

SIDICOM® QR

DICOM Conformance Statement

English



V3.1

Released 16/12/2015

for product version from 3.1 onwards

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0 History

Release	Date	Author	Review
1.0	27/12/2004	U. Meng	J. Zimmermann
1.1	22/11/2005	U. Meng	J. Zimmermann
3.0	26/06/2007	U. Meng	J. Zimmermann
3.1	27/08/2015	U. Meng	J. Zimmermann

1 Introduction

1.1 Purpose

This document refers to the DICOM functionality of SIDICOM QR (SIDEXIS DICOM Query & Retrieve Plugin) version 3.1 (furthermore called "SIDICOM QR").

This document is written according to part PS 3.2 of [1].

The applications described in this Conformance Statement are the SIDEXIS software and SIDEXIS DICOM Query & Retrieve DirectDental Plugin (DICOM gateway).

The SIDEXIS software controls the digital Sirona X-ray products and includes a local patient and image database. SIDICOM QR adds DICOM Query & Retrieve functionality to SIDEXIS.

SIDICOM QR acts as a Query & Retrieve SCU, and as a temporary C-Store SCP to retrieve dental SC, IO, DX, or CT images and import them to SIDEXIS. In addition, SIDICOM QR supports the C-Echo service for administration.

1.2 Scope

This Conformance Statement refers to the Sirona X-ray products using SIDEXIS and the SIDICOM QR in its current version.

SIDICOM QR is available only in English.

1.2.1 System requirements

Supported SIDEXIS version

- SIDEXIS version 2.61 or higher

Supported operating systems

- Windows XP SP3 32bit
- Windows 7 Professional SP1 32bit
- Windows 7 Ultimate SP1 32bit & 64bit
- Windows 7 Ultimate 64bit on BootCamp 3.0.4 (325) on iMAC, MAC OS 10.6.7
- Windows Server 2003 32bit
- Windows Server 2008 Standard 32bit & 64bit
- Windows 8 Professional 32bit & 64bit Patch Level Sep. 23, 2013
- Windows 8.1 Professional 32bit & 64bit
- Windows 10 Pro 32bit & 64bit

Each increased by the current service pack at the time of the release of SIDICOM QR.

1.3 Definitions & abbreviations

1.3.1 Definitions

C-STORE	DICOM service for storing of objects, e.g. images
CT	Computer Tomography; specific DICOM Information Object

DX	Digital X-Ray; specific DICOM Information Object
DirectDental Plugin	Additional software that can be easy integrated/used within SIDEXIS
Gateway	Connection between different data channels
IO	Intra Oral; specific DICOM Information Object
SC	Secondary Capture; specific DICOM Information Object
VL	Visible Light (Photographic Image); specific DICOM Information Object

1.3.2 Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity
CT	Computer Tomography
DICOM	Digital Imaging and Communication in Medicine
DX	Digital X-ray
IO	Digital intraoral X-ray
IOD	DICOM Information Object Definition
IS	Information System (HIS, RIS, PACS within hospital)
NEMA	National Electrical Manufacturers Association
PPS	Performed Procedure Step
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SPS	Scheduled Procedure Step
SIDEXIS	S irona D ental X -ray & I maging S ystem
SOP	DICOM Service-Object pair
UID	Unique identifier, string unique in the whole network

1.4 References

- [1] Digital Imaging and Communication in Medicine (DICOM) 3.0, NEMA PS 3.1-18, 2011
- [2] SIDICOM QR User Manual

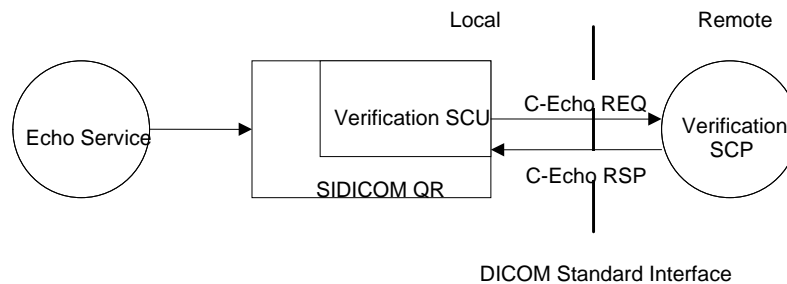
2 Implementation Model

2.1 Verification

2.1.1 Application Data Flow Diagram

The Verification service class defines an application-level class of service which allows the operator to verify the ability of an application on a remote node to respond to DICOM messages.

