Technical
Publications

LOGIQworks Plug-in 3.0
DICOM Conformance Statement

Direction 5229912-100

Rev. 1.0

CE 0124

Regulatory Requirement

This product complies with regulatory requirements of the following European Directive 93/42/EEC concerning medical devices.

$C\epsilon$ 0124

GE Medical Systems

Revision History

Table i-1: Reason for Change

Rev.	Author	Date	Reason for change
1.0	Chunyan Jiang	2007-05-15	Initial Version for LOGIQworks Plug-in 3.0.4

***ATTENTION**:*

This document contains information concerning the use of your LOGIQworks. Precautions and instructions are included that supplement the User Manual and address specific concerns related to LOGIQworks. Keep this document with the User Manual and have all users become familiar with its contents and organization before using your LOGIQworks system.

Table of Contents

1 Introduction

1.1 Scope and Field of Application

This document is the DICOM Conformance Statement for version 3.0 of the LOGIQworks Plug-in. The purpose of this document is to describe how LOGIQworks Plug-in processes the DICOM file that conforms to the DICOM 3.0 standard. LOGIQworks is a plug-in for third party software, like RA600 and ViewPoint. The third party software performs the operations of DICOM network collaborations.

If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM v3.0 standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements, which are sent by GEMS devices.

1.2 References

- Digital Imaging and Communications in Medicine (DICOM), parts 1-15 (NEMA PS 3.1 - 15).
- RA600 DICOM Conformance Statement
- ViewPoint DICOM Conformance Statement

1.3 Definitions

See Digital Imaging and Communications in Medicine (DICOM), parts 1-15 (NEMA PS 3.1-15).

1.4 Symbols and Abbreviations

See Digital Imaging and Communications in Medicine (DICOM), parts 1-15 (NEMA PS 3.1-15).

1.5 Important Considerations for the Reader

This DICOM Conformance Statement doesn't focus on connectivity between LOGIQworks Plug-in and equipment from other vendors. The following considerations should be made if the reader has the concerns:

- The integration of equipment from different vendors (including GEMS IT Application) goes beyond the scope of the DICOM 3.0 standard and the DICOM Conformance Statements from GEMS and other vendors. It is the responsibility of the user (or user's agent) to assess the application requirements and to design a solution that integrates GEMS equipment with equipment from other vendors.

- When the comparison of this DICOM Conformance Statement with a DICOM Conformance Statement from another vendor indicates that connectivity should be possible it is the responsibility of the user (or user's agent) to verify this by carrying out validation tests and to check whether all required functionality is met.

- With regard to the future evolution of the DICOM 3.0 standard GEMS reserves the right to make changes to the LOGIQworks Plug-in architecture described in this document. The user (or user's agent) should ensure that any equipment connected via DICOM to GEMS equipment also follows the future evolution of the DICOM 3.0 standard.

2 LOGIQworks Plug-in DICOM Media Server AE

LOGIQworks Plug-in provides standard conformance to the DICOM Media Storage Service
and File Format (PS 3.10) and the Media Storage Application Profiles (PS 3.11).

