DICOM Conformance Statement
CBS Images and Worklist
Version 2.01

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1 CONFORMANCE STATEMENT OVERVIEW

CBSIW is a DICOM Application Entity system used for receiving and sending of DICOM Images and Modality Worklist queries and results. The system conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

Note: This document is intended for informational use only and is not intended as an obligation to provide services or guarantee interoperability with other software or hardware platforms.

Document: DICOM Conformance Statement CBSIW 1.0.doc Page 2 of 19 **Copyright:** © Compulink, Inc.		
SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	No	Yes
Workflow Management		
Modality Worklist Information Model - FIND	No	Yes

Image Transfer	
C-Move	Yes
C-Store	Yes

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3 Introduction

3.1 Revision History

Document Version	Author	Date	Change
1.0	Robert Rosen	2010-09-25	Initial revision for CBSIW v1.0

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.

3.4 Definitions, Terms and Abbreviations

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
CBS [EHR]	Compulink EHR
EHR	Electronic Health Record management system
ILE	Implicit Little Endian
IOD	Information Object Definition
MWL	Modality Work List
NB	Network Broker
PMS	Practice Management System
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, pair of user and provider.
SW	Software
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, 2008
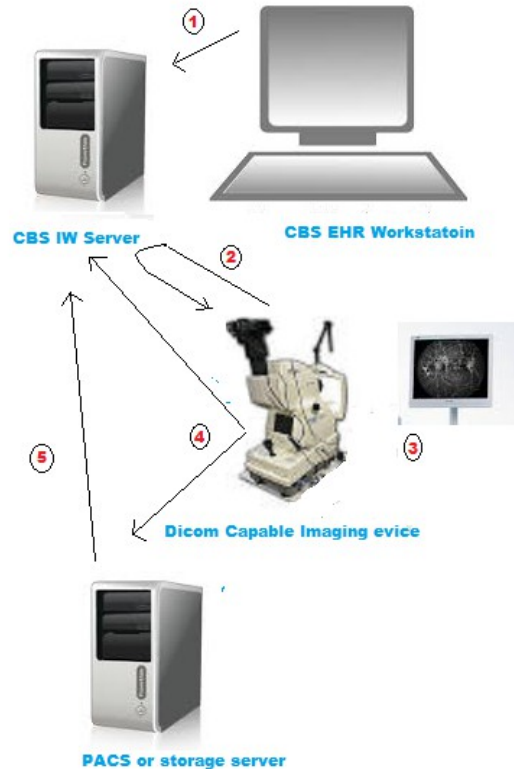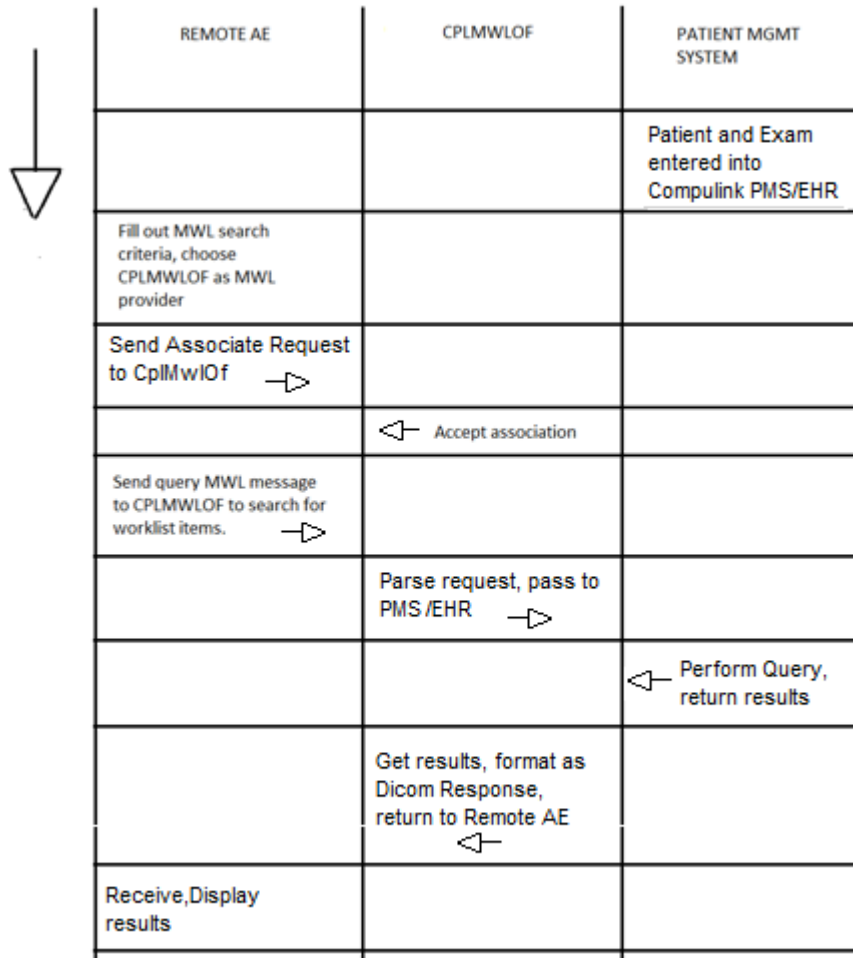
4 Network Messaging

