Series Instance UID | 0020,000E | UI | | |
| Series Number | 0020,0011 | IS | | |
| Series Date | 0008,0021 | DA | | Creation Date |
| Series Time | 0008,0031 | TM | | Creation Time |
| Series Description | 0008,103E | LO | | |
| Patient Position | 0018,5100 | DA | Prone and supine orientations only. | |

Table 8-9: General Series Module

8.1.2.1.5 RT Series Module

| Attribute Name | Tag | VR | Import | Export |
|---------------------|-----------|----|-----------------------------|-----------|
| Modality | 0008,0060 | CS | Only "RTPLAN" or "RTSTRUCT" | "RTIMAGE" |
| Series Instance UID | 0020,000E | UI | | |
| Series Number | 0020,0011 | IS | | |

| | | | | |
|--------------------|-----------|----|--|--|
| Series Description | 0008,103E | LO | | |
|--------------------|-----------|----|--|--|

Table 8-10: RT Series Module

8.1.2.1.6 Frame Of Reference

| Attribute Name | Tag | VR | Import | Export |
|------------------------------|-----------|----|--|--------|
| Frame of Reference UID | 0020,0052 | UI | If not provided in RTPLAN then RTSTRUCT must have a single CT referenced (frame of reference). | |
| Position Reference Indicator | 0020,1040 | LO | | |

Table 8-11: Frame of Reference Module

8.1.2.1.7 General Equipment

| Attribute Name | Tag | VR | Import | Export |
|---------------------------|-----------|----|--------|------------------------------|
| Manufacturer | 0008,0070 | LO | | "Brainlab AG" |
| Station Name | 0008,1010 | SH | | <Host Name> |
| Manufacturer's Model Name | 0008,1090 | LO | | "ExacTrac" |
| Software Version(s) | 0018,1020 | LO | | The current ExacTrac version |

Table 8-12: General Equipment Module

8.1.2.1.8 General Image

| Attribute Name | Tag | VR | Import | Export |
|---|-----------|----|--------|--|
| Instance Number | 0020,0013 | IS | | |
| Content Date | 0008,0023 | DA | | |
| Content Time | 0008,0033 | TM | | |
| Referenced Image Sequence | 0008,1140 | SQ | | |
| >Include 'Image SOP Instance Reference Macro' Table 10-3 | | | | Includes reference to "Other image of stereoscopic pair" |

Table 8-13: General Image Module

8.1.2.1.9 Image Pixel

| Attribute Name | Tag | VR | Import | Export |
|----------------|-----------|----------|--------|--------|
| Rows | 0028,0010 | IS | | |
| Columns | 0028,0011 | DA | | |
| Pixel Data | 7FE0,0010 | OB OW | | |

Table 8-14: Image Pixel Module

8.1.2.1.10 VOI LUT

| Attribute Name | Tag | VR | Import | Export |
|----------------|-----------|----|--------|--------|
| Window Center | 0028,1050 | DS | | |
| Window Width | 0028,1051 | DS | | |

Table 8-15: VOI LUT Module

8.1.2.1.11 SOP Common

| Attribute Name | Tag | VR | Import | Export |
|------------------------|------------|-----------|---------------|----------------|
| SOP Class UID | 0008,0016 | DS | | IOD specific |
| SOP Instance UID | 0008,0018 | DS | | Generated |
| Specific Character Set | 0008,0005 | CS | | "ISO_IR 100" |
| Instance Creation Date | 0008,0012 | DA | | <Current Date> |
| Instance Creation Time | 0008,0013 | TM | | <Current Time> |

Table 8-16: SOP Common Module

8.1.2.2 Imported Modules

8.1.2.2.1 CT Image

| Attribute Name | Tag | VR | Import |
|----------------------------|-----------|----|---|
| Image Type | 0008,0008 | CS | If type is LOCALIZED Device Sequence is parsed for Localizer Definitions. |
| Samples per Pixel | 0028,0002 | US | |
| Photometric Interpretation | 0028,0004 | CS | |
| Bits Allocated | 0028,0100 | US | |
| Bits Stored | 0028,0101 | US | |
| High Bit | 0028,0102 | US | |
| Pixel Representation | 0028,0103 | US | |
| Rescale Intercept | 0028,1052 | DS | |
| Rescale Slope | 0028,1053 | DS | |
| KVP | 0018,0060 | DS | |
| Acquisition Number | 0020,0012 | IS | |