In SIDICOM QR the Verification service is totally integrated to act as SCU with the configured DICOM partner. The SCP will answer this responses with C-Echo replies.



2.1.2 Functional Definitions of AE's

SIDICOM QR opens an association to an application on the remote node and sends a Verification message (C-Echo Request) to verify that the remote application can respond (C-Echo Response) to DICOM messages.

2.1.3 Sequencing of Real-World Activities

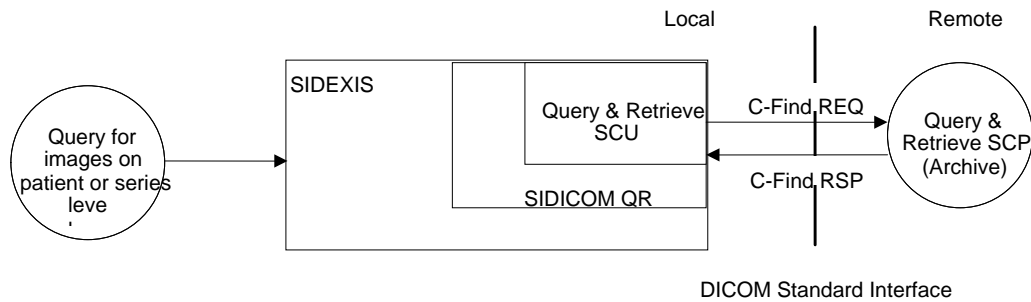
The user can select the "Echo Test" menu item in the system menu of the SIDICOM QR Query dialog. Depending on the answer of the remote application a success or failure message is displayed.

Changing the configuration parameters (IP address, port, AE Title) can be done within the configuration dialog.

2.2 Query Remote Database

2.2.1 Application Data Flow Diagram

SIDICOM QR can initiate a C-Find Request for special studies, series or images. So it has the role of a SCU in the Query & Retrieve service. The remote application sends the find requests to SIDICOM QR. If a patient root query is used this can be done in different level depths. E.g. on level 4, SIDICOM QR asks the server recursively for patients, studies, series, and images based on the criteria entered. In a Study level search always all information on study, series and images are queried for.



2.2.2 Functional Definitions of AE's

The Query SCU (SIDICOM QR) requests the Query SCP (Archive) to perform a match to the keys specified in the C-FIND DIMSE service. The Query SCP responds to the C-FIND query and sends within this response the information of matched objects on the find level. Based on the configured level depth, SIDICOM QR sends additional C-FIND responses one level deeper and waits for these responses. This can be done down to the single-image level.

