DICOM Conformance Statement

Chace and Associates Products, LLC : *Zipi*

Software Version 3.0.2.1

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1 CONFORMANCE STATEMENT OVERVIEW

The intended audience for this Conformance Statement is hospital technical staff, system integrators and software engineers. The reader is assumed to have good understanding of the DICOM standard.

The Conformance Statement of one implementation can be compared with the Conformance Statement of another implementation to determine which capabilities are commonly supported.

As stated by the NEMA conformance guidelines, DICOM does not, by itself, guarantee interoperability. Furthermore, the identification of common capabilities by comparing DICOM Conformance Statements is also not sufficient to guarantee connectivity between two devices.

A DICOM Conformance Statement cannot replace validation and cross-vendor testing with other devices. Validation and cross-vendor testing are still required to ensure that both devices are performing as intended.

The application described in this document is the Zipi Software from Chace and Associates Products, LLC Dunedin, FL. This software acts as DICOM File Creator; Creation/Reading of File-Sets. DICOMDIR is not supported at this time.

The Zipi Application Entity is designed to create DICOM images and send them to the DICOM2DB DICOM Processing engine. The process is performed via a file transfer.

The incoming data is from a wide variety of instrument modalities.

Implementation Class for Chace and Associates	
Implementation Class UID:	1.2.826.0.1.3680043.8.444.2

Information Object Definitions	**SOP Class UID**	**Transfer Syntax and UID**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Uncompressed 1.2.840.10008.1.2 JPEG Baseline compressed 1.2.840.10008.1.2.4.50

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3 INTRODUCTION

3.1 REVISION HISTORY

Revision Date	Revision Number	Person	Comments
7/18/2008	1.0	Brock Pope	Initial Revision of Document
8/14/2008	1.1	Julie Chace	Adding to document template
8/19/2008	1.2	Brock Pope	Update application context
8/27/2008	1.3	Julie Chace	Update Media Storage SOP Class ID and SOP Class ID section 4.2.1.1
9/1/2008	1.4	Brock Pope	Updated Section 8.2 – 8.3 regarding Private Tag specifications
11/14/2009	1.5	Brock Pope	Updated document to reflect current release version and sample native modality list.

3.2 AUDIENCE

This document is written for the people that need to understand how ZIPi will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.3 REMARKS

The scope of this DICOM Conformance Statement is to facilitate integration between ZIPi and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

— The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.

— Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.4 TERMS AND DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 BASICS OF DICOM COMMUNICATION

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in *italics* below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two *Application Entities* (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an *Association* (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (*Negotiation*).

DICOM specifies a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted *Transfer Syntaxes*. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called *Presentation Contexts.* The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* – which one is the *Service Class User* (SCU - client) and which is the *Service Class Provider* (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging dat Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate *Information Object Definition*, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a *Response Status* indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a *Media Application Profile* that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer

CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MAR	Medication Administration Record
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NM	Nuclear Medicine
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography

PDU	Protocol Data Unit
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)
RF	Radiofluoroscopy
RIS	Radiology Information System.
RT	Radiotherapy
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
US	Ultrasound
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

3.7 REFERENCES

References to the DICOM Standard should provide the URL for the free published version of the Standard, but should not specify a date of publication:

1. NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nemorg/

4 NETWORKING

4.1 IMPLEMENTATION MODEL

4.1.1 Application Data Flow

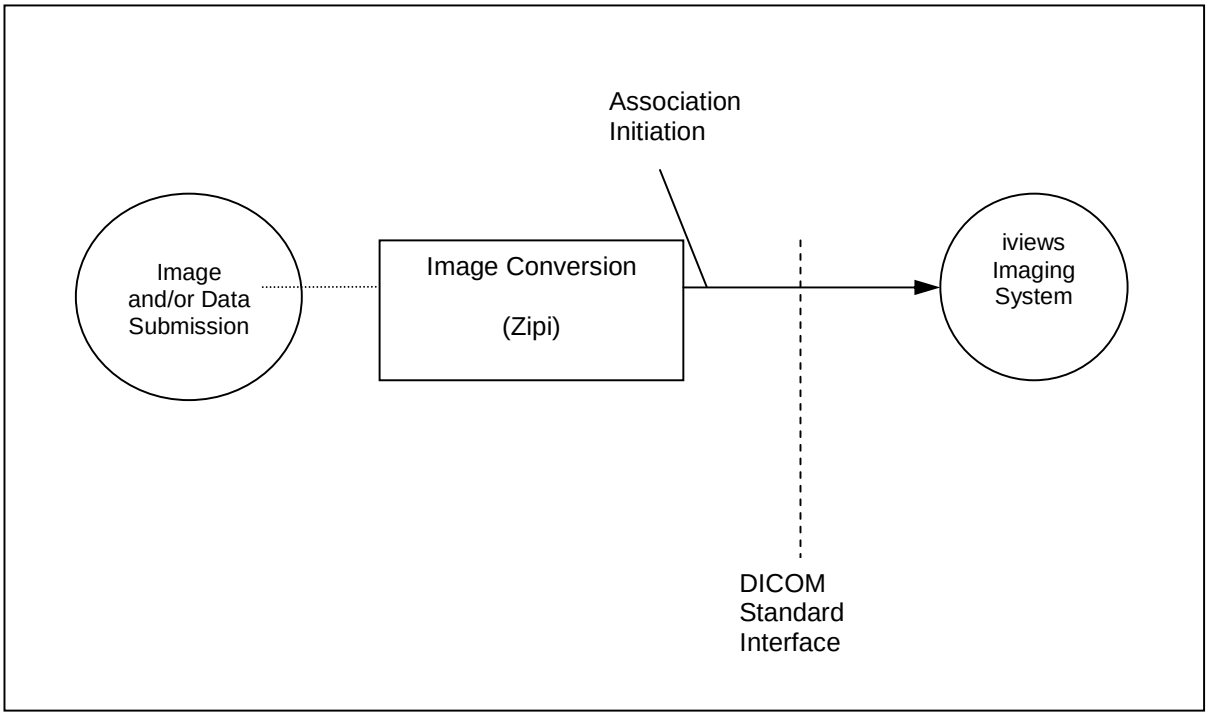


Figure 4.1 -1
FUNCTIONAL OVERVIEW

In this illustration, according to figure 4.1 -1, an occurrence of local Image data submission will cause Zipi to initiate an association for the purpose of sending a DICOM for fstorage.

4.1.2 Functional Definition of AE's

The incoming data is from a wide variety of instrument modalities.

4.1.2.1 Functional Definition of Zipi

The Zipi Application Entity is designed to create DICOM images from various ophthalmic instruments and transmit them to the DICOM2DB DICOM Processing engine. The process is performed via a file transfer. Table 4.1.2.1-1 lists the ophthalmic medical devices that Zipi natively supports.

Instrument Name	Supported Format
CZMI Stratus OCT	**PDF for Reports and Ophthalmic Maps** **JPG for Exported line scan data**
CZMI Humphrey Visual Field Analyzer	**PDF and XML pairs** **TIF and XML pairs**
CZMI Cirrus OCT	**PDF**
CZMI Visante OCT	**TIFF**
CZMI Atlas 9000	**PDF and XML Pairs**
CZMI Atlas 991/993/995	**PDF and JPG**
CZMI IOL Master	**PDF**
CZMI GDx VCC	**Ver 5.5 - SVG with XML** **Ver 6.0 - Zip File containing SVG with XML**
CZMI Matrix	**Zip file containing PDF and XML**
CZMI FDT	**Zip file containing PDF and XML**
Accutome A-scan	**PDF**
Alcon Allegro Topolyzer	**PDF**
Escalon	**TIF and DICOM**
Eyesys	**XML and PDF**

Heidelberg Spectralis OCT	**PDF for reports** **XML for line scans and photography**
Heidelberg HRT/HRA	**PDF**
Holladay HicSoap	**PDF**
Oculus Pentacam	**JPG and DICOM**
OptoVue	**PDF and JPG**
OIS	**JPEG and DICOM**
Orbscan	**PDF and native data**
Sonomod Ultrasound	**PDF**
Tomey	**JPG and CSV**
Zeimer Galilei	**PDF, DICOM, and CSV**

Figure 4.1.2.1 -1
NATIVE INSTRUMENT SUPPORT

4.2 AE SPECIFICATIONS

4.2.1 Zipi

4.2.1.1 SOP Classes

SOP CLASS(ES) FOR Zipi

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes

4.2.1.2 Association Policies

4.2.1.2.1 General

4.2.1.2.2 Number of Associations.

Zipi supports only a single association at any given time.