Table 8-17: CT Image Module

8.1.2.2.2 Image Plane

| Attribute Name | Tag | VR | Import |
|-----------------------------|-----------|----|--|
| Pixel Spacing | 0028,0030 | DS | Pixels must be square. |
| Image Orientation (Patient) | 0020,0037 | DS | Axial orientation must not be more than 3° angulated if image type is not LOCALIZED. |
| Image Position (Patient) | 0020,0032 | DS | CT scan length within 1024 mm and up to 400 images. |
| Slice Thickness | 0018,0050 | DS | |

Table 8-18: Image Plane Module

8.1.2.2.3 Device

| Attribute Name | Tag | VR | Import |
|--------------------------------|-----------|----|---|
| Device Sequence | 0050,0010 | SQ | |
| >Include 'Code Sequence Macro' | | | Baseline CID 4051 (see chapter 8.3 for details) |
| >Device ID | 0018,1003 | LO | Only LOC_BL_HN is supported if Code Meaning is Localizer. |
| >Device Description | 0050,0020 | LO | |

Table 8-19: Device Module

8.1.2.2.4 Structure Set Module

| Attribute Name | Tag | VR | Import |
|--|-----------|----|--|
| Structure Set Label | 3006,0002 | SH | |
| Structure Set Name | 3006,0004 | LO | |
| Structure Set Description | 3006,0006 | ST | |
| Instance Number | 0020,0013 | IS | |
| Structure Set Date | 3006,0008 | DA | |
| Structure Set Time | 3006,0009 | TM | |
| Referenced Frame of Reference Sequence | 3006,0010 | SQ | Only one item is permitted in this sequence if no Frame of Reference is specified by RTPLAN. |
| >Frame of Reference UID | 0020,0052 | UI | |
| >RT Referenced Study Sequence | 3006,0012 | SQ | |

| Attribute Name | Tag | VR | Import |
|------------------------------------|-----------|----|--|
| >>Referenced SOP Class UID | 0008,1150 | UI | Must reference the SOP Class for image modality CT. |
| >>Referenced SOP Instance UID | 0008,1155 | UI | |
| >>RT Referenced Series Sequence | 3006,0014 | SQ | |
| >>Series Instance UID | 0020,000E | UI | |
| >>>Contour Image Sequence | 3006,0016 | SQ | |
| >>>>Referenced SOP Class UID | 0008,1150 | UI | |
| >>>>Referenced SOP Instance UID | 0008,1155 | UI | |
| Structure Set ROI Sequence | 3006,0020 | SQ | At least one and up to 48 ROIs are permitted in this sequence. Maximum number of ROIs is configurable. Interpreted Type is evaluated to prioritize import of certain ROIs. |
| >ROI Number | 3006,0022 | IS | |
| >Referenced Frame of Reference UID | 3006,0024 | UI | |
| >ROI Name | 3006,0026 | LO | Only the first 22 characters are displayed. |
| >ROI Volume | 3006,002C | DS | |
| >ROI Generation Algorithm | 3006,0038 | CS | |

Table 8-20: Structure Set Module

8.1.2.2.5 ROI Contour Module

| Attribute Name | Tag | VR | Import |
|--------------------------------|-----------|----|--|
| ROI Contour Sequence | 3006,0039 | SQ | |
| >Referenced ROI Number | 3006,0084 | IS | |
| >ROI Display Color | 3006,002A | IS | |
| >Contour Sequence | 3006,0040 | SQ | |
| >>Contour Number | 3006,0048 | IS | |
| >>Contour Image Sequence | 3006,0016 | SQ | |
| >>>Referenced SOP Class UID | 0008,1150 | UI | Must be "1.2.840.10008.5.1.4.1.1.2" |
| >>>Referenced SOP Instance UID | 0008,1155 | UI | |
| >>Contour Geometric Type | 3006,0042 | CS | Only "CLOSED_PLANAR" is supported |
| >>Contour Offset Vector | 3006,0045 | DS | If value is provided it must 0.0. |
| >>Number of Contour Points | 3006,0046 | IS | |
| >>Contour Data | 3006,0050 | DS | Distance of contour data to referenced CT image must less than 0.1 mm or must be within half slice thickness if slice thickness is provided. |

