

DICOM Conformance Statement

GDxPRO

GDxPRO Instrument Software

Version 1.1

GDxPRO Review Software

Version 1.0

Carl Zeiss Meditec, Inc.

5160 Hacienda Drive

Dublin, CA 94568

USA

www.meditec.zeiss.com

1 Conformance Statement Overview

This document is structured as suggested in the DICOM Standard (PS 3.2, 2009).

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Workflow Management		
Modality Worklist Information Model - FIND	Yes	No

The GDxPRO does not support Media Interchange.

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3 Introduction

3.1 Revision History

Document Version	Author	Date
1.0	Vidya Kulkarni	2009-02-24
1.1	Vidya Kulkarni	2010-01-20

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. The reader should have a basic understanding of DICOM.

3.3 Remarks

If another device matches this conformance statement based on the comparison with its own conformance statement, there is a chance, but no guarantee, that they interoperate. DICOM only deals with communication; it does not specify what is needed for certain applications to run on a device. This DICOM Conformance Statement applies to the current 1.1 software version of the GDxPRO instrument and 1.0 software version of the GDxPRO Review SW. In the following, the terms "GDxPRO" and "GDxPRO Software" are used for both the instrument SW and the Review SW.

3.4 Definitions, Terms and Abbreviations

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
ILE	Implicit Little Endian
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1; JPEG Baseline; ISO 10918-1
MWL	Modality Work List
NB	Network Broker
RLE	Run Length Encoding
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, pair of user and provider.
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier

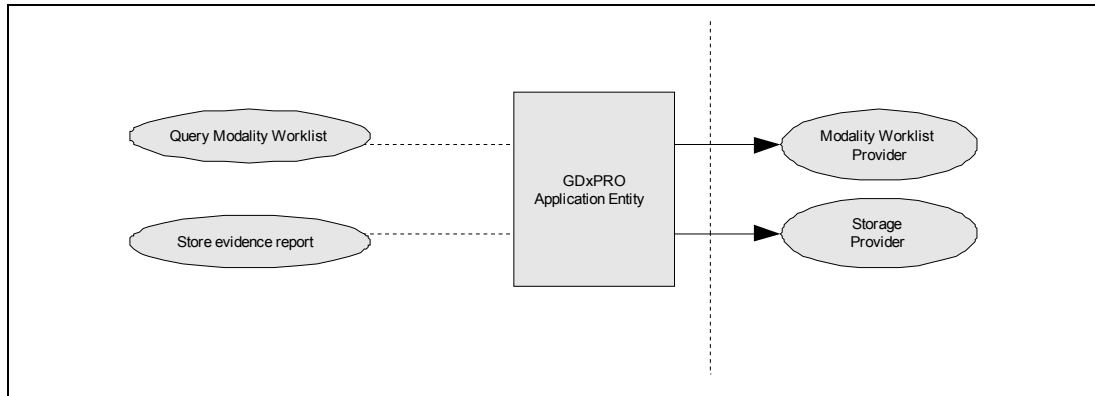
3.5 References

Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2009

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow



The GDxPRO Software works together with the Network Broker. Both software applications are hosted on the same machine. The configuration of the Network Broker is performed using the User Interface provided by the Network Broker. For Modality Worklist and Storage functionality the operator works with the instrument's Graphical User Interface.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of Network Broker

The ZEISS GDxPRO Model 8000 (GDxPRO) is an image acquisition modality. The GDxPRO is a confocal polarimetric scanning laser ophthalmoscope that is intended for imaging and three-dimensional analysis of the fundus and retinal nerve fiber layer (RNFL) in vivo. The GDxPRO and its GDx Variable Corneal Compensation (VCC) and GDx Enhanced Corneal Compensation (ECC) RNFL Normative Databases aid in the diagnosis and monitoring of diseases and disorders of the eye that may cause changes in the polarimetric retinal nerve fiber layer thickness.

The GDxPRO software allows to:

- query modality worklist
- export evidence reports

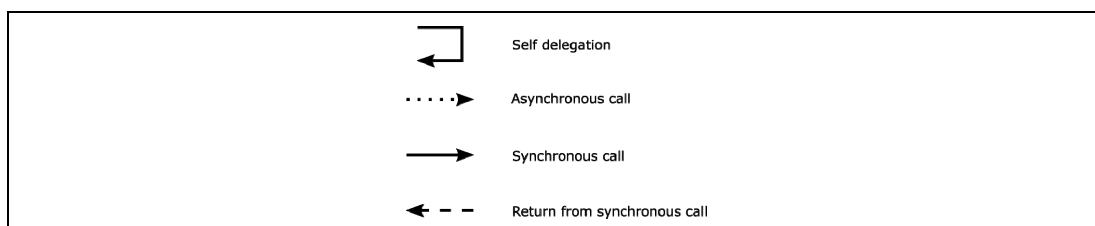
GDxPRO AE runs several DICOM Services, as Service Class User. DICOM related activities are triggered manually by operator or with the option for automatically triggered activities.

The GDxPRO Software allows performing a verification of the configured AEs. The result of this verification contains information about the supported SOP Classes and Transfer Syntaxes.

The GDxPRO Software logs extensive information about the DICOM operations to its log file.

