

DICOM Conformance Statement

Flywheel DIMSE Service

Version 1.0

02/25/2020



Flywheel Exchange LLC

www.flywheel.io

1 Conformance Statement Overview

The Flywheel DIMSE Service is a self-contained networked computer system providing multi-modality data management and archiving. It allows external systems to retrieve information about DICOM images, and retrieve the images themselves. The Flywheel DIMSE Service conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

Table 1-1. Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<u>Transfer</u>		
Verification	No	Yes
Computed Radiography Image Storage	Yes	No
Digital XRay Image Presentation Storage	Yes	No
Digital XRay Image Processing Storage	Yes	No
Digital Mammography XRay Image Presentation Storage	Yes	No
Digital Mammography XRay Image Processing Storage	Yes	No
Digital Intra Oral XRay Image Presentation Storage	Yes	No
Digital Intra Oral XRay Image Processing Storage	Yes	No
CT Image Storage	Yes	No
Enhanced CT Image Storage	Yes	No
Legacy Converted Enhanced CT Image Storage	Yes	No
Ultrasound Multiframe Image Storage	Yes	No
MR Image Storage	Yes	No
Enhanced MR Image Storage	Yes	No

MR Spectroscopy Storage	Yes	No
Enhanced MR Color Image Storage	Yes	No
Legacy Converted Enhanced MR Image Storage	Yes	No
Ultrasound Image Storage	Yes	No
Enhanced US Volume Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Multiframe Single Bit Secondary Capture Image Storage	Yes	No
Multiframe Grayscale Byte Secondary Capture Image Storage	Yes	No
Multiframe Grayscale Word Secondary Capture Image Storage	Yes	No
Multiframe True Color Secondary Capture Image Storage	Yes	No
Twelve Lead ECG Waveform Storage	Yes	No
General ECG Waveform Storage	Yes	No
Ambulatory ECG Waveform Storage	Yes	No
Hemodynamic Waveform Storage	Yes	No
Cardiac Electrophysiology Waveform Storage	Yes	No
Basic Voice Audio Waveform Storage	Yes	No
General Audio Waveform Storage	Yes	No
Arterial Pulse Waveform Storage	Yes	No
Respiratory Waveform Storage	Yes	No
Grayscale Softcopy Presentation State Storage	Yes	No
Color Softcopy Presentation State Storage	Yes	No
Pseudocolor Softcopy Presentation Stage Storage	Yes	No
Blending Softcopy Presentation State Storage	Yes	No

XAXRF Grayscale Softcopy Presentation State Storage	Yes	No
Grayscale Planar MPR Volumetric Presentation State Storage	Yes	No
Compositing Planar MPR Volumetric Presentation State Storage	Yes	No
Advanced Blending Presentation State Storage	Yes	No
Volume Rendering Volumetric Presentation State Storage	Yes	No
Segmented Volume Rendering Volumetric Presentation State Storage	Yes	No
Multiple Volume Rendering Volumetric Presentation State Storage	Yes	No
XRay Angiographic Image Storage	Yes	No
Enhanced XA Image Storage	Yes	No
XRay Radiofluoroscopic Image Storage	Yes	No
Enhanced XRF Image Storage	Yes	No
XRay 3D Angiographic Image Storage	Yes	No
XRay 3D Craniofacial Image Storage	Yes	No
Breast Tomosynthesis Image Storage	Yes	No
Breast Projection XRay Image Presentation Storage	Yes	No
Breast Projection XRay Image Processing Storage	Yes	No
Intravascular Optical Coherence Tomography Image Presentation Storage	Yes	No
Intravascular Optical Coherence Tomography Image Processing Storage	Yes	No
Nuclear Medicine Image Storage	Yes	No
Parametric Map Storage	Yes	No
Raw Data Storage	Yes	No