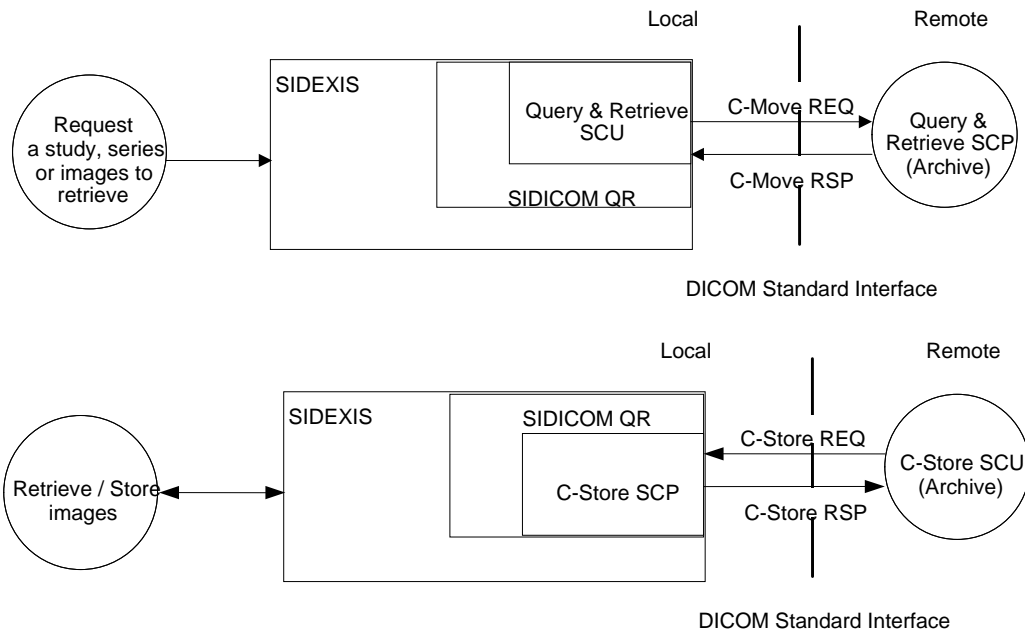
2.2.3 Sequencing of Real-World Activities

To perform a query the user clicks the "Select PACS exam..." button or "Exam" / "Import" / "Select PACS exam..." menu item, respectively, within SIDEXIS. SIDICOM QR then displays a query dialog where the user can define "filters" of the information he wants to query for. After specifying the query the "Query" button starts the C-Find Request procedure. The responses are poured into a tree with up to 4 levels (Patient, Study, Series, and Image, respectively).

2.3 Retrieve

2.3.1 Application Data Flow Diagram

SIDICOM QR initiates a C-Move request based on the selection the user wants to have transferred from the server (archive). SIDICOM QR then receives the requested images from the server and transfers them to the local SIDEXIS application.



2.3.2 Functional Definitions of AE's

The SIDICOM QR application entity acts as a Service Class User (SCU) for the C-Move Service Class and temporarily as an SCP for the C-Store Service Class.

After having transmitted the C-Move request, SIDICOM QR listens on a configurable port for an incoming connection from the archive. Then it receives the images sent from the server and transmits them to the main application SIDEXIS. After receiving the C-Move RSP, it automatically terminates.

2.3.3 Sequencing of Real-World Activities

To retrieve objects from the remote server, the user selects a study, series or an image in the query result tree and presses the "OK" button (The same can be done by a double-click in the tree). Then SIDICOM QR sends a C-Move Request to the archive and listens for incoming DICOM objects. If it receives a valid image, it opens it in a new temporary exam within SIDEXIS. Now the user can view the images, discard them or save them in the local database.

In order to obtain complete SIDEXIS exams, reports or 3D data, the entire DICOM study and corresponding Raw Data storage must be requested, and the corresponding Move services must be supported by the archive.

3 AE Specifications

3.1 SIDICOM QR Specification

The SIDICOM QR Application Entity provides Standard Conformance to the following DICOM V.3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Verification Service Class	1.2.840.10008.1.1
Patient Root Query Retrieve (Find)	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query Retrieve (Find)	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query Retrieve (Move)	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query Retrieve (Move)	1.2.840.10008.5.1.4.1.2.2.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital Intra-oral X-ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66

3.1.1 Association Establishment Policies

3.1.1.1 General

The configuration of SIDICOM QR defines:

- For archives (Query & Retrieve SCP): Application entity titles, port numbers, and the host name or net address.
- For incoming C-Store services: Application entity title and port number.
- Additionally a special transfer syntax can be prescribed (default is auto-detect).

3.1.1.2 Number of Associations

SIDICOM QR can only attempt 1 association for each service establishment at a time. It is not possible to start multiple instances of SIDICOM QR.