4.1.3 Sequencing of Real-World Activities

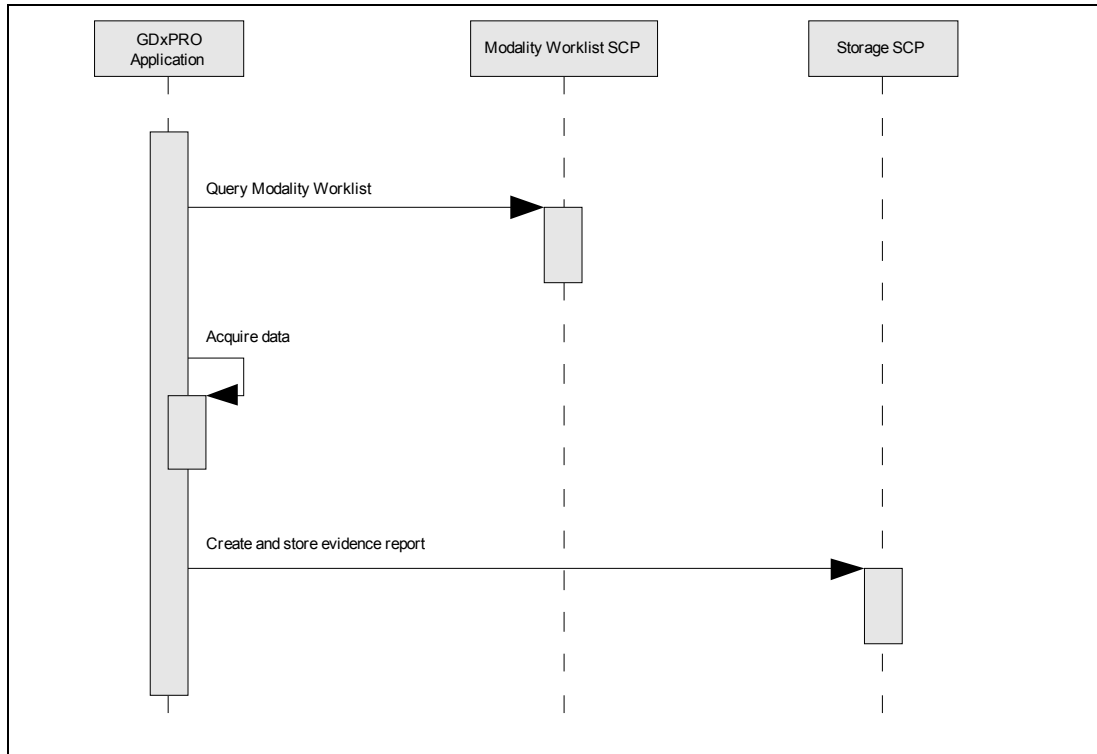
To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



The diagrams uses slightly modified UML symbols. The asynchronous call is not depicted as suggested in UML. Some objects do have more than one dashed line. It symbolizes more than one thread.

4.1.3.1 Scheduled Case

In the scheduled case the examination has been scheduled in advance, so that all patient and study related information is available the day the examination shall be taken.



Query Modality Worklist

When the patient arrives at the GDxPRO the operator may view a previously queried worklist of patients scheduled for that day or refresh the worklist by reinitiating the query in order to obtain updated patient information or newly scheduled patients not previously listed in the worklist. Those patients which were obtained from the query are listed in a scrollable list so the operator can search and select the correct patient to be examined. Once the patient is selected the GDxPRO may prompt the operator for additional information required by the acquisition modality in order to perform the exam and saves the appropriate entries into the local database (Patient, Physician, Visit, Study)

Acquire data

Once a patient record is selected from the worklist and saved by the GDxPRO the operator can begin scanning the patient’s eye with the acquisition modality using a user selected scan acquisition protocol in order to acquire data. The GDxPRO allows the user to review the acquired data before permanently saving the results.

Create and store evidence reports

Once scans are acquired and saved the GDxPRO can automatically create and store evidence reports via a user configuration which is enabled by default. The GDxPRO can also be configured to create and store evidence reports manually either at the end of the exam or sometime after. To create and store evidence reports for a previously acquired examination select the “DICOM Report Export” option via the Print and Export Options screen from the patient’s measurements list.

4.1.3.2 Unscheduled Case

In the unscheduled case the patient arrives immediately at the instrument, so that he or she was not registered and the examination could not be scheduled. This is also the case if the Modality Worklist SCP could not be reached.

The operator may manually enter search criteria to retrieve specific patient matches from the GDxPRO local database or create a new patient entry.

The data acquisition and creation and storage of evidence reports is consistent with the Scheduled Case described in chapter 4.1.3.1 Scheduled Case.

4.2 AE Specifications

4.2.1 Network Broker Application Entity Specification

4.2.1.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

4.2.1.2 Associations Policies

4.2.1.2.1 General

DICOM standard Application Context Name is DICOM 3.0.

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

4.2.1.2.2 Number of Associations

The number of simultaneous associations results in two since the activities "Query Modality Worklist" and "Store Images" can run in parallel.

Maximum number of simultaneous associations	2
---	---

4.2.1.2.3 Asynchronous Nature

GDxPRO does not support asynchronous communication (multiple outstanding transactions over a single Association).

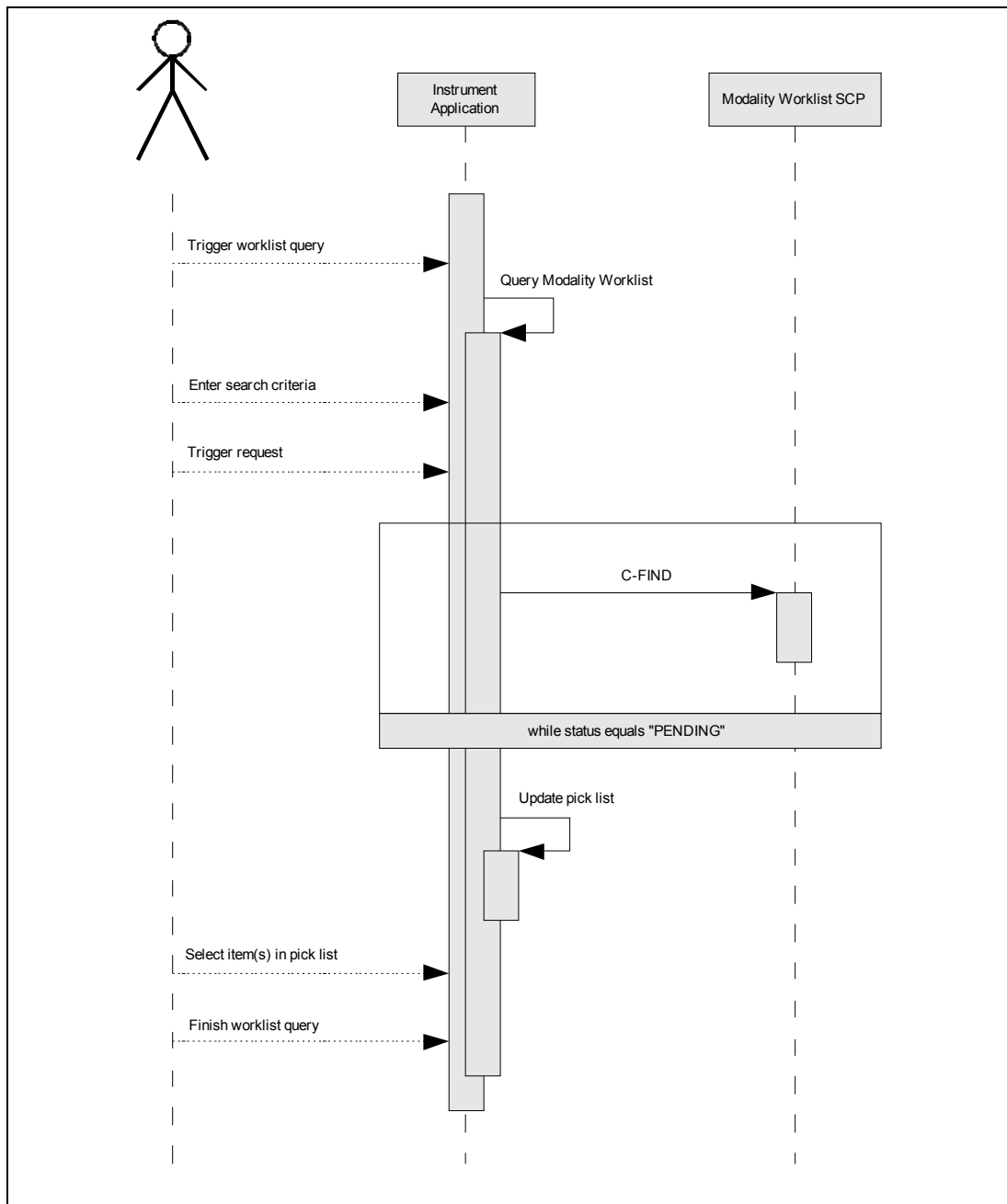
4.2.1.2.4 Implementation Identifying Information