Spatial Registration Storage	Yes	No
Spatial Fiducials Storage	Yes	No
Deformable Spatial Registration Storage	Yes	No
Segmentation Storage	Yes	No
Surface Segmentation Storage	Yes	No
Tractography Results Storage	Yes	No
Real World Value Mapping Storage	Yes	No
Surface Scan Mesh Storage	Yes	No
Surface Scan Point Cloud Storage	Yes	No
VL Endoscopic Image Storage	Yes	No
Video Endoscopic Image Storage	Yes	No
VL Microscopic Image Storage	Yes	No
Video Microscopic Image Storage	Yes	No
VL Slide Coordinates Microscopic Image Storage	Yes	No
VL Photographic Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Ophthalmic Photography 8Bit Image Storage	Yes	No
Ophthalmic Photography 16Bit Image Storage	Yes	No
Stereometric Relationship Storage	Yes	No
Ophthalmic Tomography Image Storage	Yes	No
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	Yes	No
Wide Field Ophthalmic Photography 3D Coordinates Image Storage	Yes	No
Ophthalmic Optical Coherence Tomography En Face Image Storage	Yes	No

Ophthalmic Optical Coherence Tomography B Scan Volume Analysis Storage	Yes	No
VL Whole Slide Microscopy Image Storage	Yes	No
Lensometry Measurements Storage	Yes	No
Autorefracton Measurements Storage	Yes	No
Keratometry Measurements Storage	Yes	No
Subjective Refraction Measurements Storage	Yes	No
Visual Acuity Measurements Storage	Yes	No
Spectacle Prescription Report Storage	Yes	No
Ophthalmic Axial Measurements Storage	Yes	No
Intraocular Lens Calculations Storage	Yes	No
Macular Grid Thickness And Volume Report	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements Storage	Yes	No
Ophthalmic Thickness Map Storage	Yes	No
Corneal Topography Map Storage	Yes	No
Basic Text SR Storage	Yes	No
Enhanced SR Storage	Yes	No
Comprehensive SR Storage	Yes	No
Comprehensive 3D SR Storage	Yes	No
Extensible SR Storage	Yes	No
Procedure SR Storage	Yes	No
Mammography CAD SR Storage	Yes	No
Key Object Selection Storage	Yes	No
Chest CAD SR Storage	Yes	No

XRay Radiation Dose SR Storage	Yes	No
Radiopharmaceutical Radiation Dose SR Storage	Yes	No
Colon CAD SR Storage	Yes	No
Implantation Plan SR Storage	Yes	No
Acquisition Context SR Storage	Yes	No
Simplified Adult Echo SR Storage	Yes	No
Patient Radiation Dose SR Storage	Yes	No
Planned Imaging Agent Administration SR Storage	Yes	No
Performed Imaging Agent Administration SR Storage	Yes	No
Content Assessment Results Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Encapsulated CDA Storage	Yes	No
Encapsulated STL Storage	Yes	No
Positron Emission Tomography Image Storage	Yes	No
Enhanced PET Image Storage	Yes	No
Legacy Converted Enhanced PET Image Storage	Yes	No
Basic Structured Display Storage	Yes	No
CT Performed Procedure Protocol Storage	Yes	No
RT Image Storage	Yes	No
RT Dose Storage	Yes	No
RT Structure Set Storage	Yes	No
RT Beams Treatment Record Storage	Yes	No
RT Plan Storage	Yes	No
RT Brachy Treatment Record Storage	Yes	No

RT Treatment Summary Record Storage	Yes	No
Query Retrieve		
Patient Root Query Retrieve Information Model Find	No	Yes
Patient Root Query Retrieve Information Model Move	No	Yes
Study Root Query Retrieve Information Model Find	No	Yes
Study Root Query Retrieve Information Model Move	No	Yes

Note

Relational Queries are not supported either as an SCU or SCP.