2.1 Implementation Model

2.1.1 Application Data Flow Diagram
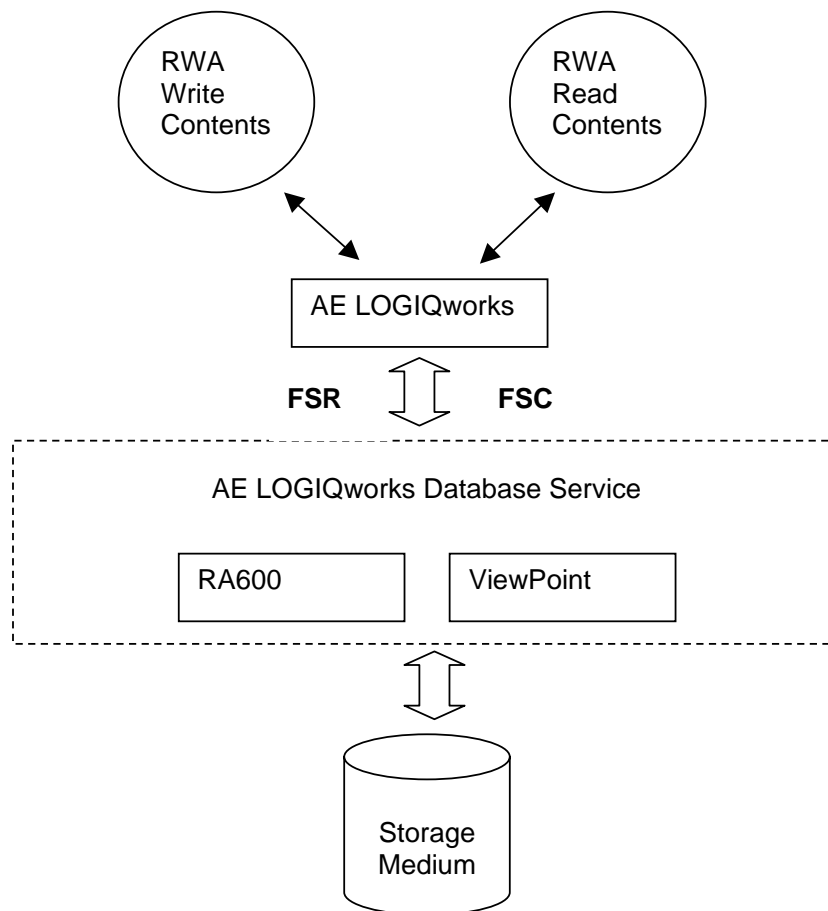
The LOGIQworks Plug-in Media Server application flow consists of the following items:

- The LOGIQworks Plug-in front-end application serves both as a FSC and a FSR. As a plug-in, LOGIQworks is able to read directory information from the LOGIQworks Database Service and to write images and directory information to the LOGIQworks Plug-in Database Service.
- The LOGIQworks Database Services RA600 and ViewPoint are responsible for receiving and sending images to other DICOM devices. See DICOM Conformance Statements for RA600 and ViewPoint for more details.

- The two Real World Activities involved are available through the LOGIQworks Plug-in AE's user interface.

2.2 AE Specification

2.2.1 Application Entity LOGIQworks Database service Specification

LOGIQworks Plug-in supports the following application profile:

Supported Application Profile	
Description	Identifier
General Purpose medium storage image interchange profile	STD-GEN-CD

2.2.2 Real World Activities

LOGIQworks Plug-in supports the following Real World Activities within the profile mentioned above:

Real World Activities and roles			
Supported Application Profiles	Real World Activities	Role	SC option
STD-GEN-CD	Read images from storage medium	FSR	Interchange
	Write images on storage medium	FSR	Interchange

Please note that to ensure compliance to the STD-GEN-CD application profile the Explicit Little Endian transfer syntax should be selected by system integrator or user, which is also default in the system.

2.2.2.1 Real World Activity Read Images from Storage medium

LOGIQworks Plug-in will act as a FSR when reading all/selected images from the LOGIQworks Database Service.

LOGIQworks Plug-in is able to read images only if they belong to one of the following SOP classes:

SOP classes for import of DICOM Part 10 images	
Name	UID
CR Image	1.2.840.10008.5.1.4.1.1.1
DX Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1
DX Image (Process)*	1.2.840.10008.5.1.4.1.1.1.1.1
DX Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2
DX Mammography Image (Process)*	1.2.840.10008.5.1.4.1.1.1.2.1
DX Intra-oral Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3
DX Intra-oral Image (Process)*	1.2.840.10008.5.1.4.1.1.1.3.1