Implementation Class UID	1.2.276.0.75.2.5.10
Implementation Version Name	1.3.6.0648

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Query Modality Worklist

4.2.1.3.1.1 Description and Sequencing of Activities



The activity "Query Modality Worklist" can be triggered at any time by operator. It is meaningful to perform the query when the patient arrives at the modality or once at the start of the day assuming all patients have been scheduled prior, then the work list usually contains the latest information.

The Modality Worklist query offers a GUI for interactive queries. The GUI offers three sets of query keys. By default the Get Today's Patient query is used to retrieve all patients scheduled for today. The other two queries belong to the so called "Patient Query" and "Broad Query". The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used. The operator triggers the search after he or she filled in search criteria. The Instrument Software sends a DICOM request, containing the search criteria. The Instrument Software waits for the response from the partner Application Entity. After receiving the response, the pick-list gets updated. The pick-list shows directly the most important information for a quick overview (see 4.2.1.3.1.3 SOP Specific Conformance for Modality Worklist SOP Class for the supported set of tags).

The process can be performed more than one time and the operator may change query keys until he or she finds the adequate worklist. The software maintains the last and current query which can be toggled from. The operator can select one worklist item at a time in either of the two pick-lists. Each item selected is then subjected to be imported in the Instrument Software. The operator finally finishes the worklist query by confirming the selected worklist item.

The Instrument Software takes over the selected item. It prepares data according to the selected item and prompts the operator for additional information required by their instrument if necessary. For patients who relate to existing data sets of the local database, the Instrument Software will always update based on the information which is provided from the worklist provider. If a conflict arises due to a duplicate patient ID the instruments software prompts the operator to either update or to overwrite the information stored locally. For patients who do not relate to existing data sets, the Instrument Software creates new data sets.

4.2.1.3.1.2 Proposed Presentation Contexts

Presentation Context Table						
Abstract Syntax			Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List			
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	No	

4.2.1.3.1.3 SOP Specific Conformance for Modality Worklist SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The instrument finishes receiving worklist items. The user can select items in instrument's pick list.
Pending	Matches are continuing	FF00, FF01	The instrument puts received worklist item into the pick list.
*	*	Any other status code	The status label of the dialog shows an error message.

The operator can perform a default search for patients scheduled on a given day.

Following tags are non editable as search criteria in input mask "Get Today's Patient".

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The value is set to today's date.
>(0008,0060)	Modality	Value is set to "OPM"
>(0040,0001)	Scheduled Station AE Title	The value is derived from the configuration values.

The operator can fill in search criterions as query keys. GDxPRO offers two input masks for it.

Following tags are editable as search criteria in input mask "Patient Query".

Tag	Tag Name	Description
(0010,0010)	Patients Name	The GDxPRO supports family name and given name only. The operator can use '*' or '?' as wild cards.
(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.
(0040,0100)	Modality	The default value is "OPM". The operator can change the value and select one value of a predefined set of values including an empty string Possible values are "OPM", "OT" and empty string.

Following tags are editable as search criteria in input mask "Broad Query".

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.



>(0040,0002)	Scheduled Procedure Step Start Date	The default value is today's date. The operator can change the. It is also possible to search for all dates if the operator does not define a specific date.
>(0008,0060)	Modality	The default value is "OPM". The operator can change the value and select one value of a predefined set of values including an empty string. Possible values are "OPM", "OT" and empty string.
>(0040,0001)	Scheduled Station AE Title	The default value is derived from the configuration values. The operator can enter the AE Title of another device or leave the field empty.

