

# DICOM 3.0 Conformance Statement



## Butterfly Network DICOM Connector

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## 1. Conformance Statement Overview

Butterfly Network's foundational innovation enables construction of an ultrasound machine on a chip without the need for bulky computers or crystal transducers. The Butterfly iQ Ultrasound transducer connects to a Mobile Device (iPhone or iPad) running the Butterfly iQ mobile App to enable its users to image patients using the ultrasound technology and generate medical images. Images and any Personal Health Information (PHI) metadata acquired through Butterfly mobile App are securely transmitted to the individual's or facility's Butterfly Cloud account for storage and display.

The DICOM Connector is a connectivity component that implements DICOM services to allow for data transmission between the Butterfly Cloud and DICOM Store and Modality Worklist providers.

Table 1.0 provides an overview of the network services supported.

**Table 1.0 – Overview of Supported DICOM Services**

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<b>Storage</b>		
Ultrasound Image Storage	Yes	No
Ultrasound Multi-Frame Image Storage	Yes	No
<b>Workflow Management</b>		
Verification	Yes	No
Modality Worklist Information Model (FIND)	Yes	No

## 2. Introduction

### 2.1. Revision History

Document Version	Date	Author	Description
A	September 1, 2018	Damien Dolimier	Initial release
B	Mar 07, 2019	Adam Kielski	Updates for Cloud version, IOD, and Diagrams

### 2.2. Audience

This document is written for individuals that need to understand how the Butterfly Cloud DICOM Connector 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 this 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.

## 2.3. Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between Butterfly Cloud DICOM Connector 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.

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.

## 2.4. Definitions, Terms, and Abbreviations

DICOM definitions, terms, and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4.

The word Butterfly in this document refers to Butterfly Network, Inc.

In this document, the term 'DICOM Connector' is used to identify the Butterfly Network Cloud DICOM Connector; an integral component of the Butterfly iQ imaging ecosystem.

The following abbreviations are used within this DICOM Conformance Statement.

ACR	American College of Radiology	NEMA	National Electrical Manufacturers Association
AE	Application Entity	NTP	Network Time Protocol
AET	Application Entity Title	OSI	Open Systems Interconnection
ACSE	Association Control Service Element	PACS	Picture Archiving and Communication System
DICOM	Digital Imaging and Communications in Medicine	RIS	Radiology Information System
DIMSE	DICOM Message Service Element	SCP	Service Class Provider
EMR	Electronic Medical Record	SCU	Service Class User

IETF	Internet Engineering Task Force	SOP	Service-Object Pair
IOD	Information Object Definition	TLS	Transport Layer Security
ISO	International Organization for Standards	UID	Unique Identifier
JPEG	Joint Photographic Experts Group	US	Ultrasound
MPEG	Moving Picture Experts Group	VR	Value Representation
MWL	Modality Worklist		