Table 8-21: ROI Contour Module

8.1.2.2.6 ROI Observations Module

| Attribute Name | Tag | VR | Import |
|------------------------------|-----------|----|--------|
| RT ROI Observations Sequence | 3006,0080 | SQ | |

| Attribute Name | Tag | VR | Import |
|--------------------------|-----------|----|---|
| >Observation Number | 3006,0082 | IS | |
| >Referenced ROI Number | 3006,0084 | IS | |
| >RT ROI Interpreted Type | 3006,00A4 | CS | ROIs of type "EXTERNAL" are by default not imported. Further exclude types can be configured. ROIs of types "PTV", "AVOIDANCE", "CTV", "ORGAN" are by default imported prioritized. Further types can be configured. |
| >ROI Interpreter | 3006,00A6 | PN | |

Table 8-22: RT ROI Observations Module

8.1.2.2.7 Approval Module

| Attribute Name | Tag | VR | Import |
|-----------------|-----------|----|--|
| Approval Status | 300E,0002 | CS | Only if the status is APPROVED all of the following attributes must be available: Review Date, Review Time and Reviewer Name so that the approval status is displayed in the patient case comment. |
| Review Date | 300E,0004 | DA | |
| Review Time | 300E,0005 | TM | |
| Reviewer Name | 300R,0008 | PN | |

Table 8-23: Approval Module

8.1.2.2.8 RT General Plan Module

| Attribute Name | Tag | VR | Import |
|-----------------------------------|-----------|----|---|
| RT Plan Label | 300A,0002 | LO | Used for plan identification in patient case comment. |
| RT Plan Name | 300A,0003 | SH | Used for plan identification in patient case comment if RT Plan Label is empty. |
| RT Plan Description | 300A,0004 | ST | |
| Instance Number | 0020,0013 | IS | |
| Operators' Name | 0008,1070 | PN | |
| RT Plan Date | 300A,0006 | DA | |
| RT Plan Time | 300A,0007 | TM | |
| Plan Intent | 300A,000A | CS | Not used. |
| RT Plan Geometry | 300A,000C | CS | Geometry must be "PATIENT". |
| Referenced Structure Set Sequence | 300C,0060 | SQ | |
| >Referenced SOP Class UID | 0008,1150 | UI | |
| >Referenced SOP Instance UID | 0008,1155 | UI | |
| Referenced RT Plan Sequence | 300C,0002 | SQ | (see Note 8-1) |
| >Referenced SOP Class UID | 0008,1150 | UI | |
| >Referenced SOP Instance UID | 0008,1155 | UI | |
| >RT Plan Relationship | 300A,0055 | CS | (see Note 8-1) |
| >Private Creator Code | 300B,00xx | LO | Brainlab - ONC - Beam Parameters |
| >Referenced Beam List | 300B,xx10 | IS | |

Table 8-24: RT General Plan Module

Note 8-1: ExacTrac supports only one conceptual plan in one plan instance. In case a conceptual plan is split into several instances, ExacTrac also supports the Defined Term "EQUIVALENT". This way, several equivalent plans can be listed in the Referenced RT Plan Sequence (which may be linked to each other using the standard term CONCURRENT) in order to describe that these concurrent plans in total equal a single treatment plan instance.

8.1.2.2.9 RT Prescription Module

| Attribute Name | Tag | VR | Import |
|--------------------------------|-----------|----|---|
| Dose Reference Sequence | 300A,0010 | SQ | |
| >Dose Reference Number | 300A,0022 | IS | |
| >Dose Reference Structure Type | 300A,0014 | CS | |
| >Dose Reference Description | 300A,0016 | ST | |
| >Referenced ROI Number | 3006,0084 | IS | For automatic isocenter PTV assignment to find ROI in RTSTRUCT. |
| >Dose Reference Type | 300A,0020 | CS | Not used. |

Table 8-25: RT Prescription Module

8.1.2.2.10 RT Patient Setup Module

| Attribute Name | Tag | VR | Import |
|------------------------|-----------|----|---|
| Patient Setup Sequence | 300A,0180 | SQ | |
| >Patient Setup Number | 300A,0182 | IS | |
| >Patient Setup Label | 300A,0183 | LO | Not used. |
| >Patient Position | 0018,5100 | CS | Only head-first orientations are allowed. |

