MPTronic Medical software	DICOM Conformance Statement	Doc. Ref. : CONF-EZDP2P-EN
	Ez Dicom Print To PACS	Version : 1.2.x

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CE

MD Ez Dicom Print To PACS

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1 FOREWORD

This software is a Class I active medical device in the EU. It is CE marked, in compliance with the current requirements of European Regulation 2017/745.

Meaning of symbols:

Symbol	Symbol Title
	Manufacturer
	CE-Mark
	Medical device
	Unique Device ID

2 INTRODUCTION

2.1 Scope and field of application

This document is the DICOM conformance statement for the Ez Dicom Print to PACS Software of MPTronic. This document describes how the Ez Dicom Print to PACS Software collaborates in a DICOM network with other Medical Imaging applications that conform to the DICOM 3.0 Standard.

This DICOM Conformance Statement documents the conformance of the Ez Dicom Print to PACS Software with the Digital Imaging and Communications in Medicine standard (DICOM). This document is essential in order to evaluate whether or not another DICOM compliant device can communicate with this software product. This statement is conformant with the recommended format as described in PS 3.2 of the DICOM standard.

2.2 Important Considerations for the Reader

This document on its own should not be interpreted as a guarantee of connectivity between Ez Dicom Print to PACS and any equipment and/or applications offered by other vendors.

Integration of Ez Dicom Print to PACS with the equipment and/or applications of different vendors, including MPTronic Systems, are outside the scope of the DICOM 3.0 standard and product conformance statements. Integration and interoperability of different equipment/applications are the sole responsibility of the user.

In the case of any possible connectivity inferred by a user to exist between Ez Dicom Print to PACS and another product, the user is responsible for testing and verifying the inferred connectivity.

Future changes to the DICOM 3.0 standard may require alterations to be made to Ez Dicom Print to PACS. MPTronic reserves the right to modify the Ez Dicom Print to PACS architecture as needed, in order to meet changing standards.

The user should ensure that any existing DICOM equipment also changes with the future developments of the DICOM standards. Failure to keep pace with any alterations in the DICOM standards may result in decreased or lost connectivity.

All trade names mentioned in this document are recognized.

2.3 Revision History

Version	Date	Author	Description
1.0	18-09-2010	Gustavo Echenique	Initial Version
1.2	01-01-2020	Laurent Ghinassi	New layout

2.4 Abbreviations and Acronyms

ASCII American	Standard Code for Information Interchange
AE Application	Entity
AE-Title	name of an AE
ANSI	American National Standards Institute
CR	Computed Radiography
CT	Computed Tomography
ISDN	Integrated Service Digital Network
DICOM	Digital Imaging and Communications in Medicine
ECR	European Congress of Radiology
GPRS	General Packet Radio Service
GSPS	Grayscale Softcopy Presentation State
HIMSS	Healthcare Information and Management Systems Society
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
ISO	International Standards Organization
NEMA	National Electrical Manufacturers Association
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
RSNA	Radiological Society of North America
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol / Internet Protocol
TLS	Transport Layer Security
UID	Unique Identifier
VM	Value Multiplicity
VR	Value Representation

3 IMPLEMENTATION MODEL

3.1 Application Data Flow Diagram

This DICOM conformance statement specifies the behaviour and functionality of the Ez Dicom Print to PACS software. This software provides the following capabilities:

- Acquire images and videos from different sources (Importing BMP, JPG, PNG images)
- Scanning radiology films and documents.
- Capturing images and videos from video capture cards.
- Convert them to DICOM and then send them as a study to any PACS Server.
- Patient demographics information can be entered manually or obtained by querying a Worklist or DICOM Server.