CT Image	1.2.840.10008.5.1.4.1.1.2
US Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3
US Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1
MR Image	1.2.840.10008.5.1.4.1.1.4
NM Image (Retired)	1.2.840.10008.5.1.4.1.1.5
US Image (Retired)	1.2.840.10008.5.1.4.1.1.6
US Image	1.2.840.10008.5.1.4.1.1.6.1
SC Image	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single Bit SC Image	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte SC Image	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word SC Image	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color SC Image	1.2.840.10008.5.1.4.1.1.7.4
Standalone Overlay*	1.2.840.10008.5.1.4.1.1.8
Standalone Curve*	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT*	1.2.840.10008.5.1.4.1.1.10
Standalone VOI LUT*	1.2.840.10008.5.1.4.1.1.11
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
XA Image	1.2.840.10008.5.1.4.1.1.12.1
XF Image	1.2.840.10008.5.1.4.1.1.12.2
NM Image	1.2.840.10008.5.1.4.1.1.20
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4
Basic Text Structured Reports	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Reports	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Reports*	1.2.840.10008.5.1.4.1.1.88.33
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59
PET Image	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve*	1.2.840.10008.5.1.4.1.1.129
RT Image	1.2.840.10008.5.1.4.1.1.481.1
RT Dose*	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set*	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record*	1.2.840.10008.5.1.4.1.1.481.4
RT Plan*	1.2.840.10008.5.1.4.1.1.481.5
RT Brachy Treatment Record*	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record*	1.2.840.10008.5.1.4.1.1.481.7

LOGIQworks Plug-in is able to read images only if they have one of the following transfer syntaxes:

Transfer Syntaxes for import of DICOM part 10 images	
Name	**UID**
Implicit VR, Little Endian	1.2.840.10008.1.2
Explicit VR, Little Endian	1.2.840.10008.1.2.1
Explicit VR, Lossy JPEG 8-Bit Image Compression	1.2.840.10008.1.2.4.50
Explicit VR, JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
Explicit VR, RLE Lossless compression	1.2.840.10008.1.2.5

Note that Explicit VR, Big Endian (1.2.840.10008.1.2.2) is currently not supported.

Note that this feature comprises reading of volumes created according to the STD-GEN-CD application profile, regardless of the setting of the JPEG lossless Compression flag (which only applies to writing of DICOM Part 10 volumes).

Importing of studies from a DICOM Part 10 Volume is a standard feature of LOGIQworks Plug-in.

2.2.2.2 **Real World Activity: Write Images**

LOGIQworks Plug-in will act as a FSC when writing all or selected patients, studies or series to the LOGIQworks Database Service.

LOGIQworks Plug-in uses a third party library from VOB Software GMBH to accomplish this.

LOGIQworks Plug-in is able to write images of the following SOP classes:

SOP classes for import of DICOM Part 10 images	
Name	**UID**
CR Image	1.2.840.10008.5.1.4.1.1.1
DX Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1
DX Image (Process)*	1.2.840.10008.5.1.4.1.1.1.1.1
DX Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2
DX Mammography Image (Process)*	1.2.840.10008.5.1.4.1.1.1.2.1
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DX Intra-oral Image (Process)*	1.2.840.10008.5.1.4.1.1.1.3.1
CT Image	1.2.840.10008.5.1.4.1.1.2
US Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3
US Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1
MR Image	1.2.840.10008.5.1.4.1.1.4
NM Image (Retired)	1.2.840.10008.5.1.4.1.1.5
US Image (Retired)	1.2.840.10008.5.1.4.1.1.6
US Image	1.2.840.10008.5.1.4.1.1.6.1
SC Image	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single Bit SC Image	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte SC Image	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word SC Image	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color SC Image	1.2.840.10008.5.1.4.1.1.7.4
Standalone Overlay*	1.2.840.10008.5.1.4.1.1.8
Standalone Curve*	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT*	1.2.840.10008.5.1.4.1.1.10
Standalone VOI LUT*	1.2.840.10008.5.1.4.1.1.11
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
XA Image	1.2.840.10008.5.1.4.1.1.12.1
XF Image	1.2.840.10008.5.1.4.1.1.12.2
NM Image	1.2.840.10008.5.1.4.1.1.20
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3

VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4
Basic Text Structured Reports	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Reports	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Reports*	1.2.840.10008.5.1.4.1.1.88.33
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59
PET Image	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve*	1.2.840.10008.5.1.4.1.1.129
RT Image	1.2.840.10008.5.1.4.1.1.481.1
RT Dose*	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set*	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record*	1.2.840.10008.5.1.4.1.1.481.4
RT Plan*	1.2.840.10008.5.1.4.1.1.481.5
RT Brachy Treatment Record*	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record*	1.2.840.10008.5.1.4.1.1.481.7

LOGIQworks Plug-in is able to write images in one of the following transfer syntaxes (configurable):

Transfer syntaxes for writing DICOM Part 10 images	
Name	**UID**
Explicit VR, Little Endian	1.2.840.10008.1.2.1
Explicit VR, JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70

If images are stored non-compressed in the LOGIQworks Plug-in local database, and JPEG Lossless compressed is configured for writing DICOM Part 10 studies, the compression is performed prior to saving the images. Please note that this feature lies outside the scope of the STD-GEN-CD Application Profile. If a requested compression is not possible for some reason, the images will be saved non-compressed with Explicit VR and Little Endian transfer syntax.

LOGIQworks Plug-in creates DICOMDIR files for the DICOM Part 10 Volumes, containing the following keys:

Keys exported to the DICOMDIR File			
Directory Record Type	**Key Description**	**Tag**	**Type**
PATIENT	Specific Character Set	(0008,0005)	1C
PATIENT	Patient Name	(0010,0010)	2
PATIENT	Patient ID	(0010,0020)	1
PATIENT	Other Patient Ids	(0010,1000)	3
STUDY	Specific Character Set	(0008,0005)	1C
STUDY	Study Data	(0008,0020)	1
STUDY	Study Time	(0008,0030)	1
STUDY	Accession Number	(0008,0050)	2
STUDY	Modalities in Study	(0008,0061)	
STUDY	Referring Physician	(0008,0090)	3
STUDY	Study Description	(0008,1030)	3
STUDY	Patient Name	(0010,0010)	2
STUDY	Patient ID	(0010,0020)	1
STUDY	Patients Date of Birth	(0010,0030)	2
STUDY	Patients Sex	(0010,0040)	2
STUDY	Study UID	(0020,000D)	1C