Table 8-26: RT Patient Setup Module

8.1.2.2.11 RT Fraction Scheme Module

| Attribute Name | Tag | VR | Import |
|-------------------------------------|-----------|----|---|
| Fraction Group Sequence | 300A,0070 | SQ | |
| >Fraction Group Number | 300A,0071 | IS | |
| >Referenced Dose Reference Sequence | 300C,0050 | SQ | |
| >>Referenced Dose Reference Number | 300C,0051 | IS | Used to assign isocenter positions to target volumes. |
| >Number of Beams | 300A,0080 | IS | |
| >Referenced Beam Sequence | 300C,0004 | SQ | |
| >>Referenced Beam Number | 300C,0006 | IS | |

Table 8-27: RT Fraction Scheme Module

8.1.2.2.12 RT Beams Module

| Attribute Name | Tag | VR | Import |
|----------------|-----------|----|---|
| Beam Sequence | 300A,00B0 | SQ | |
| >Beam Number | 300A,00C0 | IS | |
| >Beam Name | 300A,00C2 | LO | Used to identify isocenters from 3rd party TPS. |

| Attribute Name | Tag | VR | Import |
|---|-----------|----|--|
| >Beam Description | 300A,00C3 | LO | Used to identify isocenters from iPlan RT TPS of Brainlab |
| >Beam Type | 300A,00C4 | CS | |
| >Radiation Type | 300A,00C6 | CS | Not used. |
| >Treatment Machine Name | 300A,00B2 | SH | |
| >Manufacturer | 0008,0070 | LO | |
| >Institution Name | 0008,0080 | LO | |
| >Institutional Department Name | 0008,1040 | LO | |
| >Manufacturer's Model Name | 0008,1090 | LO | |
| >Primary Dosimeter Unit | 300A,00B3 | CS | Not used. |
| >Source-Axis Distance | 300A,00B4 | DS | |
| >Beam Limiting Device Sequence | 300A,00B6 | SQ | |
| >>RT Beam Limiting Device Type | 300A,00B8 | CS | |
| >>Number of Leaf/Jaw Pairs | 300A,00BC | IS | |
| >>Leaf Position Boundaries | 300A,00BE | DS | |
| >Referenced Patient Setup Number | 300C,006A | IS | |
| >Treatment Delivery Type | 300A,00CE | CS | For automatic isocenter PTV assignment only "TREATMENT" beams are used. |
| >Number of Wedges | 300A,00D0 | IS | |
| >Number of Blocks | 300A,00F0 | IS | |
| >Number of Compensators | 300A,00E0 | IS | |
| >Number of Boli | 300A,00ED | IS | |
| >Final Cumulative Meterset Weight | 300A,010E | DS | |
| >Number of Control Points | 300A,0110 | IS | |
| >Control Point Sequence | 300A,0111 | SQ | |
| >>Control Point Index | 300A,0112 | IS | |
| >>Cumulative Meterset Weight | 300A,0134 | DS | |
| >>Referenced Dose Reference Sequence | 300C,0050 | SQ | |
| >>>Referenced Dose Reference Number | 300C,0051 | IS | Only used by automatic isocenter PTV assignment to find related target volume for this beam. |
| >>>Cumulative Dose Reference Coefficient | 300A,010C | DS | |
| >>Nominal Beam Energy | 300A,0114 | DS | |
| >>Dose Rate Set | 300A,0115 | DS | |
| >>Beam Limiting Device Position Sequence | 300A,011A | SQ | |
| >>>RT Beam Limiting Device Type | 300A,00B8 | CS | |
| >>>Leaf/Jaw Positions | 300A,011C | DS | |
| >>Gantry Angle | 300A,011E | DS | |
| >>Gantry Rotation Direction | 300A,011F | CS | |
| >>Beam Limiting Device Angle | 300A,0120 | DS | |
| >>Beam Limiting Device Rotation Direction | 300A,0121 | CS | |

| Attribute Name | Tag | VR | Import |
|--|-----------|----|----------------------|
| >>Patient Support Angle | 300A,0122 | DS | |
| >>Patient Support Rotation Direction | 300A,0123 | CS | |
| >>Table Top Eccentric Angle | 300A,0125 | DS | |
| >>Table Top Eccentric Rotation Direction | 300A,0126 | CS | |
| >>Table Top Pitch Angle | 300A,0140 | DS | |
| >>Table Top Pitch Rotation Direction | 300A,0142 | CS | |
| >>Table Top Roll Angle | 300A,0144 | DS | |
| >>Table Top Roll Rotation Direction | 300A,0146 | CS | |
| >>Table Top Vertical Position | 300A,0128 | DS | |
| >>Table Top Longitudinal Position | 300A,0129 | DS | |
| >>Table Top Lateral Position | 300A,012A | DS | |
| >>Isocenter Position | 300A,012C | DS | Used for positioning |