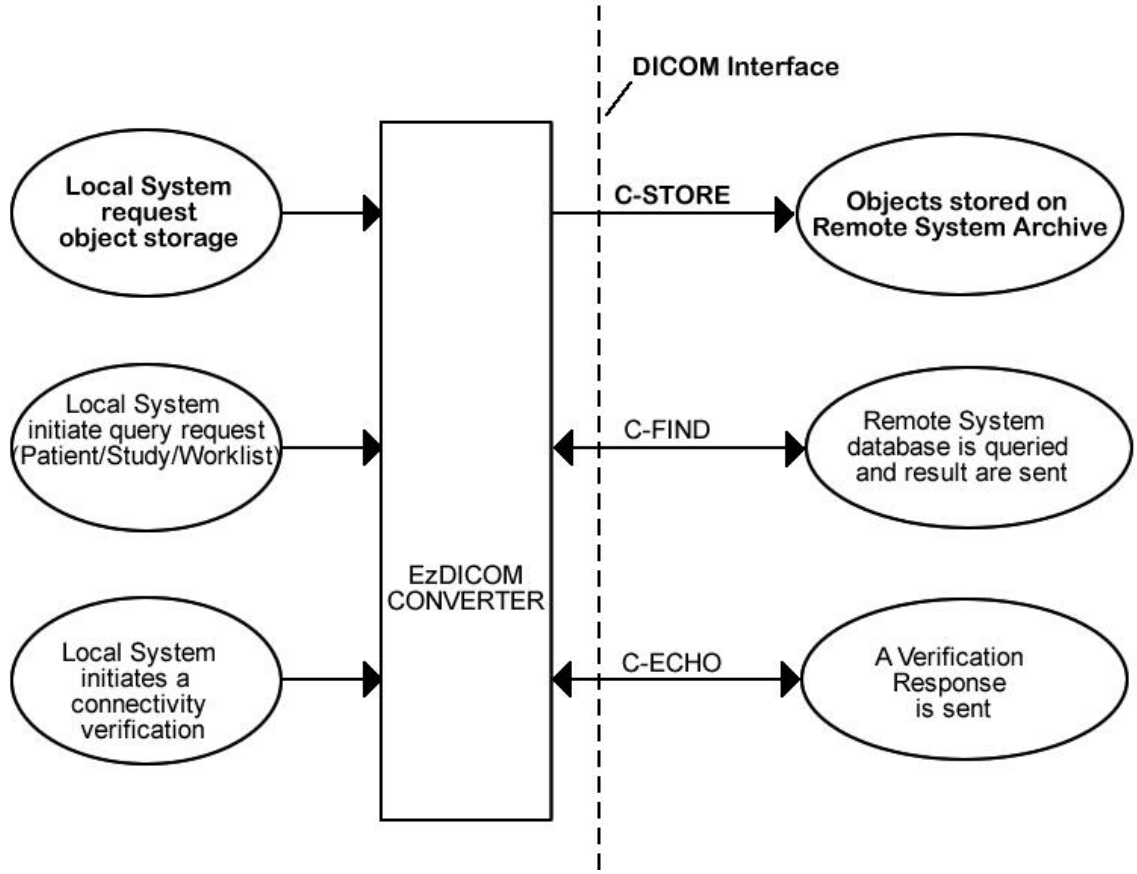

Image 1: Application data flow diagram

3.2 Functional Definitions

All communications and image transfer with the remote application is accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

Below is a table of the functions supported by Ez Dicom Print to PACS software:

SCU
Connectivity verification
Storage
Query/Retrieve

Acting as a Service Connection Client (SCU), Ez Dicom Print to PACS can use the following services:

- Verification Service Class (C-ECHO) to verify the connectivity to a remote AE.
- Query/Retrieve Service Class (C-FIND) to query a remote DICOM AE.
- Storage Service Class (C-STORE) to transfer images to remote DICOM AE.

4 AE SPECIFICATIONS

4.1 Application DICOM Services AE Specifications

The Ez Dicom Print to PACS Software - AE provide standard conformance to the following DICOM V3.0 SOP classes. The SOP classes in the following table can be processed/stored/displayed by Ez Dicom Print to PACS.

SOP Classes as SCU	
SOP Class Name	**SOP Class UID**
Verification	1.2.840.10008.1.1
Default Storage Application SOP Classes	See table below
Study Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Modality Worklist Information Model	1.2.840.10008.5.1.4.31

Storage SOP Class as SCU	
SOP Class Name	**SOP Class UID**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

4.1.1 Association Establishment Policies

4.1.1.1 GENERAL

The DICOM Application Context Name (ACN) proposed by Ez Dicom Print to PACS is 1.2.840.10008.3.1.1.

The maximum PDU size which can be transmitted by Ez Dicom Print to PACS is fixed at 16 Kbytes (16384 bytes). The maximum PDU size which can be received by the Ez Dicom Print to PACS is up to 16 Kbytes (16384 bytes).

Extended negotiations are not supported for any of the supported service classes.

The only supported network protocol is TCP/IP. Any physical media supporting TCP/IP may be used to connect to Ez Dicom Print to PACS Software. Ez Dicom Print to PACS Software uses the TCP/IP stack of the under laying operating system.