## 2.5. References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard.

<http://medical.nema.org/>

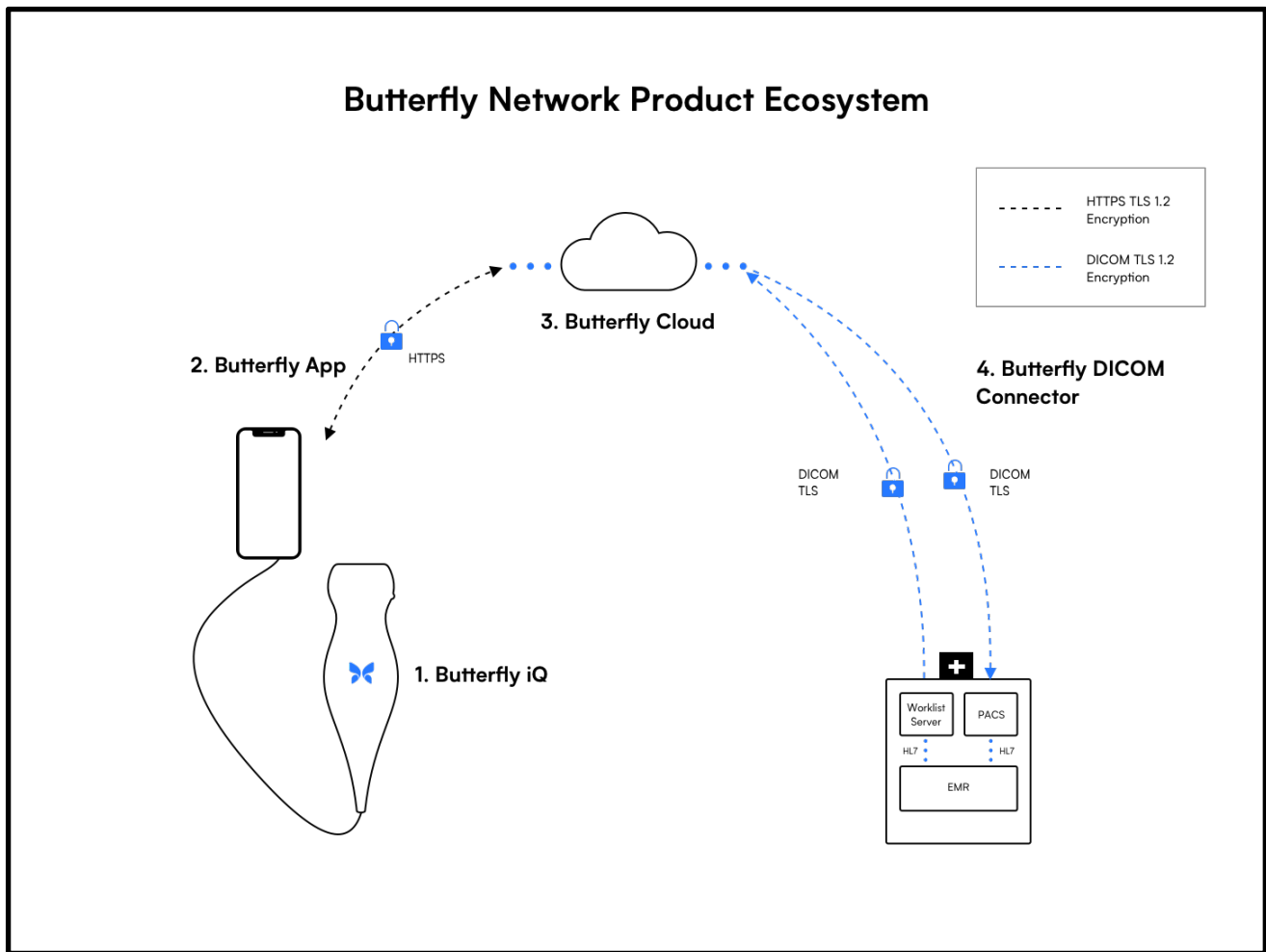
IETF BCP 195/RFC 7525 Internet Engineering Task Force, Secure Use of Transport Layer Security (TLS) <https://tools.ietf.org/html/rfc7525>

# 3. Networking

## 3.1. Implementation Model

The Butterfly Network whole-body ultrasound imaging platform consists of four (4) key components as referenced in Figure 3.1.

- Butterfly iQ Ultrasound probe.
- Butterfly iQ App for mobile devices.
- Butterfly Cloud.
- Butterfly Cloud DICOM Connector.



**Figure 3.1 - Butterfly Network Product Ecosystem**

An end-user will connect the Butterfly iQ Ultrasound probe to a mobile device running the Butterfly iQ mobile App. The end-user will need to log-in with their unique Butterfly account, via the Butterfly iQ mobile App, to allow for secure data transfer between their mobile device and their Butterfly Cloud account. Thereafter the end-user is able to acquire images or multi-frame clips which are encrypted and temporarily stored to the mobile device. Once all imaging is acquired, the end-user is prompted to save the data to a user-designated Archive in the Butterfly Cloud. Upon successful data transmission, the image data stored on the mobile device is purged. If the selected Archive in the Butterfly Cloud is associated with a Remote SCP end-point then the imaging will be further transferred via the Butterfly Cloud DICOM Connector. The characteristics of the DICOM data transfer depends on the specific configuration settings of the Remote AE as defined in the Butterfly Cloud DICOM Administration screen.

**Note:**

Integration between Butterfly Cloud DICOM Connector and a Remote AE requires the data to transit over public networks. Butterfly Cloud DICOM Connector supports the Secure Transport Connection Profile, as per NEMA PS3.15, to provide for the secure transmission of DICOM data over public networks. For details see Section 5.1 Security Profiles.