Table 8-28: RT Beams Module

8.1.2.3 Exported Modules

8.1.2.3.1 RT Image Module

| Attribute Name | Tag | VR | Export |
|----------------------------------|-----------|----|---|
| Samples per Pixel | 0028,0002 | US | "1" |
| Photometric Interpretation | 0028,0004 | CS | "MONOCHROME2" |
| Bits Allocated | 0028,0100 | US | "8" |
| Bits Stored | 0028,0101 | US | "8" |
| High Bit | 0028,0102 | US | "7" |
| Pixel Representation | 0028,0103 | US | "0" |
| RT Image Label | 3002,0002 | SH | (see Note 8-2) |
| RT Image Name | 3002,0003 | LO | (see Note 8-2) |
| RT Image Description | 3002,0004 | ST | (see Note 8-2) |
| Operators' Name | 0008,1070 | PN | |
| Image Type | 0008,0008 | CS | (see Note 8-3) |
| Conversion Type | 0008,0064 | CS | "DI" or "WSD" |
| Reported Values Origin | 3002,000A | CS | "PLAN" or "ACTUAL" |
| RT Image Plane | 3002,000C | CS | Always "NORMAL" to beam axis |
| X-Ray Image Receptor Translation | 3002,000D | DS | (see Note 8-4) |
| X-Ray Image Receptor Angle | 3002,000E | DS | "0" |
| RT Image Orientation | 3002,0010 | DS | Normal to beam axis, thus "1,0,0,0,-1,0" |
| Image Plane Pixel Spacing | 3002,0011 | DS | According to the flat panel manufacturer's specification. |
| RT Image Position | 3002,0012 | DS | (-columns * PixelSpacingX / 2.0, rows * PixelSpacingY / 2.0) |
| Radiation Machine Name | 3002,0020 | SH | Configurable: "ExacTrac Xray" or the Treatment Machine Name from RT Plan. |
| Exposure Sequence | 3002,0030 | SQ | Only if 3rd parameter of Image Type is "RADIOGRAPH" or "PORTAL". |
| >KVP | 0018,0060 | DS | |
| >Exposure Time | 0018,1150 | IS | |
| >X-ray Tube Current | 0018,1151 | IS | |
| >Meterset Exposure | 3002,0032 | DS | Only if 3rd parameter of Image Type is "PORTAL". |
| >Number of Blocks | 300a,00F0 | IS | 0 |
| Primary Dosimeter Unit | 300A,00B3 | CS | |
| Radiation Machine SAD | 3002,0022 | DS | (see Note 8-5) |
| RT Image SID | 3002,0026 | DS | (see Note 8-6) |
| Referenced RT Plan Sequence | 300C,0002 | SQ | |
| >Referenced SOP Class UID | 0008,1150 | UI | |
| >Referenced SOP Instance UID | 0008,1155 | UI | (see Note 8-7) |
| Referenced Beam Number | 300C,0006 | IS | (see Note 8-7) |
| Referenced Fraction Group Number | 300C,0022 | IS | |
| Gantry Angle | 300A,011E | DS | (see Note 8-8) |
| Gantry Pitch Angle | 300A,014A | DS | (see Note 8-8) |
| Beam Limiting Device Angle | 300A,0120 | DS | |
| Patient Support Angle | 300A,0122 | DS | The planned Patient Support Angle. In case of Image Type ...DRRTREATMENT_POS: the vertical angle of the fusion result is added (in degrees). |
| Table Top Vertical Position | 300A,0128 | DS | |