4.1.1.2 NUMBER OF ASSOCIATIONS

The number of simultaneous associations which will be accepted by Ez DICOM Print to Pacs is limited only by the kernel parameters of the underlying TCP/IP implementation.

Therefore, Ez DICOM Print to Pacs can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations which the Application Entity represented by Ez DICOM Print to Pacs can maintain.

4.1.1.3 ASYNCHRONOUS NATURE

Asynchronous operations on an association are supported.

4.1.1.4 IMPLEMENTATION IDENTIFYING INFORMATION

Image processing and management systems provide a single Implementation Class Unique Identifier (UID) which is **“1.2.826.0.1.3680043.2.1065”** and the implementation version is **“MPTronic”.**

4.1.2 Association Initiation Policy

Ez Dicom Print to PACS initiates associations for the following activities:

- DICOM communication verification between Ez Dicom Print to PACS and a remote system (4.1.2.1).
- Sending images from the local Ez Dicom Print to PACS database to a remote system (4.1.2.2).
- Queries of remote database contents (4.1.2.3).

4.1.2.1 VERIFICATION COMMUNICATION WITH A REMOTE SYSTEM

4.1.2.1.1 ASSOCIATED REAL WORLD ACTIVITY

Verification as SCU is initiated by the user when adding/modifying a remote server and clicking the “ECHO” button.

4.1.2.1.2 PROPOSED PRESENTATION CONTEXTS

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Verification	1.2.840.10008.1.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification	1.2.840.10008.1.1	Explicit VR, Big Endian	1.2.840.10008.1.2.2	SCU	None

4.1.2.1.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR SOP VERIFICATION CLASS

Ez Dicom Print to PACS provides standard conformance for DICOM communication verification.

4.1.2.2SEND IMAGES TO A REMOTE SYSTEM

4.1.2.2.1 ASSOCIATED READ-WORLD ACTIVITY

After image acquisition the user select the store destination from a drop down list. A progress bar is shown during the transfer.

A DICOM Association will be opened with the Store Destination. DICOM Instances are then transfered the Store Destination. If the Store Destination returns a response code that is not Success, the association is aborted and the transfer is flagged as an error.

4.1.2.2.2 PROPOSED PRESENTATION CONTEXTS

Presentation Context Table			
		Role	Extended Negotiation
Abstract Syntax	UID		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU	None

Transfer Syntax	
Name List	UID List
Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2
JPEG Baseline	1.2.840.10008.1.2.4.50
JPEG Extended	1.2.840.10008.1.2.4.51
JPEG Lossless	1.2.840.10008.1.2.4.57
JPEG Lossless FirstOrder	1.2.840.10008.1.2.4.70
JPEG LS Lossless	1.2.840.10008.1.2.4.80
JPEG LS Lossy	1.2.840.10008.1.2.4.81
RLE Lossless	1.2.840.10008.1.2.5
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000 Lossy	1.2.840.10008.1.2.4.91

4.1.2.2.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR SOP CLASS STORAGE

Images that are to be sent to remote systems are converted to instances of the corresponding SOP Storage class(es). Images are then sent sequentially to the remote system(s).

Attributes list for DICOM Storage SCU		
Description	**Tag**	**Comment**
Specific Character Set	(0008,0005)	Configurable
Image Type	(0008,0008)	DERIVED/SECONDARY
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7 (Secondary Capture)
SOP Instance UID	(0008,0018)	Always Specified
Study Date	(0008,0020)	Manual Input / From Query AE / From WL
Series Date	(0008,0021)	Manual Input / From Query AE / From WL
Acquisition Date	(0008,0022)	
Content Date	(0008,0023)	
Study Time	(0008,0030)	
Series Time	(0008,0031)	
Acquisition Time	(0008,0032)	
Content Time	(0008,0033)	
Accession Number	(0008,0050)	
Modality	(0008,0060)	Manual Input / From Query AE / From WL
Modalities in Study	(0008,0061)	Manual Input / From Query AE / From WL
Conversion Type	(0008,0064)	WSD
Manufacturer	(0008,0070)	MPTronic Software
Institution	(0008,0080)	Configurable
Institution Address	(0008,0081)	Configurable
Referring Physician	(0008,0090)	Manual Input / From Query AE / From WL
Station Name	(0008,1010)	Configurable
Study Description	(0008,1030)	Manual Input / From Query AE / From WL
Series Description	(0008,103e)	Manual Input / From Query AE / From WL / Configurable
Patient Name	(0010, 0010)	Manual Input / From Query AE / From WL
Patient ID	(0010, 0020)	Manual Input / From Query AE / From WL Default=Inverted DateTime
Patient Birth date	(0010, 0030)	Manual Input / From Query AE / From WL
Patient Sex	(0010, 0040)	Manual Input / From Query AE / From WL
Patient Age	(0010, 1010)	Calculated from BirthDate / From Query AE / From WL
Body Part Examined	(0018, 0015)	Manual Input / From Query AE / From WL
Date of Secondary Capture	(0018,1012)	
Time of Secondary Capture	(0018,1014)	
Secondary Capture Device Manufacturer	(0018,1016)	MPTronic Software