3.1.1.3 Asynchronous Nature

SIDICOM QR does not support asynchronous communication (multiple outstanding transactions over a single association).

SIDEXIS is blocked during Query & Retrieve operations.

3.1.1.4 Implementation Identifying Information

The SIDICOM QR Implementation Class UID is

1.2.276.0.7230010.3.0.3.5.3

The default AE Title is

SIDICOM QR

The implementation version name is

OFFIS_DCMTK_353
 Sirona Company Root UID
 1.3.6.1.4.1.25790

3.1.2 Association Initiation by Real-World Activity

SIDICOM QR initiates associations for the following DICOM V.3.0 services:

- Verification
- C-Find
- C-Move

3.1.3 Association Acceptance by Real-World Activity

After a C-Move request, SIDICOM QR accepts incoming calls for the DICOM V.3.0 service:

- C-Store

3.1.3.1 Real-World Activity – for Verification

SIDICOM QR initiates an association for DICOM V.3.0 Verification service.

3.1.3.1.1 Associated Real-World Activity - for Verification

After starting SIDICOM QR from within SIDEXIS, the user can perform a verification service to the configured DICOM Query & Retrieve server. This can be done in the dialog's system menu / "Echo Test".

3.1.3.1.2 Proposed Presentation Contexts - for Verification

The presentation contexts that are proposed by SIDICOM QR for the verification operation are specified in the following:

Presentation Context Table								
Abstract Syntax		Transfer Syntax				Role	Extended Negotiation	
Name	UID	Name List		UID List				
Verification Service Class	1.2.840.10008.1.1	Explicit	VR	Little	Endian	SCU	None	
		Implicit	VR	Little	Endian			
		Explicit	VR	Big	Endian			

3.1.3.2 Real-World Activity – for Query (C-Find)

SIDICOM QR initiates an association for DICOM V.3.0 C-Find service.

3.1.3.2.1 Associated Real-World Activity - Query

The user can perform a query by pressing "Query". Special search criteria can be defined by filling in the edit fields (e.g. patient name, study date, etc.). After the association has been established, a C-Find request with possible matching values is sent to the SCP. Then the partner sends the matching objects with C-Find responses back to SIDICOM QR. SIDICOM QR fills in the responses into the tree in the query "Result" window. If the server cannot find a valid study, the message "There were no items found based on the criteria entered" is shown (This message is also shown if a patient without studies is found and if SIDICOM QR is configured not to display patients without studies).

3.1.3.2.2 Proposed Presentation Contexts – Query (C-Find)

The presentation contexts that are proposed by SIDICOM QR for the Query C-Find operation are specified in the following:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query Retrieve (Find)	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query Retrieve (Find)	1.2.840.10008.5.1.4.1.2.2.1		1.2.840.10008.1.2 1.2.840.10008.1.2.2		

3.1.3.3 Real-World Activity – for Retrieve operations (C-Move)

SIDICOM QR initiates an association for DICOM V.3.0 C-Move service.

3.1.3.3.1 Associated Real-World Activity - for Move operations

A move is initiated when the user selects an object (study, series or image) and presses the “OK” button. (This can be also done by double-clicking the object). After the move request is transmitted to the server, SIDICOM QR waits for incoming C-Store request calls to receive the objects.

3.1.3.3.2 Proposed Presentation Contexts - for Move operations

The presentation contexts that are proposed by SIDICOM QR for the send image operation are specified in the following:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query Retrieve (Move)	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query Retrieve (Move)	1.2.840.10008.5.1.4.1.2.2.2		1.2.840.10008.1.2 1.2.840.10008.1.2.2		

3.1.3.4 Real-World Activity – for Retrieve operation (C-Store)

After the C-Move request, SIDICOM QR waits for C-Store responses to receive the DICOM object(s) (series/images/...). The current version of SIDICOM QR is unable to receive images in an asynchronous way (Initiated without a preceding move request from SIDICOM QR).