| Attribute Name | Tag | VR | Export |
|---------------------------------|-----------|----|--|
| Table Top Longitudinal Position | 300A,0129 | DS | |
| Table Top Lateral Position | 300A,012A | DS | |
| Table Top Pitch Angle | 300A,0140 | FL | The planned Table Top Pitch Angle. In case of Image Type ...\\DRR\\TREATMENT_POS: this angle is set to the lateral angle of the fusion result (in degrees). |
| Table Top Roll Angle | 300A,0144 | FL | The planned Table Top Roll Angle. In case of Image Type ...\\DRR\\TREATMENT_POS: this angle is set to the longitudinal angle of the fusion result in degrees. |
| Isocenter Position | 300A,012C | DS | The isocenter position from the related DICOM RT Plan. In case of Image Type ...\\DRR\\TREATMENT_POS: the translation is applied to the Isocenter Position taking into account the Patient Position from the referenced RT Plan (supported so far: HFP, FFP, HFS, FFS). |
| Patient Position | 0018,5100 | CS | |

Table 8-29: RT Image Module

Note 8-2: The content of RT Image Label, RT Image Name and RT Image Description can be configured and adapted to the needs of the local environment. See the ExacTrac manual for details.

Note 8-3: Image Type (0008,0008) contains one of the following parameters:

| | | |
|--------|--|--|
| X-rays | ORIGINAL\\PRIMARY\\RADIOGRAPH or ORIGINAL\\PRIMARY\\PORTAL | The x-ray images acquired during the correction procedure. Note: The third parameter can be configured to be "PORTAL" for systems that cannot handle the value "RADIOGRAPH" |
| DRRs | DERIVED\\SECONDARY\\DRR | The initial DRRs at the planned treatment position. |
| | DERIVED\\SECONDARY\\DRR\\TREATMENT_POSITION | The DRRs in the actual treatment position, corresponding to the x-ray images, including the correction result. |

Note 8-4: The Image Receptor is expected to be at the same position as an EPID (Gantry Angle = 0, Gantry Pitch Angle = 0).

Thus, the X-ray Image Receptor Translation calculates like: $((\text{Columns} / 2 - \text{PPX}) * \text{PixelSpacingX}, -(\text{Rows} / 2 - \text{PPY}) * \text{PixelSpacingY}, \text{SAD} - \text{SID})$, where PPX, and PPY are the coordinates of the principal point.

Note 8-5: Using the ExacTrac Camera Projection Matrix P, the center of the camera is computed. The distance between this point and the isocenter (0,0,0) yields SAD.

Note 8-6: The distance between the isocenter and a second point – also located in the isocenter plane – is computed in 3D. These two points are now projected in the plane, and again the distance in mm is computed using the known Pixel Spacing of the Flat Panel. Multiplying the ratio of the distance in the plane and the distance in space with SAD, yields SID.

Note 8-7: Referenced RT Plan and Referenced Beam Number are taken from the imported plan. If the imported plan has a Referenced RT Plan Sequence Item with the RT Plan Relationship EQUIVALENT, this SOP Instance UID is used instead.

Note 8-8: Gantry Angle and Gantry Pitch Angle are used to define the viewing angles of the ExacTrac imaging system. The two angles are determined by computing the x- (pitch) and y- (roll) angles where the viewing axes intersect the z-axis of the IEC Fixed Reference Coordinate System.

8.1.2.3.2 Spatial Registration

| Attribute Name | Tag | VR | XRay Correction Export | CBCT Correction Export |
|---|-----------|----|---|-----------------------------------|
| Content Date | 0008,0023 | DA | | |
| Content Time | 0008,0033 | TM | | |
| Instance Number | 0020,0013 | IS | | |
| Content Label | 0070,0080 | CS | "EXACTRAC_REG" | "EXACTRAC_REG" |
| Content Description | 0070,0081 | LO | "Registration of Planning FOR to Treatment FOR" | Related RTPLAN SOP Instance UID |
| Content Creator's Name | 0070,0086 | PN | | |
| Registration Sequence | 0070,0308 | SQ | Contains exactly 2 sequence items | Contains exactly 2 sequence items |
| >Frame of Reference UID | 0020,0052 | UI | | |
| >Referenced Image Sequence | 0008,1140 | SQ | Not used | Related CT or CBCT instances |
| >>Include 'Image SOP Instance Reference Macro' Table 10-3 | | | | |
| >Matrix Registration Sequence | 0070,0309 | SQ | | |
| >>Frame of Reference Transformation Comment | 3006,00C8 | LO | (See Note 8-9) | (See Note 8-9) |
| >>Registration Type Code Sequence | 0070,030D | SQ | | |
| >>>Include 'Code Sequence Macro' Table 8.8-1 | | | | |
| >>Matrix Sequence | 0070,030A | SQ | | |
| >>>Frame of Reference Transformation Matrix | 3006,00C6 | DS | (See Note 8-10) | (See Note 8-11) |
| >>>Frame of Reference Transformation Matrix Type | 0070,030C | CS | "RIGID" | "RIGID" |
| >Used Fiducials Sequence | 0070,0314 | SQ | Not used | Not used |
| >>Include 'SOP Instance Reference Macro' Table 10-11 | | | | |
| >>Fiducial UID | 0070,031A | UI | | |