Tags	Tag Name	Query key	Imported	Displayed	Editable	IOD
Patient						
(0008,1120)	Referenced Patient Sequence					
(0010,0010)	Patients Name	PBQ	X	PL, APP	X	X
(0010,0020)	Patient ID	PBQ	X	PL, APP	X	X
(0010,0021)	Issuer Of Patient ID		X	PL		X
(0010,0030)	Patients Birth Date		X	APP	X	X
(0010,0040)	Patients Sex		X	APP	X	X
(0010,0032)	Patients Birth Time					
(0010,1000)	Other Patient IDs					
(0010,1001)	Other Patient Names					
(0010,2160)	Ethnic Group			APP	X	X
(0010,4000)	Patient Comments					
(0010,2000)	Medical Alerts					
(0010,2110)	Contrast Allergies					
(0010,21C0)	Pregnancy Status					
(0038,0050)	Special Needs					
(0038,0500)	Patient State					
Study						
(0008,0050)	Accession Number	PBQ	X	PL		X
(0008,0090)	Referring Physicians Name		X	PL, APP	X	X
(0020,000D)	Study Instance UID		X			X
(0032,1032)	Requesting Physician					
(0032,4000)	Study Comments					
Requested Procedure						
(0008,1110)	Referenced Study Sequence					
(0032,1060)	Requested Procedure Description					
(0032,1064)	Requested Procedure Code Sequence					
(0040,1001)	Requested Procedure ID	PBQ				
(0040,0100)	Scheduled Procedure Step Sequence					
>(0008,0060)	Modality	PBQ, BRQ, DEF		PL		
>(0040,0001)	Scheduled Station Application Entity Title	BRQ, DEF		PL		
>(0040,0003)	Scheduled Procedure Step Start Time					
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ, DEF		PL		
>(0040,0006)	Scheduled Performing Physicians Name		X	APP	X	X
>(0040,0007)	Scheduled Procedure Step Description					
>(0040,0008)	Scheduled Protocol Code Sequence					
>(0040,0009)	Scheduled Procedure Step ID		X			
(0040,2016)	Placer Order Number Imaging Service Request					

Values for column Query Key:

- **PBQ – Patient Based Query**
A tag that is marked with PBQ is used as query key in the Patient Based Query mode of the interactive Modality Worklist Query Dialog.
- **BRQ – Broad Query**
A tag that is marked with BRQ is used as query key in the Broad Query mode of the interactive Modality Worklist Query Dialog.
The Today's patients query is a specialty of the broad query. All query keys are set to the default values.
- **DEF – Default Value**
A tag that is marked with DEF has a value assigned when the interactive Modality Worklist Query Dialog is shown the first time or when the Reset button is pushed.
Default values can get modified. Those modifications will be remembered until the Modality Worklist Query Dialog is shown again
- **X**
The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

Values for column Displayed:

- **PL – Pick-list**
Values of this tag are instantly visible in the pick list.
- **APP – Application**
Values of this tag are visible in the application.

Values for column Modifiable:

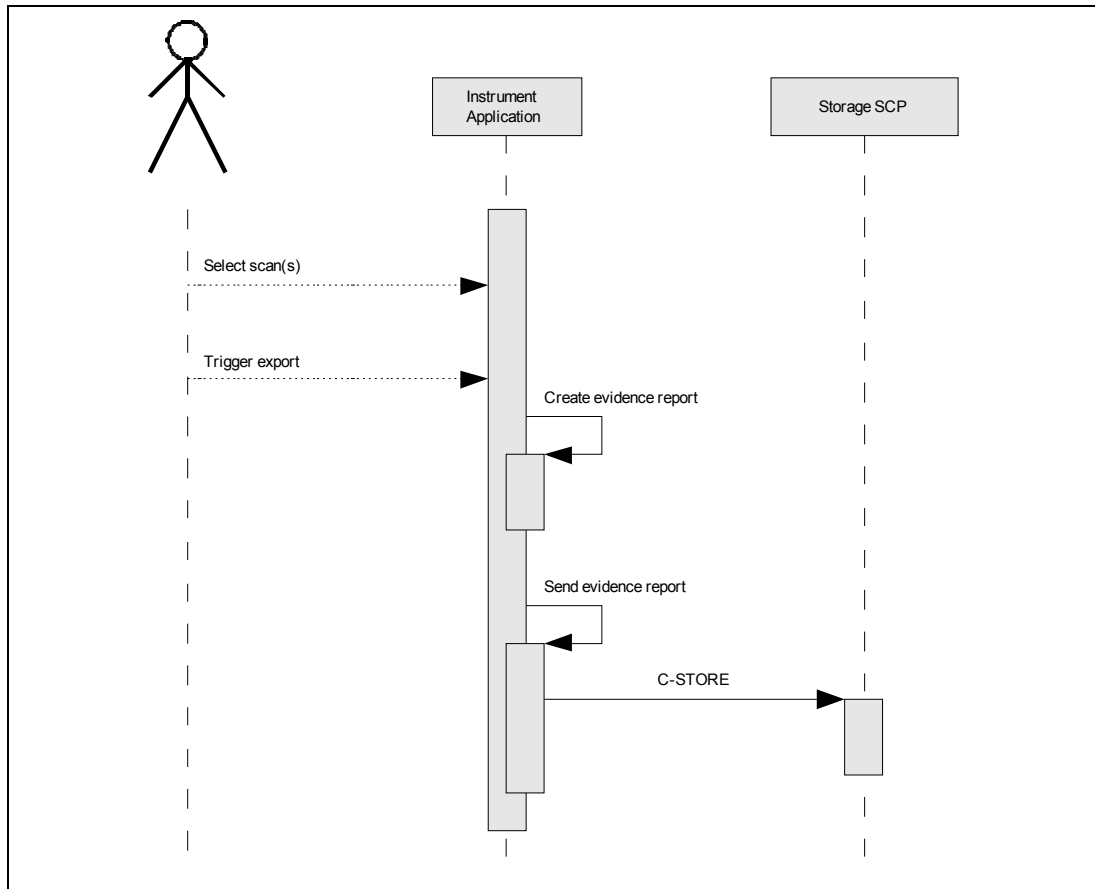
- **X**
A value which has been imported to the application might be modified inside the application.
Important note: Don't change Patient Demographic information if not absolutely necessary! Patient Demographic information shall always be modified at the Patient Management System Level and changes propagated to the instrument.

Values for column IOD:

- **X**
Values of marked tags will be stored in created IODs. See also table "mapping of attributes" in 8.1.3 Attribute Mapping.

4.2.1.3.2 Activity – Create and store evidence reports

4.2.1.3.2.1 Description and Sequencing of Activities



After finishing the examination, the whole Study can be submitted automatically or manually. The operator can initiate sending evidence reports at any time to storage entities. The GDxPRO Application passes data to the Network Broker. The Network Broker creates immediately DICOM objects and puts a send-job for that DICOM object in a queue. The transmission of the DICOM objects is processed in the background (that means it is performed while operator can continue work with GDxPRO Application, including creating and submitting additional studies). The storage progress is reflected in a dialog. The operator can even control the storage progress. It's up to the operator if the storage progress dialog is visible or not.