It is recommended that the Standard DICOM Interface (non-TLS) be used solely for testing and validation purposes.

### 3.1.1. Application Data Flow

Figure 3.1.1 represents the relationship between the Butterfly Network system’s real-world activities, the DICOM Connector built into the Butterfly Cloud, and the Remote AE that the DICOM Connector communicates with via DICOM.

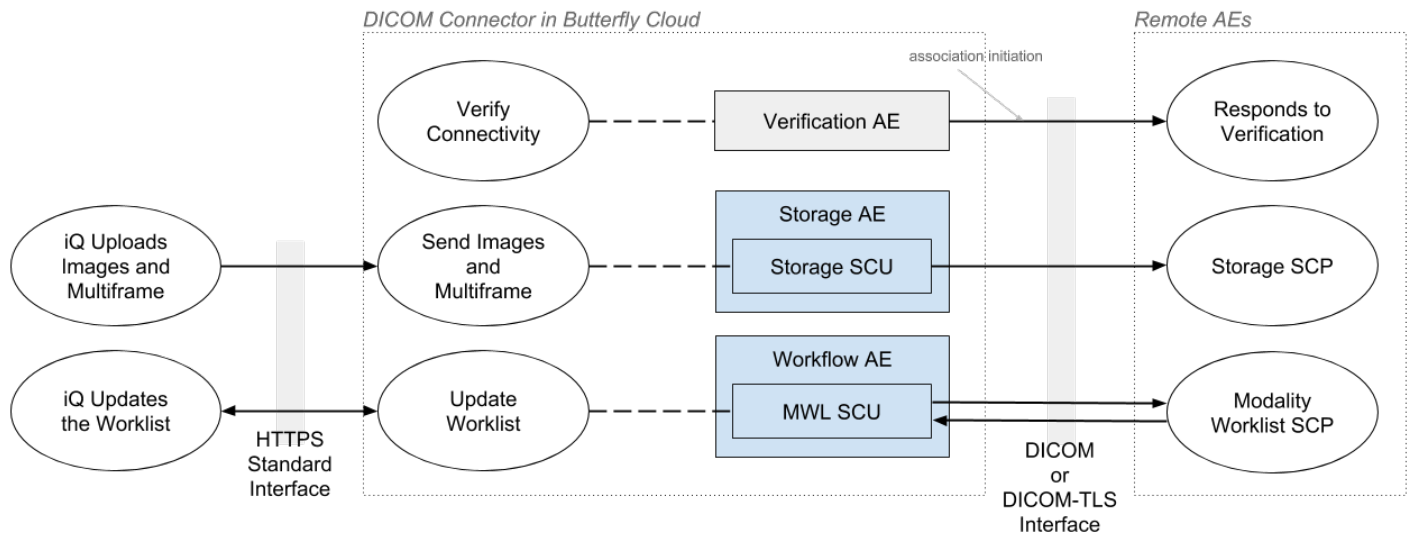


Figure 3.1.1

### 3.1.2. Functional Definitions of the Application Entities

#### 3.1.2.1. Storage Application Entity

Upon acquiring all necessary imaging in the Butterfly iQ mobile App, the end-user is prompted to select the destination Archive for image storage in the Butterfly Cloud. The specific Remote AE’s to which the image data is sent automatically is dependent upon whether the Archive has a Remote AE associated with it. An Archive can have between zero (0) and a maximum of three (3) Remote AE’s associated with it.

Imaging that is to be forwarded to a Remote AE is placed in a queue to be uploaded one at a time to the Remote AE – that is; one association is made per image or multi-frame clip. The Storage AE makes an association request that is sent to the Remote AE with a transfer syntax as defined in the DICOM settings for each Remote AE. Upon successful DICOM association negotiation, the image transfer is started. If the association cannot be negotiated, the imaging transfer is set to a Failed status and the end-user can restart the transfer through the Butterfly Cloud interface.