2 Table of Contents

1 Conformance Statement Overview	1
2 Table of Contents	8
3 Introduction	9
3.1 Revision History	9
4 Networking	9
4.1 AE Specifications	9
4.1.1 STORAGE-SCU Application Entity Specification	9
4.1.1.1 SOP Classes	9
4.1.1.2 Association Establishment Policies	16
4.1.1.2.1 General	16
4.1.1.2.2 Number of Associations	16
4.1.1.2.3 Asynchronous Nature	16
4.1.1.2.4 Implementation Identifying Information	16
4.1.1.2.4.1 SOP Specific Conformance for Verification SOP Class	17
4.1.1.2.4.2 SOP Specific Conformance for Image SOP Classes	17
4.1.2 QUERY-RETRIEVE-SCP Application Entity Specification	17
4.1.2.1 SOP Classes	17
4.1.2.1.1 General	17
4.1.2.1.2 Number of Associations	18
4.1.2.1.3 Asynchronous Nature	18
4.1.2.1.4 Implementation Identifying Information	18
4.1.2.1.4.1 SOP Specific Conformance for Query SOP Classes	19
4.1.2.1.4.2 SOP Specific Conformance for Retrieval SOP Classes	21
4.1.2.1.5 IPv4 and IPv6 Support	22
4.2 Configuration	22
4.2.1 AE Title/Presentation Address Mapping	22
4.2.1.1 Local AE Titles	22
4.2.1.2 Remote AE Title/Presentation Address Mapping	22
4.2.2 Parameters	22
5 Support of Extended Character Sets	23

3 Introduction

3.1 Revision History

Table 3.1-1. Revision History

Document Version	Date	Author	Description
1.0	March 6, 2020	Flywheel	Initial Version

4 Networking

4.1 AE Specifications

4.1.1 STORAGE-SCU Application Entity Specification

4.1.1.1 SOP Classes

The STORAGE-SCU AE provides Standard Conformance to the following DICOM SOP Classes:

Table 4.1-1. SOP Classes for STORAGE-SCU AE

SOP Classes	UID	User of Service (SCU)	Provider of Service (SCP)
Verification	1.2.840.10008.1.1	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital XRay Image Presentation Storage	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital XRay Image Processing Storage	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No

Digital Mammography XRay Image Presentation Storage	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography XRay Image Processing Storage	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Digital Intra Oral XRay Image Presentation Storage	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
Digital Intra Oral XRay Image Processing Storage	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	No
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	Yes	No
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	Yes	No
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multiframe Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	No
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multiframe Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	No

Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Twelve Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	No
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	No
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	Yes	No
Pseudocolor Softcopy Presentation Stage Storage	1.2.840.10008.5.1.4.1.1.11.3	Yes	No
BlendingSoftcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	Yes	No
XAXRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	Yes	No
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	Yes	No
Compositing Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.7	Yes	No
Advanced Blending Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.8	Yes	No
Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.9	Yes	No
Segmented Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.10	Yes	No

Multiple Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.11	Yes	No
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	No
XRay Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	No
XRay 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	No
XRay 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No
Breast Projection XRay Image Presentation Storage	1.2.840.10008.5.1.4.1.1.13.1.4	Yes	No
Breast Projection XRay Image Processing Storage	1.2.840.10008.5.1.4.1.1.13.1.5	Yes	No
Intravascular Optical Coherence Tomography Image Presentation Storage	1.2.840.10008.5.1.4.1.1.14.1	Yes	No
Intravascular Optical Coherence Tomography Image Processing Storage	1.2.840.10008.5.1.4.1.1.14.2	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Parametric Map Storage	1.2.840.10008.5.1.4.1.1.30	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Yes	No
Tractography Results Storage	1.2.840.10008.5.1.4.1.1.66.6	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	No

Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	No
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	No
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	No
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	No
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes
Ophthalmic Photography 8Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Photography 16Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Yes	No
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.5	Yes	No
Wide Field Ophthalmic Photography 3D Coordinates Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.6	Yes	No
Ophthalmic Optical Coherence Tomography En Face Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.7	Yes	No
Ophthalmic Optical Coherence Tomography B Scan Volume Analysis Storage	1.2.840.10008.5.1.4.1.1.77.1.5.8	Yes	No
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes	No
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Yes	No
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Yes	No
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	Yes	No

Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	Yes	No
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	Yes	No
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Macular Grid Thickness And Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	Yes	No
Ophthalmic Thickness Map Storage	1.2.840.10008.5.1.4.1.1.81.1	Yes	No
Corneal Topography Map Storage	1.2.840.10008.5.1.4.1.1.82.1	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Comprehensive 3D SR Storage	1.2.840.10008.5.1.4.1.1.88.34	Yes	No
Extensible SR Storage	1.2.840.10008.5.1.4.1.1.88.35	Yes	No
Procedure SR Storage	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Storage	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
XRay Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	Yes	No
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69	Yes	No
Implantation Plan SR Storage	1.2.840.10008.5.1.4.1.1.88.70	Yes	No
Acquisition Context SR Storage	1.2.840.10008.5.1.4.1.1.88.71	Yes	No
Simplified Adult Echo SR Storage	1.2.840.10008.5.1.4.1.1.88.72	Yes	No

Patient Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.73	Yes	No
Planned Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.74	Yes	No
Performed Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.75	Yes	No
Content Assessment Results Storage	1.2.840.10008.5.1.4.1.1.90.1	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	Yes	No
Encapsulated STL Storage	1.2.840.10008.5.1.4.1.1.104.3	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	Yes	No
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	Yes	No
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	Yes	No
CT Performed Procedure Protocol Storage	1.2.840.10008.5.1.4.1.1.200.2	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	No

4.1.1.2 Association Establishment Policies

4.1.1.2.1 General

The STORAGE-SCU AE can only form Associations when requested to do so by the QUERY-RETRIEVE-SCP AE. The STORAGE-SCU AE can only request the opening of an Association. It cannot accept requests to open Associations from external Application Entities.

The DICOM standard Application Context Name for DICOM is always proposed:

Table 4.1-2. DICOM Application Context for STORAGE-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.1.1.2.2 Number of Associations

The maximum number of simultaneous Associations is 100.

The STORAGE-SCU AE can initiate simultaneous Associations to a given external C-MOVE Destination AE up to 100. There is no separate limit on the maximum number permitted to the same C-MOVE Destination AE.

Table 4.1-3. Number of Associations as a SCU for STORAGE-SCU AE

Maximum number of simultaneous Associations	100 (Not Configurable)
---	------------------------

4.1.1.2.3 Asynchronous Nature

The STORAGE-SCU AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.1-4. Asynchronous Nature as a SCU for STORAGE-SCU AE

Maximum number of outstanding asynchronous transactions	100 (Not Configurable)
---	------------------------

4.1.1.2.4 Implementation Identifying Information

Table 4.1-5. DICOM Implementation Class and Version for STORAGE-SCU AE

Implementation Class UID	2.16.840.1.114570.1.1.1
Implementation Version Name	FWQR_11_1_0

Note that the STORAGE-SCU AE and QUERY-RETRIEVE-SCP AE use the same Implementation Class UID. All Flywheel DIMSE Service AEs use the same Implementation Version Name.

4.1.1.2.4.1 SOP Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCP. The Verification Service as an SCP is actually only supported as a diagnostic service tool for network communication issues.

4.1.1.2.4.2 SOP Specific Conformance for Image SOP Classes

Composite DICOM SOP Instances are maintained as DICOM Part 10 compliant files in the Flywheel DIMSE Service database. The entire set of tags received with the image will be saved in Flywheel DIMSE Service; this includes all Private and SOP Extended Elements. When a SOP Instance is selected for export from the Flywheel DIMSE Service, its content will be exported as it was originally received except for a few possible exceptions. Some of the Patient demographic and Study information Elements whose values can have been altered due to changes administered on the Flywheel DIMSE Service or changes to the state of the image data due to compression can be altered when the SOP Instance is exported.

Table 4.1-8. STORAGE-SCU AE Communication Failure Behavior

All errors or refusals are treated as a permanent failure. The STORAGE-SCU AE never automatically resends images when an error Status Code is returned in a C-STORE Response.

4.1.2 QUERY-RETRIEVE-SCP Application Entity Specification

4.1.2.1 SOP Classes

The QUERY-RETRIEVE-SCP AE provides Standard Conformance to the following DICOM SOP Classes:

Table 4.1-9. SOP Classes for QUERY-RETRIEVE-SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

4.1.2.1.1 General

The QUERY-RETRIEVE-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM AEs. The QUERY-RETRIEVE-SCP AE will accept Associations for Verification, C-FIND, and C-MOVE requests. In the case of a C-MOVE

request, the QUERY-RETRIEVE-SCP AE will issue a command to the STORAGE-SCU AE to initiate an Association with the Destination DICOM AE to send images as specified by the originator of the C-MOVE Request.