4.2.1.3.2.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Multi-frame True Color SC Image Storage	1.2.840.10008.5.1.4.1.1.7.4	ILE	1.2.840.10008.1.2	SCU	No
		JPG-1	1.2.840.10008.1.2.4.50	SCU	No
		RLE	1.2.840.10008.1.2.5	SCU	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	ILE	1.2.840.10008.1.2	SCU	No

4.2.1.3.2.3 SOP Specific Conformance for Image Storage SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The job gets a success state and will be marked as deleted in the job list.
*	*	Any other status code	The job gets an error state.

4.2.1.4 Association Acceptance Policy

The Network Broker does not accept Associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible for the applications. The application uses the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

No additional protocols are supported.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

4.4.1.1 Local AE Titles

The IP is not configurable by the Network Broker Configuration Tool. The IP is administrated by the Operating System. The calling AET is configurable. The calling AET is the AET of the Network Broker.

4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The Network Broker allows setting up one AE as Modality Worklist Provider and one AE as Storage Provider. For both AEs, the host or IP, the Port and the Application Entity Title must be known.

4.4.2 Parameters

4.4.2.1 General Parameters

4.4.2.2 Modality Worklist SCU Parameters

The association initiation timeout is configurable. Default is 10 seconds. Additionally, for this service file-based parameters are available. The file-based parameter describes a template for DICOM objects which is used to perform the request. Whenever the operator performs a request, the application loads the template file and creates a DICOM object of it. Then the application fills in values which were typed in by the operator in the current active input mask. A dedicated file contains template information for the Modality Worklist Query. By default, the file looks like this:

```
#Specific Character Set
(0008,0005)

#Scheduled Procedure Step Sequence
(0040,0100)
#Scheduled Station AE Title
(0040,0100) [0]>(0040,0001)
#Scheduled Step Start Date
(0040,0100) [0]>(0040,0002)
#Scheduled Step Start Time
(0040,0100) [0]>(0040,0003)
#Modality
(0040,0100) [0]>(0008,0060)
#Scheduled Performing Physicians Name
(0040,0100) [0]>(0040,0006)
#Scheduled Procedure Step Description
(0040,0100) [0]>(0040,0007)
#Scheduled Station Name
(0040,0100) [0]>(0040,0010)
```



```
#Scheduled Procedure Step Location
(0040,0100) [0]>(0040,0011)

#Scheduled Protocol Code Sequence
# (0040,0100)>(0040,0008)
#Code Value (Sequence)
(0040,0100) [0]>(0040,0008) [0]>(0008,0100)
#Coding Scheme Version
(0040,0100) [0]>(0040,0008) [0]>(0008,0103)
#Coding Scheme Designator
(0040,0100) [0]>(0040,0008) [0]>(0008,0102)
#Coding Meaning
(0040,0100) [0]>(0040,0008) [0]>(0008,0104)

#Pre-Medication
(0040,0100) [0]>(0040,0012)
#Scheduled Procedure Step ID
(0040,0100) [0]>(0040,0009)
#Requested Contrast Agent ?
(0040,0100) [0]>(0032,1070)
#Scheduled Procedure Step Status
(0040,0100) [0]>(0040,0020)

#Requested Procedure ID
(0040,1001)
#Requested Procedure Description
(0032,1060)
#Requested Procedure Priority
(0040,1003)

#Requested Procedure Code Sequence
# (0032,1064)
#Code Value
(0032,1064) [0]>(0008,0100)
#Coding Scheme Designator
(0032,1064) [0]>(0008,0102)
#Coding Scheme Version
(0032,1064) [0]>(0008,0103)
#Code Meaning
(0032,1064) [0]>(0008,0104)

#Study Instance UID
(0020,000D)
#Study Comments
(0032,4000)

#Referenced Study Sequence
# (0008,1110)
#Referenced SOP Class UID
(0008,1110) [0]>(0008,1150)
#Referenced SOP Instance UID
(0008,1110) [0]>(0008,1155)

#Requested Procedure Priority
(0040,1003)
#Patient Transport Arrangements
(0040,1004)
#Accession Number
(0008,0050)
#Requesting Physician
(0032,1032)
#Referring Physician's Name
(0008,0090)
#Placer Order Number / Imaging Service Request
(0040,2016)
#Patient Transport Arrangements
(0040,1004)
#Confidentiality Constraint on Patient Data Description
(0040,3001)

#Admission ID
(0038,0010)
#Current Patient Location
(0038,0300)

#Referenced Patient Sequence
```

```
#(0008,1120)
#Referenced SOP Class UID
(0008,1120)[0]>(0008,1150)
#Referenced SOP Instance UID
(0008,1120)[0]>(0008,1155)

#Patient's Name
(0010,0010)
#Patient ID
(0010,0020)
#Issuer of Patient ID
(0010,0021)
#Other Patient IDs
(0010,1000)
#Other Patient Names
(0010,1001)
#Patients Birth Date
(0010,0030)
#Patients Birth Time
(0010,0032)
#Patient's Sex
(0010,0040)
#Patients's Weight
(0010,1030)
#Confidentiality constraint on patient data
(0040,3001)
#Patient State
(0038,0500)
#Ethnic Group
(0010,2160)
#Patient Comments
(0010,4000)
#Pregnancy Status
(0010,21C0)
#Medical Alerts
(0010,2000)
#Contrast Allergies
(0010,2110)
#Special Needs
(0038,0050)
```

4.4.2.3 Storage SCU Parameters

The association initiation timeout is configurable. Default is 10 seconds.

For GDxPRO the selectable compressions for the IODs are:

- Multi-frame True Color Secondary Capture
 - No Compression
 - RLE Compression
 - JPEG Baseline Compression
- Encapsulated PDF
 - No selection possible



5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported via Network Broker.

6 Support of Character Sets

In addition to the default character repertoire, the Defined Terms for Specific Character Set in the table are supported.

Supported Specific Character Set	
Character Set Description	Defined Term
Latin alphabet No. 1	ISO_IR 100

7 Security

The DICOM capabilities of the GDxPRO Application do not support any specific security measures.