#### 3.1.2.2. Workflow Application Entity

Prior to imaging being uploaded from the Butterfly iQ App to the Butterfly Cloud, the end-user is provided with the option to associate the acquired imaging with a DICOM Modality Worklist (MWL) entry or to enter patient and study metadata manually. The Active MWL AE that is associated with the end-user’s Organization is used for all MWL queries by the Workflow AE. More than one DICOM MWL SCP may be defined per Org, however, only one (1) MWL may be active at a time. MWL queries are issued from the Butterfly Cloud to the Remote MWL AE whenever an end-user selects the “Add From Worklist” option in the Butterfly iQ mobile app. All returned Worklist data is then cached

in the Butterfly Cloud and made available to the iQ fleet associated with that Org, when necessary.

The selected patient demographics that are provided via the Workflow AE cannot be modified by the user to avoid any data reconciliation issues between the acquired imaging and the metadata expected by the Remote DICOM Store AE.

### 3.1.2.3. Verification Application Entity

From the DICOM Administration interface in the Butterfly Cloud, an end-user can verify the connection settings of a Remote DICOM AE: MWL SCP or Store SCP. The DICOM Connector initiates a connection with the remote AE, posts a Verification request and closes the connection. The results of a successful Verification indicate the DICOM transfer syntaxes supported by the Remote AE and are available in the “View Output” option for the Remote AE. The results of a failed Verification are also indicated in the “View Output” option.

### 3.1.3. Sequencing of Real-World Activities

Figure 3.1.3 shows the sequencing of Acquisition, Patient selection from Worklist, and Upload of image data for a typical scheduled exam.