The DICOM standard Application Context Name for DICOM is always accepted:

Table 4.1-10. DICOM Application Context for QUERY-RETRIEVE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.1.2.1.2 Number of Associations

The QUERY-RETRIEVE-SCP AE can support multiple simultaneous Associations. The maximum is 100 in total.

Table 4.2-11. Number of Simultaneous Associations as a SCP for QUERY-RETRIEVE-SCP AE

Maximum number of simultaneous Associations	100 (Not Configurable)
---	------------------------

4.1.2.1.3 Asynchronous Nature

The QUERY-RETRIEVE-SCP AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.2-12. Asynchronous Nature as a SCP for QUERY-RETRIEVE-SCP AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)
---	----------------------

4.1.2.1.4 Implementation Identifying Information

The implementation information for the Application Entity is:

Table 4.2-13. DICOM Implementation Class and Version for QUERY-RETRIEVE-SCP AE

Implementation Class UID	2.16.840.1.114570.1.1.1
Implementation Version Name	FWQR_0_1_0-dev

Note that the STORAGE-SCU AE, and QUERY-RETRIEVE-SCP AE use the same Implementation Class UID. All Flywheel DIMSE Service AEs use the same Implementation Version Name.

4.1.2.1.4.1 SOP Specific Conformance for Query SOP Classes

The QUERY-RETRIEVE-SCP AE supports hierarchical queries and not relational queries. There are no attributes always returned by default. Only those attributes requested in the query identifier are returned. Query responses always return values from the Flywheel DIMSE Service database. Exported SOP Instances are always updated with the latest values in the database prior to export. Thus, a change in Patient demographic information will be contained in both the C-FIND Responses and any Composite SOP Instances exported to a C-MOVE Destination AE.

Patient Root Information Model

All required search keys on each of the four levels (Patient, Study, Series, and Image) are supported.

Study Root Information Model

All the required search keys on each of the three levels (Study, Series, and Image) are supported.

Table 4.1-14. Patient Root C-FIND SCP Supported Elements

Level Name Attribute Name	Tag	VR	Types of Matching
Patient Level			
Specific Character Set	0008,0005	CS	NONE
Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Patient Birth Date	0010,0030	DA	S,U
Study Level			
Study Date	0008,0020	DA	S,R,U
Study Time	0008,0030	TM	R,U
Accession Number	0008,0050	SH	S,*,U
Referring Physician Name	0008,0090	PN	S,*,U
Patient Sex	0010,0040	CS	S,U
Study Instance UID	0020,000D	UI	S,U,L
Study ID	0020,0010	SH	S,*,U
Number of Study Related Series	0020,1206	IS	NONE
Number of Study Related Instances	0020,12078	IS	NONE

Series Level			
Modality	0008,0060	CS	S,*,U
Series Description	0008,103E	LO	S,*,U
SeriesInstanceUID	0020,000E	UI	S,U,L
Series Number	0020,0011	IS	S,R,U
Number of Series Related Instances	0020,1209	IS	NONE
Performed Procedure Start Date	0040,0244	DA	S,R,U
Performed Procedure Start Time	0040,0245	TM	S,R,U
Scheduled Procedure Step ID	0040,0009	SH	S,*,U
Requested Procedure ID	0040,1001	SH	S,*,U
Instance Level			
SOP Instance UID	0008,0018	UI	S,U,L
Instance Number	0020,0013	IS	S,R,U

Table 4.1-15. Study Root C-FIND SCP Supported Elements

Level Name Attribute Name	Tag	VR	Types of Matching
Study Level			
Specific Character Set	0008,0005	CS	NONE
Study Date	0008,0020	DA	S,R,U
Study Time	0008,0030	TM	S,R,U
Accession Number	0008,0050	SH	S,*,U
Referring Physician Name	0008,0090	PN	S,*,U
Patient's Name	0008,0090	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Patient Birth Date	0010,0030	DA	S,R,U
Patient Sex	0010,0040	CS	S,*,U