NUMBER OF ASSOCIATIONS FOR ZIPI

Maximum number of simultaneous associations	1

4.2.1.2.3 Asynchronous Nature

Zipi does not currently implement any asynchronous features.

4.2.1.2.4 Implementation Identifying Information

DICOM IMPLEMENTATION CLASS AND VERSION FOR ZIPI

Implementation Class UID	1.2.826.0.1.3680043.8.444.2
Implementation Version Name	Zipi – L2V 2.0.1

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Image Conversion

4.2.1.3.1.1 Description and Sequencing of Activities

When a user submits data, either an image or image-data pair, Zipi will use the definition specified in the configuration to attempt to read the data. The data is read and the appropriate information is analyzed to ensure that enough data is present and that the data is valid to correctly identify the patient. If successful, the image is then converted to a DICOM and the verified data is used to populate the DICOM data tags. After the DICOM is created, Zipi places the final DICOM into the input directory for Dicom processing.

4.2.1.3.1.2 Proposed Presentation Contexts

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	ILE	1.2.840.10008.1.2	SCU	No

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible. The application uses the communication stack of the operating system.

4.3.2 Additional Protocols

No additional protocols are used.

4.3.3 IPv4 and IPv6 Support

No custom specifications of IPv4 or IPv6 are used.

4.4 Configuration

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

4.4.1 AE Title/Presentation Address Mapping

Zipi does not utilize socket based DICOM communication at this time. Therefore no AE Titles are defined.

4.4.2 Parameters

The following table lists the configuration parameters necessary for Zipi operation.

CONFIGURATION PARAMETERS TABLE

Parameter	Description	Default Value
Parameters		
Device Parameters		
Active	True if Zipi should look for files in this directory	False

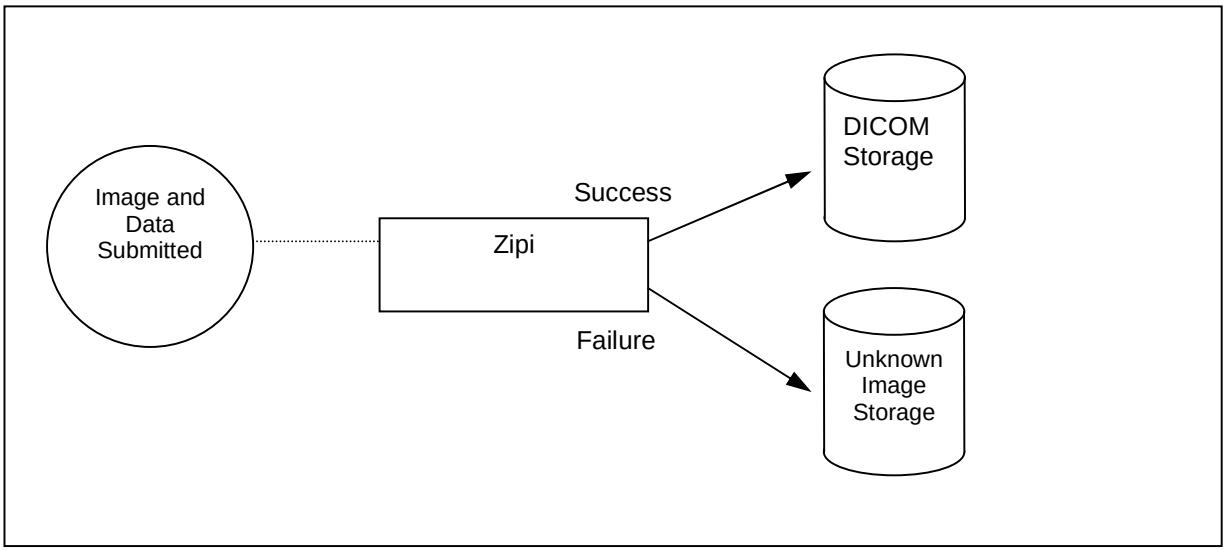
Parameter	Description	Default Value
Parameters		
Category	The name of the instrument. There is a predefined list for native support	Predefined List
Directory Path	The directory that contains the instrument data	N/A
Instrument Name	The name of the instrument	N/A
Instrument S/N	The Serial Number of the instrument	N/A
Delay	The number of milliseconds for Zipi to pause before trying to read a file.	10 ms
Regional Setting	The cultural setting for the country region	US-English
Manufacturer	The manufacturer of the device	Zeiss
General Parameters		
DICOM Output Path	Path to the DICOM2DB service	C:\Eis\d2db_in
Image Store	The storage bin for the ORIGINAL images that have been successfully read and converted	C:\ZIPI\IMAGE_STORE
Unknown file path	The storage path for any file that cannot be converted for any reason	C:\ZIPI\Unknown
Character Casing	The casing for patient names. All names will be converted to the set casing	Mixed

5 MEDIA INTERCHANGE

5.1 IMPLEMENTATION MODEL

The Implementation Model shall identify the DICOM Application Entities in a specific implementation and relate the Application Entities to Real-World Activities.