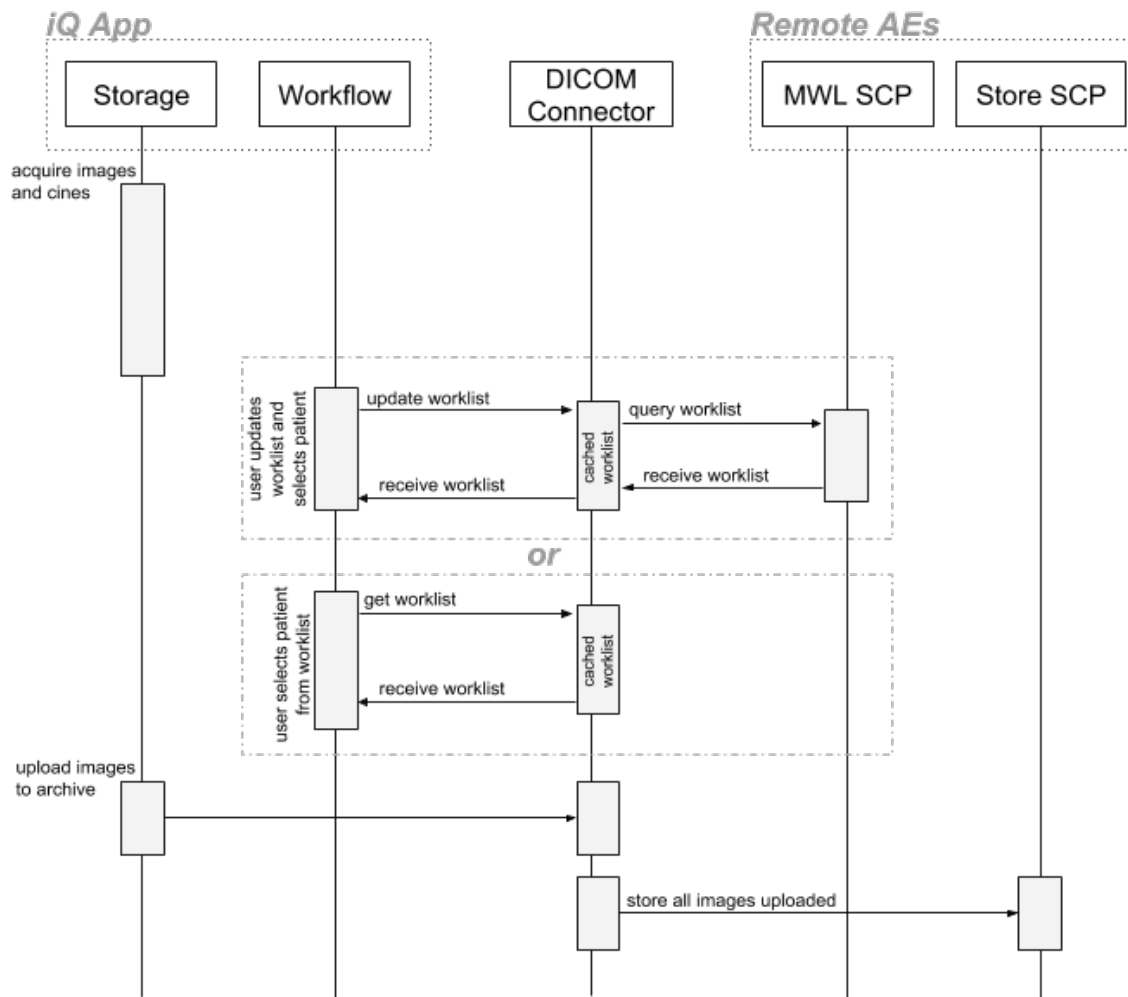


Figure 3.1.3



## 3.2. Application Entity Specifications

Configuration must be completed and saved, in the Butterfly Cloud DICOM Administration screen, before the system is able to perform DICOM Store, MWL Query, or Echo operations.

### 3.2.1. SOP Classes

The Butterfly DICOM Connector's AE provides Standard Conformance to the SOP Classes listed in Table 3.2.1.1.

**Table 3.2.1 – Supported SOP Classes**

SOP Class Name	SOP Class UID	SCU	SCP
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Verification	1.2.840.10008.1.1	Yes	No

### 3.2.2. Association Policies

#### 3.2.2.1. General

The Butterfly DICOM Connector's AE will establish an association according to DICOM 3.0. Table 3.2.2.1-A outlines the general policies for each association. Table 3.2.2.1-B specifies other DICOM connection settings.

**Table 3.2.2.1-A – Association Policies**

<b>Application Context Name</b>	1.2.840.10008.3.1.1.1
<b>Maximum number of simultaneous associations</b>	1
<b>Asynchronous Nature</b>	Each association is handled synchronously. Butterfly DICOM Connector does not support asynchronous operations
<b>Implementation Class UID</b>	1.2.276.0.7230010.3.0.3.6.3
<b>Implementation Version Name</b>	OFFIS_DCMTK_363

**Table 3.2.2.1-B – Connection Settings**

Setting	Default Value	User Configurable
ACSE timeout	300 seconds	yes
DIMSE timeout	300 seconds	yes
Connection timeout	100 seconds	yes

Retry Interval	5 seconds	no
Maximum Retries	3	no

### 3.2.3. Association Initiation Policy

#### 3.2.3.1. Image Store Activity – Real World Triggers

The Storage AE will open an association to a configured Remote Storage SCP based on:

- Confirmation of Image Save to an Archive with an Associated Remote DICOM AE in the Butterfly iQ App.
- Use of per-study DICOM Management to Send the study to a configured Remote AE.

#### 3.2.3.2. Proposed Presentation Contexts to Remote Storage SCP.

**Table 3.2.3.2 – Proposed Presentation Contexts to Remote Storage SCP**

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless JPEG Baseline JPEG-LS Lossless JPEG-LS Lossy JPEG 2000 Lossless JPEG 2000 Lossy	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.80 1.2.840.10008.1.2.4.81 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	none
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian JPEG Lossless JPEG Baseline JPEG-LS Lossless JPEG-LS Lossy JPEG 2000 Lossless JPEG 2000 Lossy	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.80 1.2.840.10008.1.2.4.81 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	none
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	MPEG-4 AVC/H.264 High Profile / Level 4.1 Video Compression	1.2.840.10008.1.2.4.102	SCU	none

#### 3.2.3.3. Query Worklist Activity – Real World Triggers

The Workflow AE will open an association to a configured Remote MWL SCP based on:

- Use of “Add From Worklist” option in the Butterfly iQ mobile App.

The Butterfly DICOM Connector will send a C-FIND request to the Remote MWL SCP and will wait in blocking mode until receipt of C--FIND response is confirmed.