Table 8-30: Spatial Registration Module

Note 8-9: The Frame of Reference Transformation Comment (3006,00C8) is "IDENTITY", if the Frame of Reference in this Registration Sequence item is identical to the Frame of Reference of the Spatial Registration SOP Instance. The value is "SOURCE", if the matrix describes the actual transformation between the reference data FOR and the acquisition data FOR.

Note 8-10: The Registration Sequence (0070,0308) always contains 2 entries that describe the transformation of the reference and treatment data Frame of References (FOR) to the common FOR defined in the Spatial Registration object instance. For Xray correction export, both entries contain the unity matrix. The Spatial Registration does not include the shift result of the correction procedure. This result is encoded in the corresponding RT Image data.

Note 8-11: The Registration Sequence (0070,0308) always contains 2 entries that describe the transformation of the reference and treatment data Frame of References (FOR) to the common FOR defined in

the Spatial Registration object instance. For CBCT correction export, the planning CT FOR is used as the common FOR. Therefore, the Frame of Reference Transformation Matrix describing the transformation of the planning data (CT) to the common FOR contains the unity matrix. The second matrix describes the transformation of the treatment data (CBCT) FOR to the common FOR.

8.1.2.3.3 Common Instance Reference

| Attribute Name | Tag | VR | Export |
|--|-----------|----|--|
| Referenced Series Sequence | 0008,1115 | SQ | All instances referencing the Frames of Reference within the Registration Sequence (0070,0308) |
| >Series Instance UID | 0020,000E | UI | |
| >Referenced Instance Sequence | 0008,114A | SQ | |
| >>Include 'SOP Instance Reference Macro' Table 10-11 | | | |

Table 8-31: Common Instance Reference Module

8.2 Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the Table below. Brainlab reserves blocks of private attributes in group 0009 and 0099. Further details on usage of these private attributes are contained in Section 8.1.

8.2.1 Group 300B

| Tag | Attribute Name | VR | VM |
|-------------|---|----|----|
| (300B,00xx) | Private Creator Code 'Brainlab - ONC - Beam Parameters' | LO | 1 |
| (300B,xx10) | Referenced Beam List | IS | 1 |

Table 8-32: Beam Parameters

8.2.2 Group 3275

| Tag | Attribute Name | VR | VM |
|-------------|---|----|----|
| (3275,00xx) | Private Creator Code 'Varian Medical Systems VISION 3275' | LO | 1 |
| (3275,xx00) | Registration Sub Type | LO | 1 |

Table 8-33: Varian Registration Sub Type

8.3 Coded Terminology and Templates

CID 4051 General Devices

Context ID 4051

General Devices

Type: Extensible

Version: 20061023

| Coding Scheme Designator (0008,0102) | Code Value (0008,0100) | Code Meaning (0008,0104) |
|---|-----------------------------------|-------------------------------------|
| INCLUDE CID BL-GEN-00001 | | |

CID BL-GEN-00001

Brainlab Device Definitions

Context ID BL-GEN-00001

Localizer Definitions

Type: Extensible **Version:** 20100812

| Coding Scheme Designator (0008,0102) | Code Value (0008,0100) | Code Meaning (0008,0104) |
|---|-----------------------------------|-------------------------------------|
| BL-GEN-LOC | LOC-HEADRING | Headring |
| BL-GEN-LOC | LOC-LOCALIZER | Localizer |

8.4 Grayscale Image Consistency

Not supported.

8.5 Standard Extended/Specialized/Private Sop Classes

None supported.

8.6 Private Transfer Syntaxes

None supported.

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