5.1.1 Application Data Flow Diagram



5.1.2 Functional definitions of AE's

5.1.2.1 Zipi Application Entity

The Zipi Application Entity does not support Media Interchange

5.1.3 Sequencing of Real World Activities

5.1.4 File Meta Information for Implementation Class and Version

Implementation Class UID	1.2.826.0.1.3680043.8.444.2
Implementation Version Name	Zipi – 3.0.2.1

5.2 AE SPECIFICATIONS

5.2.1 Zipi Application Entity

The Zipi Application Entity does not support Media Interchange.

5.2.2.2 Real-World Activities

The operator can export image data from the ophthalmic device.

5.2.2.2.1 Export image data from ophthalmic device

When a user submits data, either an image or image-data pair, Zipi will use the definition specified in the configuration to attempt to read the data. The data is read and the appropriate information is analyzed to ensure that enough data is present and that the data is valid to correctly identify the patient. If successful, the image is then converted to a DICOM and the verified data is used to populate the DICOM data tags. After the DICOM is created, Zipi writes the final DICOM into the input directory for DICOM processing.

5.2.2.2.1.1 Media Storage Application Profile

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline	1.2.840.10008.1.2.4.50

5.3 AUGMENTED AND PRIVATE APPLICATION PROFILES

Zipi does not support Augmented Application Profiles or Private Application Profiles.

5.4 MEDIA CONFIGURATION

There is no specialized configuration for Media Interchange.

6 SUPPORT OF CHARACTER SETS

Zipi supports the DICOM default character set.

7 SECURITY

Zipi does not support any specific security measures at this time. It is assumed that the software is used within a secure environment which includes a minimum of the following:

1) Anti-virus software on the hosting system. This may also include a network based detection system.
2) Firewall protection to ensure that only approved external hosts have access to the network.
3) Firewall protection limits the access of the Zipi to only the approved external hosts.
4) All external communications use only approved and secure channels.
5) Any wireless communication must be secured and encrypted.

There are additional security measures that applied, but are generally the responsibility of the local security policy.

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ANNEXES

8.1 IOD CONTENTS

8.1.1 Created SOP Instance(s) – Grayed boxes are not implemented.

Note: ALWAYS stands for the tag value is always present
ANAP stands for Attribute Not Always Present
VNAP stands for Value Not Always Present
USER stands for User provided value

GENERAL STUDY MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	(0020,000D)	UI	Generated by device	ALWAYS	MWL/ AUTO
Study Date	(0008,0020)	DA		ALWAYS	AUTO
Study Time	(0008,0030)	TM		VNAP	AUTO
Referring Physician's Name	(0008,0090)	PN		VNAP	MWL/ USER
Study ID	(0020,0010)	SH	Generated by device	VNAP	MWL/ USER
Accession Number	(0008,0050)	SH		ANAP	MWL/ USER
Study Description	(0008,1030)	LO		VNAP	USER
Referenced Study Sequence	(0008,1110)	SQ		ANAP	AUTO
Referenced SOP Class UID	(0008,1150)	UI		ANAP	AUTO
Referenced SOP Instance UID	(0008,1155)	UI		ANAP	AUTO

PATIENT STUDY MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Admitting Diagnosis Description	(0008,1080)	LO		VNAP	AUTO
Patient's Age	(0010,1010)	AS		ANAP	AUTO
Patient's Weight	(0010,1030)	DS		VNAP	AUTO