## 3.2.3.4. Proposed Presentation Contexts to Remote MWL SCP.

**Table 3.2.3.4 – Proposed Presentation Contexts to Remote MWL SCP**

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	none

## 3.2.3.5. SOP Specific Conformance for Worklist Management SOP Class

**Table 3.2.3.4 – Attributes Usage for Worklist Management SOP Class**

Module Name >Attribute Name	Tag	Matching Keys for Worklist Update	Matching Keys for Worklist Search	Editable in Patient Form	Displayed in Worklist	Copied into Image IOD
Scheduled Procedure Step:						
>Scheduled Station AE Title	(0040,0001)	-	-	-	-	-
>Scheduled Procedure Step Start Date	(0040,0002)	range	-	-	-	-
>Scheduled Procedure Step Start Time	(0040,0003)	range	-	-	-	-
>Scheduled Procedure Step Location	(0040,0011)	-	-	-	-	-
>Modality	(0008,0060)	value	-	-	-	yes
>Scheduled Performing Physician's Name	(0040,0006)	-	-	-	-	-
>Scheduled Procedure Step ID	(0040,0009)	-	-	-	-	yes
>Scheduled Protocol Code Sequence	(0040,0008)	-	-	-	-	yes
>>Code Value	(0008,0100)	-	-	-	-	yes
>>Coding Scheme Version	(0008,0103)	-	-	-	-	yes
>>Coding Scheme Designator	(0008,0102)	-	-	-	-	yes
>>Code Meaning	(0008,0104)	-	-	-	-	yes
>Scheduled Procedure Step Description	(0040,0007)	-	-	-	-	yes
Requested Procedure:						
Requested Procedure Description	(0032,1060)	-	-	-	-	yes
Requested Procedure Code Sequence	(0032,1064)	-	-	-	-	yes
>Code Value	(0008,0100)	-	-	-	-	yes
>Coding Scheme Designator	(0008,0102)	-	-	-	-	yes

>Coding Scheme Version	(0008,0103)	-	-	-	-	yes
>Code Meaning	(0008,0104)	-	-	-	-	yes
Requested Procedure ID	(0040,1001)	-	-	-	-	yes
Study Instance UID <sup>2</sup>	(0020,000D)	-	-	-	-	yes
Referenced Study Sequence	(0008,1110)	-	-	-	-	yes
>Referenced SOP Class UID	(0008,1150)	-	-	-	-	yes
>Referenced SOP Instance UID	(0008,1155)	-	-	-	-	yes
Imaging Service Request:						
Accession Number <sup>1</sup>	(0008,0050)	-	yes	yes	yes	yes
Requesting Physician	(0032,1032)	-	-	-	-	yes
Referring Physician's Name	(0008,0090)	-	-	-	-	yes
Visit Identification:						
Admission ID	(0038,0010)	-	-	-	-	-
Visit Status:						
Current Patient Location	(0038,0300)	-	-	-	-	-
Visit Relationship:						
Referenced Patient Sequence	(0008,1120)	-	-	-	-	yes
>Referenced SOP Class UID	(0008,1150)	-	-	-	-	yes
>Referenced SOP Instance UID	(0008,1155)	-	-	-	-	yes
Patient Identification:						
Patient's Name <sup>1</sup>	(0010,0010)	-	yes	yes	yes	yes
Patient ID <sup>1</sup>	(0010,0020)	-	yes	yes	yes	yes
Patient Demographic:						
Patient's Birth Date <sup>1</sup>	(0010,0030)	-	-	yes	yes	yes
Patient's Sex <sup>1</sup>	(0010,0040)	-	-	yes	yes	yes

**Note 1:**

In case of patient demographics import from Worklist, this DICOM tag value may not be modified in the iQ App. If Worklist is not used, this field may be entered by the user.

**Note 2:**

In the case of a patient demographics import from the worklist, this DICOM tag value may not be modified in the iQ App. If Worklist is not used, this field is automatically generated to guarantee its uniqueness.