STUDY	Study ID	(0020,0010)	1
STUDY	Study Status ID	(0032,000A)	
STUDY	Reading Physician	(0008,1060)	3
STUDY	Reason for Study	(0032,1030)	
SERIES	Specific Character Set	(0008,0005)	1C
SERIES	Modality	(0008,0060)	1
SERIES	Performing Physician	(0008,1050)	3
SERIES	Body Part	(0018,0015)	3
SERIES	Patient Position	(0018,5100)	2C
SERIES	Series UID	(0020,000E)	1
SERIES	Series Number	(0020,0011)	1
SERIES	Laterality	(0020,0060)	3
SERIES	Series Date	(0008,0021)	3
SERIES	Series Time	(0008,0031)	3
SERIES	Description	(0008,103E)	3
SERIES	Protocol	(0018,1030)	3
SERIES	View Position	(0018,5101)	2
SERIES	Frame of Reference UID	(0020,0052)	1
SERIES	Smallest Pixel Value in Series	(0028,0108)	3
SERIES	Largest Pixel Value in Series	(0028,0109)	3
SERIES	Institution Name	(0008,0080)	3
SERIES	Station Name	(0008,1010)	3
SERIES	Institutional Department Name	(0018,1040)	3
IMAGE	Repetition Time	(0018,0080)	2C
IMAGE	Echo Time	(0018,0081)	2
IMAGE	Specific Character Set	(0008,0005)	1C
IMAGE	SOP Class UID	(0008,0016)	1
IMAGE	SOP Instance UID	(0008,0018)	1C
IMAGE	Image Number	(0020,0013)	1
IMAGE	Rows	(0028,0010)	3
IMAGE	Columns	(0028,0011)	3
IMAGE	Patient Orientation	(0020,0037)	2C
IMAGE	Image Type	(0008,0008)	3
IMAGE	Derivation Description	(0008,2111)	3
IMAGE	Slice Thickness	(0018,0050)	2
IMAGE	Image Pixel Spacing	(0018,1164)	3
IMAGE	Image Position (Patient)	(0020,0032)	2C
IMAGE	Pixel Spacing	(0028,0030)	1
IMAGE	Pixel Aspect Ration	(0028,0034)	1C
IMAGE	Smallest Image Pixel Value	(0028,0106)	3
IMAGE	Largest Image Pixel Value	(0028,0107)	3
IMAGE	Window Center	(0020,1050)	1C
IMAGE	Window Width	(0028,1051)	1C
IMAGE	Window Center & Width Explanation	(0028,1055)	3
IMAGE	Lossy Image Compression	(0028,2110)	3
IMAGE	Rescale Intercept	(0028,1052)	1
IMAGE	Rescale Slope	(0028,1053)	1
IMAGE	Rescale Type	(0028,1054)	1
IMAGE	Contrast/Bolus Agent	(0018,0010)	2
IMAGE	Patient Orientation	(0020,0020)	2C
IMAGE	Acquisition Number	(0020,0012)	3

IMAGE	Slice Location	(0020,1041)	3
IMAGE	Instance Creation Date	(0008,0012)	3
IMAGE	Instance Creation Time	(0008,0013)	3
OVERLAY	Specific Character Set	(0008,0005)	1C
OVERLAY	Overlay Number	(0020,0022)	2
MODALITY LUT	Specific Character Set	(0008,0005)	1C
MODALITY LUT	Lookup table Number	(0020,0026)	1
VOI LUT	Specific Character Set	(0008,0005)	1C
VOI LUT	Lookup table Number	(0020,0026)	1
CURVE	Specific Character Set	(0008,0005)	1C
CURVE	Curve Number	(0020,0024)	1
PRESENTATION	Specific Character Set	(0008,0005)	1C
PRESENTATION	SOP Instance UID	(0008,0018)	1C
PRESENTATION	Instance Number	(0020,0013)	1
PRESENTATION	Presentation Label	(0070,0080)	1
PRESENTATION	Presentation Description	(0070,0081)	2
PRESENTATION	Presentation Creation Date	(0070,0082)	1
PRESENTATION	Presentation Creator's Time	(0070.0083)	1
PRESENTATION	Presentation Creator's Name	(0070,0084)	2
PRESENTATION	Referenced Series Sequence	(0008,1115)	1
SR DOCUMENT	Instance Number	(0020,0013)	1
SR DOCUMENT	Completion Flag	(0040,A491)	1
SR DOCUMENT	Verification Flag	(0040,A493)	1
SR DOCUMENT	Content Date	(0008,0023)	1
SR DOCUMENT	Content Time	(0008,0033)	1
SR DOCUMENT	Verification Date/Time	(0040,A030)	1C
SR DOCUMENT	Concept Name Code Sequence	(0040,A043)	1
SR DOCUMENT	Content Sequence	(0040,A730)	1C
RT DOSE	Specific Character Set	(0008,0005)	1C
RT DOSE	SOP Instance UID	(0008,0018)	1C
RT DOSE	Instance Number	(0020,0013)	1
RT DOSE	Dose Summation Type	(3004,000A)	1
RT STRUCTURE SET	Specific Character Set	(0008,0005)	1C
RT STRUCTURE SET	SOP Instance UID	(0008,0018)	1C
RT STRUCTURE SET	Instance Number	(0020,0013)	1
RT STRUCTURE SET	Structure Set Label	(3006,0002)	1
RT STRUCTURE SET	Structure Set Date	(3006,0008)	2
RT STRUCTURE SET	Structure Set Time	(3006,0009)	2
RT PLAN	Specific Character Set	(0008,0005)	1C
RT PLAN	SOP Instance UID	(0008,0018)	1C
RT PLAN	Instance Number	(0020,0013)	1
RT PLAN	RT Plan Label	(300A,0002)	1
RT PLAN	RT Plan Date	(300A,0006)	2
RT PLAN	RT Plan Time	(300A,0007)	2
RT TREAT RECORD	Specific Character Set	(0008,0005)	1C
RT TREAT	SOP Instance UID	(0008,0018)	1C