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GENERAL SERIES MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	OT	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Generated by device	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by device	ALWAYS	AUTO
Series Date	(0008,0021)	DA	<yyyymmdd>	ANAP	AUTO
Series Time	(0008,0031)	TM	<hhmmss>	ANAP	AUTO
Performing Physician's Name	(0008,1050)	PN	Physician field in Study list. Maximum 64 characters.	ANAP	USER
Protocol Name	(0018,1030)	LO	Organ program	ANAP	AUTO
Series Description	(0008,103E)	LO	Organ from Study list. Maximum 512 characters.	ANAP	USER
Operator's Name	(0008,1070)	PN	Operator field in Study list. Maximum 64 characters.	ANAP	USER
Referenced Performed Procedure Step Sequence	(0008,1111)	SQ	Identifies the MPPS SOP Instance to which this image is related	ANAP	MPPS
>Referenced SOP Class UID	(0008,1150)	UI	MPPS SOP Class UID	ANAP	MPPS
>Referenced SOP Instance UID	(0008,1155)	UI	MPPS SOP Instance UID	ANAP	MPPS
Request Attributes Sequence	(0040,0275)	SQ	Zero or 1 item will be present	ANAP	AUTO
>Requested Procedure ID	(0040,1001)	SH	From Modality Worklist	ANAP	MWL
>Scheduled Procedure Step ID	(0040,0009)	SH	From Modality Worklist	ANAP	MWL
>Scheduled Procedure Step Description	(0040,0007)	LO	From Modality Worklist	ANAP	MWL
>Scheduled Protocol Code Sequence	(0040,0008)	SQ	From Modality Worklist	ANAP	MWL
Performed Procedure Step ID	(0040,0253)	SH	Same as MPPS.	ANAP	MPPS
Performed Procedure Step Start Date	(0040,0244)	DA	Same as MPPS	ANAP	MPPS
Performed Procedure Step Start Time	(0040,0245)	TM	Same as MPPS	ANAP	MPPS
Performed Procedure Step Description	(0040,0254)	LO	Same as MPPS. From user input. Maximum 64 characters.	ANAP	MPPS
Performed Protocol Code Sequence	(0040,0260)	SQ	Same as MPPS	ANAP	MPPS
Comments on the	(0040,0280)	LO	Same as MPPS. From user input.	ANAP	MPPS

Performed Procedure Step			Maximum 64 characters.		

GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	EXAMPLE-IMAGING-PRODUCTS	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	From Configuration	ANAP	CONFIG
Station Name	(0008,1010)	SH	From Configuration	ANAP	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	EXAMPLE-INTEGRATED-MODALITY	VNAP	CONFIG
Device Serial Number	(0018,1000)	LO	From Configuration	ANAP	CONFIG
Software Version	(0018,1020)	LO	From Configuration	ALWAYS	CONFIG
Private Creator	(0009,00xx)	LO	EXINTMOD_EQ_01	ALWAYS	AUTO
Equipment UID	(0009,xx01)	UI	From Configuration	ALWAYS	CONFIG
Service UID	(0009,xx02)	UI	From Configuration	ALWAYS	CONFIG

GENERAL IMAGE MODULE OF CREATED RF SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Number	(0020,0013)	IS	Generated by device	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	Zero length	ANAP	AUTO
Content Date	(0008,0023)	DA	<yyyymmdd>	ANAP	AUTO
Content Time	(0008,0033)	TM	<hhmmss>	ANAP	AUTO
Acquisition Number	(0020,0012)	IS	Generated by device	ANAP	AUTO
Image Comments	(0020,4000)	LT	From user input. Maximum 1024 characters.	VNAP	USER
Anatomic Region Sequence	(0008,2218)	SQ	From user input.		

IMAGE PIXEL MODULE OF CREATED RF SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Pixel Data	(7FE0,0010)	OW	The Pixel Data itself does not contain any burned-in annotation.	ALWAYS	AUTO

X-RAY IMAGE MODULE OF CREATED RF SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Increment Pointer	(0028,0009)	AT	<0018,1063> only if multi-frame	ANAP	AUTO
Image Type	(0008,0008)	CS	DERIVED\SINGLE (post-processed images)	ALWAYS	AUTO
Pixel Intensity Relationship	(0028,1040)	CS	LIN or LOG	ANAP	AUTO
Samples per Pixel	(0028,0002)	US		ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS		ANAP	AUTO
Rows	(0028,0010)	US		ALWAYS	AUTO
Columns	(0028,0011)	US		ALWAYS	AUTO
Bits Allocated	(0028,0100)	US		ALWAYS	AUTO
Bits Stored	(0028,0101)	US		ALWAYS	AUTO
High Bit	(0028,0102)	US		ALWAYS	AUTO
Pixel Representation	(0028,0103)	US		ALWAYS	AUTO
Pixel Aspect Ratio	(0028,0034)	IS		ANAP	AUTO
Smallest Image Pixel Value	(0028,0106)	US		ANAP	AUTO
Largest Image Pixel Value	(0028,0107)	US		ANAP	AUTO