## 4. Support of Character Sets

**Table 4 – Character sets supported by Storage and Workflow AE**

DICOM	Character Set	Coverage
ISO_IR 6	ASCII	
ISO_IR 100	Latin alphabet #1	Afrikaans, Albanian, Breton, Catalan, Danish, English (UK and US), Faroese, France, Galician, German, Icelandic, Irish (new orthography), Italian, Kurdish (The Kurdish Unified Alphabet), Latin (basic classical orthography), Leonese , Luxembourgish (basic classical orthography), Norwegian (Bokmål and Nynorsk), Occitan, Portuguese (Portuguese and Brazilian), Rhaeto-Romanic, Scottish Gaelic, Spanish, Swahili, Swedish, Walloon, Basque
ISO_IR 192	Unicode	

## 5. Security

### 5.1. Security Profiles

Butterfly DICOM Connector supports secure DICOM communication in conformance with the Basic TLS Secure Transport Connection Profile. This support is a configurable option that can be enabled on a per Remote AE basis. Verification, Storage, and Workflow AE's can be configured with TLS security enabled.

#### 5.1.1. Basic TLS Secure Transport Connection Profile

Butterfly DICOM Connector implements the specification for (IETF) BCP 195 Transport Layer Security (TLS) and RFC752. Enabling the TLS functionality will ensure that communication between the Butterfly DICOM Connector and any Remote AE is authenticated and encrypted. For secure communication the TLS protocol v1.2 is used (prior versions of TLS are not supported).

The TLS Connection Profile supports X.509 certificates. The following TLS Certificate Validation will be performed during the TLS Handshake.

The Butterfly Connector AE (client) verifies the following:

- That the server certificate is a X.509 certificate which is not tampered with.
- That the server certificate is not expired (present time is between "Valid From" and "Valid To" fields of the X.509 certificate).

No verification is performed on:

- Revocation of certificates

### 5.2. Association Level Security

Butterfly DICOM Connector always acts as an SCU and does not support association-level security.

### 5.3. Application-Level Security

Access to the Butterfly Cloud and DICOM Connector configuration is secured with unique, password protected user accounts.

# Appendix A - IOD Details

## Supported IOD Specifications

Table A.1 defines the Modules, and Attributes Usage as implemented in the Butterfly DICOM Connector. The modules in the table are used with US Image Storage, US Multi-frame Image Storage, and Video Photographic Image Storage SOP Classes. Attributes that are not listed are not used.

**Table A.1 – Supported IOD Specifications**

<b>Module Name:</b>	Tag	Type*	Attribute Usage
Attribute Name			
<b>Patient Module:</b>			
Patient's Name	(0010, 0010)	2	From MWL. Or manually entered on Associate Patient screen in App. Or manually entered on Edit Study Details screen in Butterfly Cloud.
Patient ID	(0010,0020)	2	From MWL. Or manually entered on Associate Patient screen in App. Or manually entered on Edit Study Details screen in Butterfly Cloud
Patient's Birth Date	(0010, 0030)	2	From MWL. Or manually entered on Associate Patient screen in App. Or manually entered on Edit Study Details screen in Butterfly Cloud.
Patient's Sex	(0010, 0040)	2	From MWL. Or manually entered on Associate Patient screen in App. Or manually entered on Edit Study Details screen in Butterfly Cloud.
<b>General Study Module:</b>			
Study Instance UID	(0020, 000D)	1	From MWL. Or automatically generated.
Study Date	(0008, 0020)	2	The date the first Series was created.
Study Time	(0008, 0030)	2	The time the first Series was created.
Referring Physician's Name	(0008, 0090)	2	From MWL.

Study ID	(0020, 0010)	2	From MWL. Or automatically generated.
Accession Number	(0008, 0050)	2	From MWL. Or manually entered on Associate Patient screen in App. Or manually entered on Edit Study Details screen in Butterfly Cloud.
Study Description	(0008,1030)	3	From MWL. Or Automatically generated from Preset name of first acquired Series in Butterfly iQ App.
General Series Module:			
Modality	(0008, 0060)	1	"US"
Series Instance UID	(0020, 000E)	1	Automatically generated.
Series Number	(0020, 0011)	2	"1"
Performing Physician's Name	(0008, 1050)	3	From MWL. Or automatically generated from username of logged in user of Butterfly iQ App.
Operators' Name	(0008, 1070)	3	Automatically generated from username of logged in user of Butterfly iQ App.
Series Description	(0008,103E)	3	Automatically generated from Preset name in Butterfly iQ App.
General Equipment Module:			
Manufacturer	(0008, 0070)	2	"Butterfly Network Inc."
Institution Name	(0008,0080)	3	Automatically generated from Organization Name for logged in user of Butterfly iQ App.
Device Serial Number	(0018,1000)	3	Serial Number of Butterfly iQ probe.
General Image Module:			
Instance Number	(0020, 0013)	2	Automatically generated, begins at 1 for the first Instance then increments by 1 for each subsequent Instance in the Series
Image Type	(0008, 0008)	3	"ORIGINAL\PRIMARY\ <exam_type&gt;\&lt;nnnn&gt;" </exam_type&gt;\&lt;nnnn&gt;"  Or "DERIVED\PRIMARY\ <exam_type&gt;\&lt;nnnn&gt;" </exam_type&gt;\&lt;nnnn&gt;"  Where <Exam_Type> is mapped