Study Instance UID	0020,000D	UI	S,U,L
Study ID	0020,0010	SH	S,*,U
Number of Study Related Series	0020,1206	IS	NONE
Number of Study Related Instances	0020,12078	IS	NONE
Series Level			
Modality	0008,0060	CS	S,*,U
Series Description	0008,103E	LO	S,*,U
SeriesInstanceUID	0020,000E	UI	S,U,L
Series Number	0020,0011	IS	S,R,U
Number of Series Related Instances	0020,1209	IS	NONE
Performed Procedure Start Date	0040,0244	DA	S,R,U
Performed Procedure Start Time	0040,0245	TM	S,R,U
Scheduled Procedure Step ID	0040,0009	SH	S,*,U
Requested Procedure ID	0040,1001	SH	S,*,U
Instance Level			
SOP Instance UID	0008,0018	UI	S,U,L
Instance Number	0020,0013	IS	S,R,U

The tables should be read as follows:

Attribute Name: Attributes supported for returned C-FIND Responses.

Tag: Appropriate DICOM tag for this attribute.

VR: Appropriate DICOM VR for this attribute.

Types of Matching: The types of Matching supported by the C-FIND SCP. A "S" indicates the identifier attribute can specify Single Value Matching, a "R" will indicate Range Matching, a "*" will denote wild card matching, an 'U' will indicate universal matching, and 'L' will indicate that UID lists are supported for matching. "NONE" indicates that no matching is supported, but that values for this Element in the database can be returned.

4.1.2.1.4.2 SOP Specific Conformance for Retrieval SOP Classes

The QUERY-RETRIEVE-SCP AE will convey to the STORAGE-SCU AE that an Association with a DICOM Application Entity named by the external C-MOVE SCU (through a MOVE Destination AE Title) should be established. It will also convey to the STORAGE-SCU AE to perform C-STORE operations on specific images requested by the external C-MOVE SCU. One or more of the Image Storage Presentation Contexts listed in Table 4.2-6 will be negotiated.

The QUERY-RETRIEVE-SCP AE can support lists of UIDs in the C-MOVE Request at the Study, Series, and Image Levels. The list of UIDs must be at the Level of the C-MOVE Request.

If a failure occurs during export to the C-MOVE Destination AE by the STORAGE-SCU AE then the entire task is aborted. Thus any remaining matches are not exported.

4.1.2.1.5 IPv4 and IPv6 Support

This product supports IPv4.

4.2 Configuration

4.2.1 AE Title/Presentation Address Mapping

4.2.1.1 Local AE Titles

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

Table 4.2-1. Default Application Entity Characteristics

Application Entity	Role	Default AE Title	Default TCP/IP Port
STORAGE-SCU	SCU	FLYWHEEL	None
QUERY-RETRIEVE-SCP	SCP	None (distinct per Flywheel Project)	30400

The STORAGE-SCU and QUERY-RETRIEVE-SCP Application Entities can be configured to have the same AE Title.

4.2.1.2 Remote AE Title/Presentation Address Mapping

The mapping of external AE Titles to TCP/IP addresses and ports is configured and set within Flywheel by users with a Site Administrator role. This mapping is necessary for resolving the IP address and port of C-MOVE Destination Application Entities and must be correctly configured for the QUERY-RETRIEVE-SCP AE to correctly function as a C-MOVE SCP.

4.2.2 Parameters

Table 4.2-2. Configuration Parameters

Parameter	Configurable	Default Value
General Parameters		
Maximum PDU size I can receive	No	128kbytes
Maximum PDU size I can send	No	128kbytes

STORAGE-SCU AE Parameters		
Maximum number of simultaneous Associations.	No	100
QUERY-RETRIEVE-SCP AE Parameters		
Maximum PDU Size	No	16384
Maximum number of simultaneous Associations (Can be configured to be a maximum total number or a maximum per external SCU AE)	No	100

5 Support of Extended Character Sets

All Flywheel Project DICOM applications support the following:

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

As well as supporting this Extended Character Set for DICOM messaging, the Query-Server system database and user interface can support the expected display of this character set.