SOP COMMON MODULE OF CREATED RF SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.77.1.4	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Generated by device	ALWAYS	AUTO

ADDITIONAL SOP INSTANCES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Content Date	(0008,0023)	DA		ANAP	AUTO
Content Time	(0008,0033)	TM		ANAP	AUTO
Laterality	(0020,0060)	CS		ANAP	AUTO

8.2 DATA DICTIONARY OF PRIVATE ATTRIBUTES

Zipi also writes several private tag values to comply with the 3rd party Vendor's Software designation for private data elements.

DATA DICTIONARY OF PRIVATE ATTRIBUTES

Tag	Attribute Name	VR
(0040,0555)	Acquisition Context Sequence	SQ
(0040,a043)	Concept Name Code Sequence	SQ
(0008,0100)	Code Value	SH
(0008,0102)	Coding Schema Designator	SH
(0008,0103)	Coding Scheme Version	SH
(0008,0104)	Code Meaning	LO
(fffe,e000)	Item	OB

8.2.1 Example Structure of Private Elements

The following table shows an example of the structure of the private data elements.

DICOM Structure	Sample Value
(0040:0555) - Acquisition Context Sequence	
(fffe,e000) – Item	
(0040, A043) -- Concept Name Code Sequence	
(fffe,e000) – Item	
(0008, 0100) -- Code Value	OP-Modality
(0008, 0102) -- Coding Schema Designator	99HIKO
(0008, 0103) -- Coding Schema Version	VP4.0
(0008, 0104) -- Coding Meaning	Ophthalmic Modality
(0040, A043) -- Concept Name Code Sequence	
(fffe,e000) – Item	
(0008, 0100) -- Code Value	M-S-OCT
(0008, 0102) -- Coding Schema Designator	99HIKO
(0008, 0103) -- Coding Schema Version	VP4.0
(0008, 0104) -- Coding Meaning	Ophthalmic Modality

8.3 CODED TERMINOLOGY AND TEMPLATES

8.3.3 Example Private Code definitions

Several coding concepts have been defined for Zipi. The Coding Scheme Designator is “99HIKO”.

Note:
CC Concept Code
NVU Numeric Value with Unit
TV Text Value
NV Numeric Value

Note: The concept of Numeric Value does not conform to DICOM. It is listed here for reading capability. The implementation exists for backward compatibility reasons.

Table A.8.3.3-1
CONTEXT GROUPS

Coding Scheme Designator	Coding Schema Version	Concept Name	Concept Type
99HIKO	VP4.0	OP-Modality	CC
99HIKO	VP4.0	OP-Procedure	CC

Zipi can read and interpret all Coding Scheme Versions of coding scheme “99HIKO”.

Coding Scheme Version VP4.0 is for images which are captured by the Visupac Capture Station. This designation may also be used for Zipi.

8.3.3.1 Concept OP-Modality

CONCEPT GROUPS

Code Value	Code Meaning	Definition
M-S-OCT	Stratus OCT	Used for Zeiss Stratus OCT
M-Cirrus OCT	Cirrus OCT	Used for Zeiss Cirrus OCT
M-Visante OCT	Visante OCT	Used for Zeiss Visante OCT
M-IOLMaster	IOL Master	Used for Zeiss IOL Master
M-HFA	HFA	Used for Zeiss Humphrey visual field machine
M-Matrix Fields Report	Matrix	Used for Zeiss / Welch-Allyn Matrix
M-GDX	GDx	Used for Ziess GDx Vcc
M-OTHER	Other	Other Devices

The presence of Concept Codes depends on the Ophthalmic Modality.

NOTE : C Conditional

Y Concept is captured by the Modality

CONCEPT GROUPS

Concept Name	Ophthalmic Modality	
	OP-Modality	**OP-Procedure**
M-S-OCT	Y	Y
M-Cirrus OCT	Y	Y
M-Visante OCT	Y	Y
M-IOLMaster	Y	Y
M-HFA	Y	Y
M-Matrix Fields Report	Y	Y
M-GDX	Y	Y
M-OTHER	C	Y