3.1.3.4.1 Associated Real-World Activity - for Retrieve operations (C-Store)

After SIDICOM QR obtains a valid image from the server via a C-Store request, the images are automatically transferred to SIDEXIS. Within SIDEXIS, a new exam is generated and filled with the received image(s). The images can now be viewed by the user, then stored in the local database or discarded.

There is no overlay information of the images or examinations imported.

For the time being, a retrieval of 3D data or CT volumes is only possible with original DICOM data from Sirona 3D/DVT machines, like GALILEOS and XG3D. Some necessary additional information is stored in private tags in DICOM Raw Data objects. This means that 3D viewing in SIDEXIS/GALAXIS after retrieval is only possible if volume and SIDEXIS exam data were sent completely to the archive in the past and if now the whole study is retrieved as a whole. Therefore it is necessary that the archive supports DICOM Raw Data storage and retrieval.

3.1.3.4.2 Proposed Presentation Contexts - for Retrieve operation (C-Store)

The presentation contexts that are proposed by SIDICOM QR for the C-Store operations are specified in the following:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCP	None
Digital X-ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCP	None
Digital Intra-oral X-ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None
CT Image Storage (GALILEOS CT volumes only)	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None
Raw Data Storage (SIDEXIS-specific data)	1.2.840.10008.5.1.4.1.1.66	Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None

4 Communication Profiles

4.1 Supported Communication Stacks

SIDICOM QR provides DICOM V.3.0 TCP/IP network communication support as defined in PS 3.8 of [1].

4.2 TCP/IP Stack

SIDICOM QR communicates over the TCP/IP protocol stack on any supported physical interconnection media.

4.2.1 Physical Media Support

SIDICOM QR is indifferent to the physical medium over which TCP/IP is executed, It inherits this from the operating system on which it exists.

5 Extensions / Specializations / Privatizations

5.1 Standard Extended / Specialized / Private SOPs

None.

5.2 Private Transfer Syntaxes

None supported.

6 Configuration

6.1 AE Title/Presentation Address Mapping

SIDICOM QR can be configured to use any valid port, IP address, and AE Title for incoming and outgoing connections.

In order to decrease the communication time on some systems, it can be useful to use domain names instead of IP addresses. In this case the Domain Name Service (DNS) or system's "hosts" file must be configured correctly.

6.2 Configurable Parameters

See manual.

7 Support of Extended Character Sets

SIDICOM QR supports extended character sets under the condition that the underlying Windows operation system supports the code page used by the chosen character set.

By default, use of extended char set is switched off. It can be switched on for exports (sending IODs with product SIDICOM WLS) by setting entry:

```
[IDDTODICOM]
CharSet=<Valid character set>
```

in SIDICOM.ini. It can be switched on for Query & Retrieve imports (this product) by setting entry:

```
[DICOMTOIDD]
DecodeCharSet=1
```

in SiDICOMQR.ini in "<AppData>\Sirona\SIDICOM QR", for older installations in the SIDICOM QR installation directory.

Take care: If you import DICOM objects with SIDICOM QR with DecodeCharSet=1, the DICOM objects that include extended characters sets must be coded the right way! If DecodeCharSet is switched on then for newly exported objects CharSet= should be set to your local char set, too!

DICOM ISO Label	Language
ISO_IR 100	Western
ISO_IR 144	Cyrillic
ISO_IR 138	Hebrew
ISO_IR 126	Greek
ISO_IR 127	Arabic
ISO 2022 IR 87	Japanese / Kanji
ISO_IR 192	Universal Unicode UTF8

8 Security

SIDICOM QR does not support any specific security measures. It is assumed that SIDICOM QR is used within a secure environment. It is assumed that a secure environment includes at a minimum:

- Firewall or router protection to ensure that only approved external hosts have network access to SIDICOM QR
- Firewall or router protection to ensure that SIDICOM QR only has network access to approved external hosts and services
- Any communication with external hosts and services outside the locally secure environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automatic intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

We reserve the right to make any alterations which may be required due to technical improvements.

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