Secondary Capture Device Software Version	(0018,1019)	EzDICOMPrintToPACS + Version
Digital Image Format Acquired	(0018,1023)	Bitmap Import
Contribution Date Time	(0018,A002)	
Study Instance UID	(0020,000D)	Always Specified / From Query AE / From WL
Series Instance UID	(0020,000E)	Always Specified / From Query AE / From WL
Study ID	(0020,0010)	Manual Input / From Query AE / From WL
Series Number	(0020,0011)	Manual Input / From Query AE / From WL / Configurable
Image Number	(0020,0013)	
Samples Per Pixel	(0028,0002)	3 / For Vidar Scanner: 1
Photometric Interpretation	(0028,0004)	RGB / For Vidar Scanner: MONOCHROME2
Planar Configuration	(0028,0006)	0
Rows	(0028,0010)	Always Specified
Columns	(0028,0011)	Always Specified
Bits Allocated	(0028,0100)	8 / For Vidar Scanner: 16
Bits Stored	(0028,0101)	8 / For Vidar Scanner: 16, 12 or 8 if Bits Allocated = 16. 8 if Bits Allocated = 8
High Bit	(0028,0102)	7 / For Vidar Scanner: (Bit Stored - 1)
Pixel Representation	(0028,0103)	0
Window Center	(0028,1050)	Only for Vidar scanner
Window Width	(0028,1051)	Only for Vidar scanner
Rescale Intercept	(0028,1052)	Only for Vidar scanner
Rescale Slope	(0028,1053)	Only for Vidar scanner
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Start Time	(0040,0245)	
Performed Procedure Step ID	(0040,0253)	
Performed Procedure Step Description	(0040,0254)	
Performed Protocol Code Sequence	(0040,0260)	
Purpose of Reference Code Sequence	(0040,A170)	
> Code Value	(0008,0100)	MEDIM
> Coding Scheme Designator	(0008,0102)	DCM
> Code Meaning	(0008,0104)	Portable Media Importer Equipment
Original Attribute Sequence	(0400,0561)	
> Attribute Modification Date/Time	(0400,0562)	
> Modifying System	(0400,0563)	EzDICOMPrintToPACS + Version
> Source of Previous Values	(0400,0564)	
> Reason for the Attribute Modification	(0400,0565)	COERCE
> Modified Attribute Sequence	(0400,0550)	
Pixel Data	(7FE0,0010)	

4.1.2.3 QUERY A REMOTE DATABASE

4.1.2.3.1 ASSOCIATED REAL WORLD ACTIVITY

To convert images and send its to a DICOM Destination, the user have to create a Study and one or more Series where these images will be added.

The user can query Remote AEs to obtain demographics information from a selected patient and use it to populate converted images. Doing this will permit to add images to an existent patient, study or series.

The user may also query Worklist Servers to create new studies demanded by a HIS/RIS via a Worklist.

The performed query will start a C-FIND request. A result list will be displayed and the user will select the desired patient. The Study Form will be filled with information of this patient, study or series.

4.1.2.3.2 PROPOSED PRESENTATION CONTEXTS

Abstract Syntax		**Role**	**Extended Negotiation**
Name	**UID**		
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU	None
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	SCU	None

Transfer Syntax	
Name List	UID List
Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2

4.1.2.3.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR SOP QUERY CLASS

Ez Dicom Print to PACS supports C-Find request values as defined in DICOM v.3.0 Part 4. All Required (R) and Unique (U) Study, Series, and Image level keys are supported for the Study Root information models and Modality Worklist information models . In addition, certain Optional (O) keys are supported.