RECORD			
RT TREAT RECORD	Instance Number	(0020,0013)	1
RT TREAT RECORD	Treatment Date	(3008,0250)	2
RT TREAT RECORD	Treatment Time	(3008,0251)	1
KEY OBJECT DOC	Instance Number	(0020,0013)	1
KEY OBJECT DOC	Content Date	(0008,0023)	1
KEY OBJECT DOC	Content Time	(0008,0033)	1

2.2.3 Character Sets

LOGIQworks Plug-in may change the value of the tag (0008,0005) Character Set on incoming studies before they are written to a DICOM Part 10 Medium. This will only happen if a user operation or automatic merge operation will change an existing IOD. This may lead to multi-valued Character Set values in cases where multiple non-ASCII scripts are used within the same IOD. In case the IODs contents haven't changed, the value for the Character Set (0008,0005) is retained and therefore depends on the system that created the DICOM IOD.

3 Extensions / Specifications / Privatizations

3.1 Augmented and private application profiles

LOGIQworks Plug-in's Raw Data Processing module is able to create Secondary Capture Image Objects that can be stored to the local LOGIQworks Plug-in database.

3.2 Standard Extended / Specialized / Private SOPs

LOGIQworks Plug-in is able to create Grayscale Softcopy Presentation State IODs containing references to color images. This mechanism is used to store measurements, annotations, windowing operations and image transformations.

LOGIQworks Plug-in provides full (level 2) conformance as SCP of the Storage SOP class. This means that upon sending an image received via DICOM on to another DICOM compliant system it will send out all attributes that it received. This includes private attributes from other GEMS products that are e.g. based on GEMS TruAccess technology and private attributes from other vendors.

The GEMS TruAccess Raw Data information is stored in private data elements designated by the Private Creator element:

Element Name	Tag	VR	VM	Description
Private Creator	7FE1,00xx	LO	1	GEMS_Ultrasound_MovieGroup_001

This means that all private tags starting with 7FE1,xx will belong to the GEMS_Ultrasound_MovieGroup_001.

4 Support of Extended Character Sets

LOGIQworks Plug-in offers full support for the following character sets:

Support Character Sets	
Name	**Value**
Default Character repertoire	ISO_IR 6, <none>
single-byte JIS X 0201 (Katakana)	ISO_IR 13, ISO 2022 IR 13
single-byte JIS X 0201 (Romaji)	ISO_IR 14
multi-byte JIS X 0208 (1983)	ISO_IR 87, ISO 2022 IR 87
Latin – 1 character repertoire	ISO_IR 100, ISO 2022 IR 100
Latin – 2 character repertoire	ISO_IR 101, ISO 2022 IR 101
Latin – 3 character repertoire	ISO_IR 109, ISO 2022 IR 109
Latin – 4 character repertoire	ISO_IR 110, ISO 2022 IR 110
Greek	ISO_IR 126, ISO 2022 IR 126
Arabic	ISO_IR 127, ISO 2022 IR 127
Hebrew	ISO_IR 138, ISO 2022 IR 138
Cyrillic	ISO_IR 144, ISO 2022 IR 144
Latin – 5 character repertoire	ISO_IR 148, ISO 2022 IR 148
multibyte JIS X 212	ISO_IR 159, ISO 2022 IR 159