It is assumed that GDxPRO Application is used within a secured environment. It is assumed that a secured environment includes at a minimum:

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

Other network security procedures such as automated 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.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

Abbreviations used for presence of values:

VNAP	Value Not Always Present (attribute sent zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present with a value
EMPTY	Attribute is sent without a value

Abbreviations used for sources of data:

USER	the attribute value source is from User input
AUTO	the attribute value is generated automatically
MWL,MPPS, etc.	the attribute value is the same as the value received using a DICOM service such as Modality Worklist, Modality Performed Procedure Step, etc.
CONFIG	the attribute value source is a configurable parameter

8.1.1.1 Encapsulated PDF IOD

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	Mandatory
Study	General Study	C.7.2.1	Mandatory
	Patient Study	C.7.2.2	Optional
Series	Encapsulated Document Series	C.24.1	Mandatory
Equipment	General Equipment	C.7.5.1	Mandatory
	SC Equipment	C.8.6.1	Mandatory
Encapsulated Document	Encapsulated Document	C.24.2	Mandatory
	SOP Common	C.12.1	Mandatory

Tag	VR	Name	Value	Presence of Value	Source
Information Entity 'Patient'					
Module 'Patient'					
(0010,0010)	PN	Patient's Name	Patient's full name.	ALWAYS	MWL and USER
(0010,0020)	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL and USER
(0010,0021)	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID.	VNAP	MWL
(0010,0030)	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL and USER
(0010,0040)	CS	Patient's Sex	Gender of the named patient. Enumerated Values: M = male F = female O = other	ALWAYS	MWL and USER
(0010,2160)	SH	Ethnic Group	Ethnic group or race of the patient. Asian, Black, Chinese, Eastern, Hispanic, Indian, Japanese, White, Combined	ALWAYS	USER
Information Entity 'Study'					
Module 'General Study'					
(0008,0020)	DA	Study Date	Date the Study started.	ALWAYS	AUTO
(0008,0030)	TM	Study Time	Time the Study started.	ALWAYS	AUTO
(0008,0050)	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL or EMPTY
(0008,0090)	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL or USER
(0008,1030)	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	EMPTY	
(0008,1048)	PN	Physician(s) of Record	Names of the physician(s) who are responsible for overall patient care at time of Study (see Section C.7.3.1 for Performing Physician)	VNAP	MWL or USER
(0020,000D)	UI	Study Instance UID	Unique identifier for the Study. "1.2.276.0.75.2.4.10." as constant prefix if the value has been generated by the application.	ALWAYS	AUTO or MWL

	(0020,0010)	SH	Study ID	User or equipment generated Study identifier.	ALWAYS	AUTO
Module 'Patient Study'						
	(0010,1010)	AS	Patient's Age	Age of the Patient.	ALWAYS	AUTO
	(0010,1020)	DS	Patient's Size	Length or size of the Patient, in meters.	EMPTY	
	(0010,1030)	DS	Patient's Weight	Weight of the Patient, in kilograms.	EMPTY	
	(0010,2180)	SH	Occupation	Occupation of the Patient.	EMPTY	
	(0010,21B0)	LT	Additional Patient's History	Additional information about the Patient's medical history.	EMPTY	
Information Entity 'Series'						
Module 'Encapsulated Document Series'						
	(0008,0060)	CS	Modality	"OPM"	ALWAYS	AUTO
	(0008,103E)	LO	Series Description	User provided description of the Series	EMPTY	
	(0020,000E)	UI	Series Instance UID	Unique identifier of the Series. "1.2.276.0.75.2.4.10." as constant prefix for generated UIDs.	ALWAYS	AUTO
	(0020,0011)	IS	Series Number	A number that identifies the Series.	ALWAYS	AUTO
	(0040,0244)	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	EMPTY	
	(0040,0245)	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	EMPTY	
	(0040,0253)	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	EMPTY	
	(0040,0254)	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed.	EMPTY	
	(0040,0280)	ST	Comments on the Performed Procedure Step	User-defined comments on the Performed Procedure Step.	VNAP	USER
	(0012,0060)	LO	Clinical Trial Coordinating Center Name	The name of the institution that is responsible for coordinating the medical imaging data for the clinical trial. See C.7.3.2.1.1.	EMPTY	
Information Entity 'Equipment'						
Module 'General Equipment'						
	(0008,0070)	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances. "Carl Zeiss Meditec"	ALWAYS	AUTO
	(0008,0080)	LO	Institution Name	Institution where the equipment that produced the composite instances is located.	VNAP	USER
	(0008,0081)	ST	Institution Address	Mailing address of the institution where the equipment that produced the composite instances is located.	VNAP	USER
	(0008,1010)	SH	Station Name	User defined name identifying the machine that produced the composite instances.	EMPTY	

	(0008,1040)	LO	Institutional Department Name	Department in the institution where the equipment that produced the composite instances is located.	EMPTY	
	(0008,1090)	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. "GDxPRO"	ALWAYS	AUTO
	(0018,1000)	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.	ALWAYS	AUTO
	(0018,1020)	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the composite instances.	ALWAYS	AUTO
	(0018,1050)	DS	Spatial Resolution	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. If variable across the images of the series, the value at the image center.	EMPTY	
	(0028,0120)	US/SS	Pixel Padding Value	Value of pixels not present in the native image added to an image to pad to rectangular format. See C.7.5.1.1.2 for further explanation. Note: The Value Representation of this Attribute is determined by the value of Pixel Representation (0028,0103).	EMPTY	
Module 'SC Equipment'						
	(0008,0064)	CS	Conversion Type	"SYN" - Synthetic Image	ALWAYS	AUTO
Information Entity 'Encapsulated Document'						
Module 'Encapsulated Document'						
	(0008,0023)	DA	Content Date	The date the document content creation was started.	ALWAYS	AUTO
	(0008,002A)	DT	Acquisition Datetime	The date and time that the original generation of the data in the document started.	ALWAYS	AUTO
	(0008,0033)	TM	Content Time	The time the document content creation was started.	ALWAYS	AUTO
	(0020,0013)	IS	Instance Number	A number that identifies this SOP Instance. The value shall be unique within a series.	ALWAYS	AUTO
	(0028,0301)	CS	Burned In Annotation	"YES"	ALWAYS	AUTO
	(0040,A043)	SQ	Concept Name Code Sequence	Has never an item.	EMPTY	AUTO
	(0042,0010)	ST	Document Title	The value of the "Title" entry in the "Document Information Directory" as encoded in the PDF data.	EMPTY	AUTO