For a Study Root request the following keys are supported:

Study Root Request idenfiers for FIND-SCU			
Level	**Description**	**Tag**	**Type**
Study	Specific Character Set	(0008,0005)	S,*,U
Study	Query Retrieve Level	(0008,0052)	S
Study	Study Date	(0008,0020)	S,*,U,R
Study	Study Time	(0008,0030)	S,*,U,R
Study	Accession Number	(0008,0050)	S,*,U
Study	Patient’ s Name	(0010,0010)	S,*,U
Study	Patient's ID	(0010,0020)	S,*,U
Study	Patient's Birth Date	(0010,0030)	S,*,U,R
Study	Patient's Sex	(0010,0040)	S,*,U
Study	Study ID	(0020,0010)	S,*,U
Study	Study Instance UID	(0020,000D)	U
Study	Modalities in Study	(0008,0061)	S,*,U
Study	Referring Physician Name	(0008,0090)	S,*,U
Study	Study Description	(0008,1030)	S,*,U
Study	Body Part Examined	(0018,0015)	S
Series	Specific Character Set	(0008,0005)	S,*,U
Series	Query Retrieve Level	(0008,0052)	S
Series	Study Description	(0008, 103E)	S,*,U
Series	Modality	(0008,0060)	S,*,U

Series	Series Number	(0020,0011)	S,*,U
Series	Series Date	(0008,0021)	S,*,U,R
Series	Series Time	(0008,0031)	S,*,U,R
Series	Series Instance UID	(0020,000E)	U
Series	Study Instance UID	(0020,000D)	U

For a Modality Worklist request the following keys are supported:

Modality Worklist Request idenfiers for FIND-SCU		
Description	**Tag**	**Type**
Specific Character Set	(0008,0005)	S,*,U
Accession Number	(0008,0050)	S,*,U
Patient's Name	(0010,0010)	S,*,U
Patient's ID	(0010,0020)	S,*,U
Patient's Birth Date	(0010,0030)	S,*,U
Patient's Sex	(0008,000D)	S,*,U
Scheduled Procedure Step Sequence	(0040,0100)	SEQ
> Scheduled Station AE Title	(0040,0001)	S
> Scheduled Procedure Step Start Date	(0040,0002)	S,R
> Scheduled Procedure Step Start Time	(0040,0003)	S,R
> Modality	(0008,0060)	S
Study Instance UID	(0020,000D)	U
Referring Physician Name	(0008,0090)	S,*,U
Study ID	(0020,0010)	S,*,U
Requested Procedure Description	(0032,1060)	S,*,U

Type	Further meaning
S	Indicates the identifier attribute uses Single Value Matching
R	Indicates Range matching
*	Indicates wildcard matching
U	Indicates Universal matching

L	Indicates that UID lists are sent
NONE	Indicates that no matching is supported
UNIQUE	Indicates that this is the Unique Key for that query level (in which case Universal matching or Single Value matching is used depending on the query level)
SEQ	Indicates Sequence matching

5 COMMUNICATION PROFILES

5.1 Supported Communication Stacks

DICOM Part 8 is supported by Ez Dicom Print to PACS through TCP/IP.

5.2 OSI Stack

Not supported.

5.3 TCP/IP Stack

The only supported network protocol is TCP/IP. Any physical media supporting TCP/IP may be used to connect to Ez Dicom Print to PACS Software. Ez Dicom Print to PACS Software uses the TCP/IP stack of the under laying operating system.

5.4 Point-to-Point Stack

This implementation supports the Point-to-Point protocol that emulates a TCP/IP stack.

6 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

6.1 Standard Extended/Specialized/Private SOPs

Not applicable

6.2 Private Transfer Syntaxes

Not applicable

7 CONFIGURATION

Local AE titles are configurable.

7.1 AE Title / Presentation Address Mapping

The local AE title of the Ez Dicom Print to PACS can be changed though the “Configuration Window" in the main popup menu The AET’s of the store SCU and query/retrieve SCU processes can be set through the "Configuration Window".

7.2 Configurable Parameters

The following fields are configurable for the local AE:

- Local AE Title

The following fields are configurable for any remote AE:

- Remote AE
- Remote TCP/IP Port
- Remote IP Address

8 SUPPORT OF EXTENDED CHARACTER SETS

Ez Dicom Print to PACS software supports:

- Single byte character sets without code extensions.
- Single byte character sets with code extensions.
- Multi byte character sets without code extensions.
- Multi byte character sets with code extensions.