			from Preset in iQ App, and <nnnn> is numeric representation of acquisition mode. 0001 = 2D Imaging (B-Mode) 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0100 = Color Power Mode
Cine Module:			
Frame Time	(0018,1063)	1C	Nominal time (in msec) per individual frame
Image Pixel Module:			
Samples per Pixel	(0028,0002)	1	MONOCHROME2=1, RGB=3, YBR_FULL_422 = 3
Photometric Interpretation	(0028,0004)	1	Configurable per Remote AE. Valid settings defined by archiver type and Transfer Syntax being used. MONOCHROME2, RGB or YBR_FULL_422
Planar Configuration	(0028,0006)	1C	Not present if Photometric Interpretation is MONOCHROME2 otherwise set to 0 = The sample values for the first pixel are followed by the sample values for the second pixel, etc.
Rows	(0028,0010)	1	variable, up to 1080
Columns	(0028,0011)	1	variable, up to 718(iPhone)/1500(iPad)
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028,0103)	1	0
Multi-frame Module:			
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image.
Frame Increment Pointer	(0028,0009)	1	Always set to 0018,1063 (Frame Time).
US Image Module:			
Ultrasound Color Data Present	(0028,0014)	3	00=Color data not present in image

			01=Color data is present in image
Samples per Pixel	(0028,0002)	1	See Image Pixel Module
Photometric Interpretation	(0028,0004)	1	See Image Pixel Module
Planar Configuration	(0028,0006)	1C	See Image Pixel Module
Bits Allocated	(0028,0100)	1	See Image Pixel Module
Bits Stored	(0028,0101)	1	See Image Pixel Module
High Bit	(0028,0102)	1	See Image Pixel Module
Pixel Representation	(0028,0103)	1	See Image Pixel Module
Frame Increment Pointer	(0028,0009)	1	See Multi-frame Module
Image Type	(0008, 0008)	3	See General Image Module
US Region Calibration Module:			
Sequence of Ultrasound Regions	(0018, 6011)	1	Used
>Region Location Min x0	(0018, 6018)	1	Automatically generated
>Region Location Min y0	(0018, 601A)	1	Automatically generated
>Region Location Max x1	(0018, 601C)	1	Automatically generated
>Region Location Max y1	(0018, 601E)	1	Automatically generated
>Physical Units X Direction	(0018, 6024)	1	Automatically generated
>Physical Units Y Direction	(0018, 6026)	1	Automatically generated
>Physical Delta X	(0018, 602C)	1	Automatically generated
>Physical Delta Y	(0018, 602E)	1	Automatically generated
>Region Spatial Format	(0018, 6012)	1	Automatically generated
>Region Data Type	(0018, 6014)	1	Automatically generated
>Region Flags	(0018, 6016)	1	Automatically generated
SOP Common Module:			
SOP Class UID	(0008, 0016)	1	See Table 3.2.1
SOP Instance UID	(0008, 0018)	1	Automatically generated
Specific Character Set	(0008, 0005)	1C	See Table 4

**Type\* - Data element Types are defined as:**

Type 1: Required to be in the SOP Instance (DICOM file) and shall have a valid value.

Type 2: Required to be in the SOP Instance (DICOM file) but may contain the value of "unknown", or a zero-length value.

Type 1C: Conditional. If a condition is met, then it is a Type 1 (required, cannot be zero). If the condition is not met, then the tag is not sent.

Type 2C: Conditional. If a condition is met, then it is a Type 2 (required, zero length OK). If the condition is not met, then the tag is not sent.

Type 3: Optional. May or may not be included and could be zero length.