	(0042,0011)	OB	Encapsulated Document	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO
	(0042,0012)	LO	MIME Type of Encapsulated Document	"application/pdf"	ALWAYS	AUTO
Module 'SOP Common'						
	(0008,0005)	CS	Specific Character Set	"ISO_IR 100" Character Set that expands or replaces the Basic Graphic Set.	ALWAYS	AUTO
	(0008,0012)	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
	(0008,0013)	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
	(0008,0016)	UI	SOP Class UID	"1.2.840.10008.5.1.4.1.1.104.1"	ALWAYS	AUTO
	(0008,0018)	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4. "1.2.276.0.75.2.4.10." as constant prefix for generated UIDs	ALWAYS	AUTO

8.1.1.2 Multi-frame True Color SC Image IOD

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	Mandatory
Study	General Study	C.7.2.1	Mandatory
	Patient Study	C.7.2.2	Optional
Series	General Series	C.7.3.1	Mandatory
Equipment	General Equipment	C.7.5.1	Optional
	SC Equipment	C.8.6.1	Mandatory
Image	General Image	C.7.6.1	Mandatory
	Image Pixel	C.7.6.3	Mandatory
	Multi-frame	C.7.6.6	Mandatory
	SC Image	C.8.6.2	Optional
	SC Multi-frame Image	C.8.6.3	Mandatory
	SC Multi-frame Vector	C.8.6.4	Conditional - Required if Number of Frames is greater than 1
	SOP Common	C.12.1	Mandatory

Tag	VR	Name	Value	Presence of Value	Source
Information Entity 'Patient'					
Module 'Patient'					
(0010,0010)	PN	Patient's Name	Patient's full name.	ALWAYS	MWL or USER
(0010,0020)	LO	Patient ID	Primary hospital identification number or code for the patient.	ALWAYS	MWL or USER
(0010,0021)	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID.	VNAP	MWL
(0010,0030)	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL or USER
(0010,0040)	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	ALWAYS	MWL or USER
(0010,2160)	SH	Ethnic Group	Ethnic group or race of the patient. Asian, Black, Chinese, Eastern, Hispanic, Indian, Japanese, White, Combined	ALWAYS	USER
Information Entity 'Study'					
Module 'General Study'					
(0008,0020)	DA	Study Date	Date the Study started.	ALWAYS	AUTO
(0008,0030)	TM	Study Time	Time the Study started.	ALWAYS	AUTO
(0008,0050)	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL
(0008,0090)	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL or USER
(0008,1030)	LO	Study Description	Institution-generated description or classification of the Study (component) performed.	EMPTY	

	(0008,1048)	PN	Physician(s) of Record	Names of the physician(s) who are responsible for overall patient care at time of Study (see Section C.7.3.1 for Performing Physician) Value copied from Performing Physician provided via MWL.	VNAP	MWL or USER
	(0020,000D)	UI	Study Instance UID	Unique identifier for the Study. "1.2.276.0.75.2.4.10." as prefix if UID is generated by the instrument.	ALWAYS	AUTO, MWL
	(0020,0010)	SH	Study ID	User or equipment generated Study identifier.	ALWAYS	AUTO
Module 'Patient Study'						
	(0010,1010)	AS	Patient's Age	Age of the Patient.	ALWAYS	AUTO
	(0010,1020)	DS	Patient's Size	Length or size of the Patient, in meters.	EMPTY	
	(0010,1030)	DS	Patient's Weight	Weight of the Patient, in kilograms.	EMPTY	
	(0010,2180)	SH	Occupation	Occupation of the Patient.	EMPTY	
	(0010,21B0)	LT	Additional Patient's History	Additional information about the Patient's medical history.	EMPTY	
Information Entity 'Series'						
Module 'General Series'						
	(0008,0021)	DA	Series Date	Date the Series started.	ALWAYS	AUTO
	(0008,0031)	TM	Series Time	Time the Series started.	ALWAYS	AUTO
	(0008,103E)	LO	Series Description	User provided description of the Series	EMPTY	
	(0018,1030)	LO	Protocol Name	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	EMPTY	
	(0018,5100)	CS	Patient Position	Patient position descriptor relative to the equipment. Required for CT and MR images; shall not be present if Patient Orientation Code Sequence (0054,0410) is present; may be present otherwise. See C.7.3.1.1.2 for Defined Terms and further explanation.	EMPTY	
	(0020,000E)	UI	Series Instance UID	Unique identifier of the Series. "1.2.276.0.75.2.4.10." used as prefix for Series Instance UID	ALWAYS	AUTO
	(0020,0011)	IS	Series Number	A number that identifies this Series.	ALWAYS	AUTO
	(0020,0060)	CS	Laterality	Laterality of (paired) body part examined. Required if the body part examined is a paired structure and Image Laterality (0020,0062) or Frame Laterality (0020,9072) are not sent. Enumerated Values: R = right L	EMPTY	

				= left Note: Some IODs support Image Laterality (0020,0062) at the Image level or Frame Laterality(0020,9072) at the Frame level in the Frame Anatomy functional group macro, which can provide a more comprehensive mechanism for specifying the laterality of the body part(s) being examined.		
	(0028,0108)	US/SS	Smallest Pixel Value in Series	The minimum value of all images in this Series.	EMPTY	
	(0028,0109)	US/SS	Largest Pixel Value in Series	The maximum value of all images in this Series.	EMPTY	
	(0040,0244)	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	EMPTY	
	(0040,0245)	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	EMPTY	
	(0040,0253)	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	EMPTY	
	(0040,0254)	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed.	EMPTY	
	(0040,0280)	ST	Comments on the Performed Procedure Step	User-defined comments on the Performed Procedure Step.	VNAP	USER
Information Entity 'Equipment'						
Module 'General Equipment'						
	(0008,0070)	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances. "Carl Zeiss Meditec"	ALWAYS	AUTO
	(0008,0080)	LO	Institution Name	Institution where the equipment that produced the composite instances is located.	VNAP	USER
	(0008,0081)	ST	Institution Address	Mailing address of the institution where the equipment that produced the composite instances is located.	VNAP	USER
	(0008,1010)	SH	Station Name	User defined name identifying the machine that produced the composite instances.	EMPTY	
	(0008,1040)	LO	Institutional Department Name	Department in the institution where the equipment that produced the composite instances is located.	EMPTY	
	(0008,1090)	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. "GDxPRO"	ALWAYS	AUTO
	(0018,1000)	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created	ALWAYS	AUTO