4.1 Implementation Model

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	No	Yes
C-Store	*see below	No (mainly)	Yes (mainly)

4.1.1 Expected Work Flow

1. CBS EHR workstation schedules Dicom Imaging procedure, saves on CBSIW capable EHR Server

2. Dicom imaging device performs MWL query and receives worklist plus patient demog.

3. AE device performs imaging, assigns patient demog. , study info to resulting image(s)

4. AE device may now send desired image(s) to EHR or PACS for storage.

5. PACS or storage server may view images and/or send key images to CBSIW for viewing on CBS workstation as part of patient record.

CBS IW Server

CBS EHR Workstatoin

Dicom Capable Imaging evice

PACS or storage server

4.1.2. Worklist Data Flow

REMOTE AE	CPLMWLOF	PATIENT MGMT SYSTEM
		Patient and Exam entered into Compulink PMS/EHR
Fill out MWL search criteria, choose CPLMWLOF as MWL provider		
Send Associate Request to CplMwlOf ▷		
	◁ Accept association	
Send query MWL message to CPLMWLOF to search for worklist items. ▷		
	Parse request, pass to PMS/EHR ▷	
		◁ Perform Query, return results
	Get results, format as Dicom Response, return to Remote AE ◁	
Receive,Display results		

4.1.2 Functional Definition of AEs

4.1.2.1 Verification

CBSIW will respond to a DICOM C-Echo request from a remote AE in order to verify communication.

4.1.2.2 Modality Worklist

Assuming that a scenario exists where a patient has been registered at a medical clinical environment using CBS EHR and a device test has been scheduled using the CBS EHR for a known device (DICOM Worklist capable). CBSIW waits for a remote AE connection (Association). Once a connection has been established, device may send a C-Find request for a Worklist given a set of search criteria. The CBSIW will work with the CBS EHR to return any

matching worklist results to the device using the DICOM networking protocol. The Worklist results contain data including Patient Id, Name, Date and time of Scheduled Procedure.

4.2 AE Specifications

4.2.1 CBSIW Application Entity Specification

4.2.1.1 SOP Classes

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 CBSIW SW can be configure to use one AE Worklist related activities. Maximum number of simultaneous associations	Limited by host OS performance. Recommended 25.

4.2.1.2.3 Asynchronous Nature

CBSIW supports asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Verification (SCP)

4.2.1.3.1.1 Description and Sequencing of Activities

The CBSIW AE will respond to Verification requests to provide a remote SCU with the ability to determine if the respective AEs are able to receive and handle DICOM requests.

4.2.1.3.1.2 Accepted Presentation Contexts

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	
Name	UID	UID	Name List	UID List
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP

4.2.1.4.1.3 SOP Specific Conformance – Verification

The CBSIW provides standard conformance to the DICOM Verification Service Class as an SCP. One of the following status codes are returned: **Service Status**	**Further Meaning**	**Error Code**	**Behavior**
Success	Success	0000	Operation performed properly.

4.2.1.4 Activity – Query Modality Worklist (SCP)

4.2.1.4.1 Description and Sequencing of Activities

The CBSIW MWL AE will respond to DICOM C-FIND requests in response to a remote AE querying for a Modality Worklist. Before the CBSIW AE can respond to a DICOM Modality Worklist query, the integrated PMS/EHR must contain MWL items in the form of scheduled procedures/tests.

4.2.1.4.2 Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	
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	SCP

C-Find Extended Negotiation is supported: For the field "Date-time matching" the value "1" is returned, meaning that this is supported by the CBSIW AE.

4.2.1.4.3 SOP Specific Conformance – MWL

The CBSIW MWL AE provides standard conformance to the DICOM Basic Worklist Management Service Class. The CBSIW application can be configured to use only one AE for MWL and all the other described transactions

The following table contains detailed information on matching and returned keys:

Description	Tag	Matching Type
Scheduled Station AE Title	(0040,0001)	U S
Scheduled Procedure Step Start Date	(0040,0002)	U CDT
Modality	(0008,0060)	U S
Requested Procedure ID	(0040,1001)	U S
Accession Number	(0008,0050)	U S
Patient's Name	(0010,0010)	U S *
Patient ID	(0010,0020)	U S

| Patient's Birth Date | (0010,0030) | U S R |
| Patient's Sex | (0010,0040) | U S |

The following table contains the supported return keys:

Description	Tag
Scheduled Procedure Step Sequence	(0040,0100)
>Scheduled Station AE Title	(0040,0001)
>Scheduled Procedure Step Start Date	(0040,0002)
>Scheduled Procedure Step Start Time	(0040,0003)
>Modality	(0008,0060)
>Scheduled Performing Physician's Name	(0040,0006)
>Scheduled Procedure Step Description	(0040,0007)
> Scheduled Protocol Code Sequence	(0040,0008)
>> Code Meaning	(0008,0104)
>> Code Value	(0008,0100)
>> Coding Scheme Designator	(0008,0102)
>> Coding Scheme Version	(0008,0103)
>Scheduled Procedure Step ID	(0040,0009)
Requested Procedure ID	(0040,1001)
Requested Procedure Description	(0032,1060)
Study Instance UID	(0020,000D)
Study Date (=Scheduled Procedure Step Start Date)	(0008,0020)
Study Time (=Scheduled Procedure Step Start Time)	(0008,0030)
Accession Number	(0008,0050)
Requesting Physician	(0032,1032)
Requested Procedure Code Sequence (=Scheduled Protocol Code Sequence)	(0032,1064)
> Code Meaning	(0008,0104)
> Code Value	(0008,0100)
> Coding Scheme Designator	(0008,0102)
> Coding Scheme Version	(0008,0103)
Referring Physician's Name	(0008,0090)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Other Patient IDs	(0010,1000)
Ethnic Group	(0010,2160)
Patient Comments	(0010,4000)

The CBSIW MWL AE returns one of the following status codes in a C-FIND response:

Service Status	Further Meaning	Error Code	Description
Refused	No Such SOP class	0118	If a SOP Class is used, which was not negotiated.
	Unrecognized Operation	0211	Unrecognized value in Command Filed
Failed	Processing Failure	0110	Unexpected internal errors.
	Unable To Process	C000	Unexpected internal

			errors.
Cancel		FE00	The original requester canceled this operation.
Pending	Pending	FF00	All Optional Keys are supported in the same manner as Required Keys.
Success	Success	0000	Operation performed properly

4.2.1.5 Activity – C-STORE (*Mainly SCP)

4.2.1.5.1 Description and Sequencing of Activities

The CBSIW MWL AE will respond to the DICOM C-STORE command. The C-STORE command is used to send Dicom Objects from one AE to another. External AEs should ensure that the Patient Id contained in the Dicom Object is valid and recognizable by CBSIW. Even though the CBSIW May have capability to perform Dicom C-Stores as an SCU using utilities, its main function is to receive key images directly from another AE. Thereby making its profile mostly as a recipient of C-Store messages.

4.2.1.5.2 Accepted Presentation Contexts

Presentation Context Table

Abstract Syntax		Transfer Syntax		
C-STORE **STORAGE CLASSES** Secondary Capture Image Storage Computed Radiography Image Storage SOP Class CT Image Storage Ophthalmic Photography 8-Bit Image Storage Ophthalmic Photography 16-Bit Image Storage VL ImageStorage VL MultiFrameImageStorage VL EndoscopicImageStorage VL MicroscopicImageStorage		ILE JPEGProcess1Transfer Syntax JPEGProcess2_4Transf erSyntax RLELossles sTransferS yntax	1.2.840.10008.1.2 1.2.840.1000 8.1.2.4.50 1.2.840.1000 8.1.2.4.51 1.2.840.1000 8.1.2.5	SCP ↓

EncapsulatedPDFStorage Ophthalmic Photography 8 Bit Image Storage Ophthalmic Tomography Image Storage				
*Not an exhaustive list.				

4.2.1.5.3 SOP Specific Conformance – C-STORE

The CBSIW AE provides standard conformance to the DICOM C-STORE Service Class.
A "White list" can be used to restrict peers from sending C-STORE commands when in the SCP Role.

4.2.1.6 Activity – C-MOVE (Mostly SCP) and C-Store(SCU)

4.2.1.6.1 Description

The CBSIW MWL is focused mainly as a MWL server and storage recipient for key images. But at times it may use the DICOM C-MOVE and C-STORE in the role of SCU using the same presentation contexts as noted above with C-STORE as an SCP. It may perform these functions using ancillary utilities.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is provided by the host hardware and Operating System.

4.4 CONFIGURATION

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles
The mapping from AE Title to TCP/IP addresses and ports is configurable and set in the configuration xml file by Installation Personnel. Initial set to **Cbs_IMS**

4.4.1.2 Remote AE Title/Presentation Address Mapping
You may edit the file PeerAEs.dat to add external IPAddresses and AE titles.

5.0 MEDIA INTERCHANGE

CBSIW Will Send and Receive Dicom Image Files.

6 SUPPORT OF EXTENDED CHARACTER SETS

CBSIW supports the following:
ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

7 SECURITY

CBSIW is intended to be used behind a firewall within a secure environment.   It is not intended to be accessible via global Internet IP addresses.