				the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.		
	(0018,1020)	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the composite instances.	ALWAYS	AUTO
	(0018,1050)	DS	Spatial Resolution	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. If variable across the images of the series, the value at the image center.	EMPTY	
	(0028,0120)	US/SS	Pixel Padding Value	Value of pixels not present in the native image added to an image to pad to rectangular format. See C.7.5.1.1.2 for further explanation. Note: The Value Representation of this Attribute is determined by the value of Pixel Representation (0028,0103).	EMPTY	
Module 'SC Equipment '						
	(0008,0060)	CS	Modality	"OPM"	ALWAYS	AUTO
	(0008,0064)	CS	Conversion Type	"SYN" - Synthetic Image	ALWAYS	AUTO
Information Entity 'Image'						
Module 'General Image'						
	(0008,0022)	DA	Acquisition Date	The date the acquisition of data that resulted in this image started	ALWAYS	AUTO
	(0008,0023)	DA	Content Date	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related.	ALWAYS	AUTO
	(0008,002A)	DT	Acquisition Datetime	The date and time that the acquisition of data that resulted in this image started. Note: The synchronization of this time with an external clock is specified in the Synchronization Module in Acquisition Time Synchronized (0018,1800).	ALWAYS	AUTO
	(0008,0032)	TM	Acquisition Time	The time the acquisition of data that resulted in this image started	ALWAYS	AUTO
	(0008,0033)	TM	Content Time	The time the image pixel data creation started. Required if image is part of a series in which the images are temporally related.	ALWAYS	AUTO
	(0008,2111)	ST	Derivation Description	A text description of how this image was derived. See C.7.6.1.1.3 for further explanation.	EMPTY	

	(0020,0012)	IS	Acquisition Number	A number identifying the single continuous gathering of data over a period of time that resulted in this image.	EMPTY	
	(0020,0013)	IS	Instance Number		ALWAYS	AUTO
	(0020,0020)	CS	Patient Orientation	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032). See C.7.6.1.1.1 for further explanation. Note: IOD's may have attributes other than Patient Orientation, Image Orientation, or Image Position (Patient) to describe orientation in which case this attribute will be zero length.	EMPTY	
	(0020,1002)	IS	Images in Acquisition	Number of images that resulted from this acquisition of data	ALWAYS	AUTO
	(0020,4000)	LT	Image Comments	User-defined comments about the image	VNAP	USER
	(0028,2110)	CS	Lossy Image Compression	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See C.7.6.1.1.5	ALWAYS	AUTO
	(0028,2112)	DS	Lossy Image Compression Ratio	Describes the approximate lossy compression ratio(s) that have been applied to this image. See C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied. Notes: 1. For example, a compression ratio of 30:1 would be described in this Attribute with a single value of 30. 2. For historical reasons, the lossy compression ratio may also be described in Derivation Description (0008,2111).	VNAP	AUTO
Module 'Image Pixel '						
	(0028,0002)	US	Samples per Pixel	"3"	ALWAYS	AUTO
	(0028,0004)	CS	Photometric Interpretation	"RGB" for color images not compressed. "YBR_FULL_422" for color images, compressed.	ALWAYS	AUTO
	(0028,0006)	US	Planar Configuration	"0"	ALWAYS	AUTO
	(0028,0010)	US	Rows		ALWAYS	AUTO
	(0028,0011)	US	Columns		ALWAYS	AUTO
	(0028,0100)	US	Bits Allocated	"8"	ALWAYS	AUTO
	(0028,0101)	US	Bits Stored	"8"	ALWAYS	AUTO
	(0028,0102)	US	High Bit	"7"	ALWAYS	AUTO
	(0028,0103)	US	Pixel Representation	"0"	ALWAYS	AUTO

	(0028,0106)	US/SS	Smallest Image Pixel Value	The minimum actual pixel value encountered in this image.	EMPTY	
	(0028,0107)	US/SS	Largest Image Pixel Value	The maximum actual pixel value encountered in this image.	EMPTY	
	(7FE0,0010)	OW/OB	Pixel Data	Contains the image pixel	ALWAYS	AUTO
Module 'Multi-frame '						
	(0028,0008)	IS	Number of Frames		ALWAYS	AUTO
Module 'SC Multi-frame Image '						
	(0028,0301)	CS	Burned In Annotation	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. ALWAYS "YES"	ALWAYS	AUTO
Module 'SC Multi-frame Vector '						
	(0018,2001)	IS	Page Number Vector	Multi-valued, the number of the pages in increasing order.	ALWAYS	AUTO
Module 'SOP Common'						
	(0008,0005)	CS	Specific Character Set	ISO_IR 100 Character Set that expands or replaces the Basic Graphic Set.	ALWAYS	AUTO
	(0008,0012)	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
	(0008,0013)	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO
	(0008,0016)	UI	SOP Class UID	"1.2.840.10008.5.1.4.1.1.7.4"	ALWAYS	AUTO
	(0008,0018)	UI	SOP Instance UID	"1.2.276.0.75.2.4.10." as constant prefix	ALWAYS	AUTO
	(0020,0013)	IS	Instance Number	A number that identifies this Composite object instance.	ALWAYS	AUTO

8.1.2 Usage of Attributes from Received IOD's

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.1 Activity – Query Modality Worklist

8.1.3 Attribute Mapping

Modality Worklist	Instance IOD
Study Instance UID	Study Instance UID
Accession Number	Accession Number
Referring Physicians Name	Referring Physicians Name
Patients Name	Patients Name
Patient ID	Patient ID
Patients Birth Date	Patients Birth Date
Patients Sex	Patients Sex
Issuer of Patient ID	Issuer of Patient ID
Scheduled Performing Physician's Name	Physician(s) of Record

8.1.4 Coerced/Modified Files

Those tags are listed in chapter 4.2.1.3.1 Activity – Query Modality Worklist. Other attributes get lost and are not available in the GDxPRO Application.

8.2 Data Dictionary of Private Attributes

8.3 Coded Terminology and Templates

The Instrument Software AE does not specify a custom coded terminology nor uses codes that are available via the Modality Worklist provider.

8.4 Grayscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized / Private SOP Classes

Neither Specialized nor Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.