Digital Imaging and Communications in Medicine (DICOM)

Supplement 237: General 32-bit ECG

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Scope and Field of Application

This supplement defines a new ECG Waveform SOP Class (based on the existing General ECG SOP Class) with fewer constraints. The General ECG SOP class can store waveform with 16 bits per sample. This General 32-bit ECG SOP class permits 32 bits per sample as well.

In clinical neurophysiology it is common practice to acquire ECG as 32-bit data together with the routine scalp EEG or in case of a sleep study.

Changes to NEMA Standards Publications PS3.3 Digital Imaging and Communications in Medicine (DICOM) Part 3: Information Object Definitions

Add new IODs to Overview Table PS3.3 Table A.1-8:

Table A.1-8. Composite Information Object Modules Overview – Waveforms

IOD Modules	…	General ECG WF	…	General 32-bit ECG WF	…
Patient		M		**M**	
Clinical Trial Subject		U		**U**	
General Study		M		**M**	
Patient Study		U		**U**	
Clinical Trial Study		U		**U**	
General Series		M		**M**	
Clinical Trial Series		U		**U**	
Synchronization		U		**U**	
General Equipment		M		**M**	
Enhanced General Equipment				**M**	
Waveform Identification		M		**M**	
Waveform		M		**M**	
Waveform Annotation		C		**C**	
Acquisition Context		M		**M**	
SOP Common		M		**M**	

Extend A.34.4.1 General ECG IOD Description

A.34.4.1 General ECG IOD Description

The General ECG IOD is the specification of digitized electrical signals from the patient cardiac conduction system collected on the body surface, which has been acquired by an ECG modality or by an ECG acquisition function within an imaging modality **or by another recording device**.

Add the following new content to PS3.3 Section A.34.xx

A.34.xx General 32-bit ECG IOD

A.34.xx.1 General 32-bit ECG IOD Description

The General 32-bit ECG IOD is the specification of digitized electrical signals from the patient cardiac conduction system collected on the body surface, which has been acquired by an ECG modality or by an ECG acquisition function within an imaging modality or by another recording device.

Note This IOD differs from the General ECG IOD by allowing higher sampling frequencies and greater bit depth.

A.34.xx.2 General 32-bit ECG IOD Entity-Relationship Model

This IOD uses the E-R Model in Section A.1-2, with only the Waveform IE below the Series IE.

A.34.xx.3 General 32-bit ECG IOD Module Table

Table A.34.xx.1-1 specifies the Modules of the General 32-bit ECG IOD

Table A.34.xx.1-1- General 32-bit ECG IOD Modules

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	U
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Waveform	Waveform Identification	C.10.8	M
	Waveform	C.10.9	M
	Acquisition Context	C.7.6.14	M
	Waveform Annotation	C.10.10	C - Required if annotation is present.
	SOP Common	C.12.1	M

A.34.xx.4 General 32-bit ECG IOD Content Constraints

A.34.xx.4.1 Modality

The value of Modality (0008,0060) shall be ECG.

A.34.xx.4.2 Waveform Sequence

The number of Waveform Sequence (5400,0100) Items shall be between 1 and 4, inclusive.

A.34.xx.4.3 Number of Waveform Channels

The value of Number of Waveform Channels (003A,0005) in each Waveform Sequence (5400,0100) Item shall be between 1 and 24, inclusive.

A.34.xx.4.4 Sampling Frequency

The value of Sampling Frequency (003A,001A) in each Waveform Sequence (5400,0100) Item is not constrained.

Note Existing limits for sampling frequencies are expected to be described in the Conformance Statement for an application.

A.34.xx.4.5 Channel Source and Channel Source Modifiers

For Channel Source Sequence (003A,0208) in each Channel Definition Sequence (003A,0200) Item DCID 3001 “ECG Lead” shall be used.

NoteTerms from other Context Groups may also be used for extended specification of the Channel Source, as declared in the Conformance Statement for an application (see PS3.2).

A.34.xx.4.6 Waveform Sample Interpretation

The value of Waveform Sample Interpretation (5400,1006) in each Waveform Sequence (5400,0100) Item shall be SS or SL.

A.34.xx.4.7 Waveform Annotation Module

For Concept Name Code Sequence (0040,A043) in the Waveform Annotation Sequence (0040,B020) DCID 3335 “ECG Annotation” shall be used. This Context Group supports the annotation of suppressed pacemaker spikes in the ECG waveform.

Changes to NEMA Standards Publications PS3.4

Digital Imaging and Communications in Medicine (DICOM)
Part 4: Service Class Specifications

Add new SOP Class to PS 3.4 Annex B tables

B.5 Standard SOP classes

The SOP Classes in the Storage Service Class identify the Composite IODs to be stored. Table B.5-1 identifies Standard SOP Classes.

Table B.5-1. Standard SOP Classes

SOP Class Name	SOP Class UID	IOD Specification (defined in PS 3.3)	Specialization
…	…	…	
General 32-bit ECG Waveform Storage	**1.2.840.10008.5.1.4.1.1.9.1.x**	**General 32-bit ECG IOD**	
…			

Changes to NEMA Standards Publications PS3.6

Digital Imaging and Communications in Medicine (DICOM)
Part 6: Data Dictionary

Add new SOP Classes to PS3.6 Annex A Table A-1. UID Values

UID Value	UID Name	UID Keyword	UID Type	Part
…	…		…	...
1.2.840.10008.5.1.4.1.1.9.1.x	**General 32-bit ECG Waveform Storage**	**General32bitECGWaveformStorage**	**SOP Class**	**PS3.4**
…				

Changes to NEMA Standards Publications PS 3.17

Digital Imaging and Communications in Medicine (DICOM)
Part 17: Explanatory Information

Adapt SSSS.1.5.1 Mapping of Polysomnographic Data to DICOM

SSSS.1.5.1 Mapping of Polysomnographic Data to DICOM

Neurophysiology time series SOP Classes relevant to sleep studies are:

…

Non-neurophysiologic time series or video SOP Classes relevant to sleep studies, are:

General ECG Waveform Storage	The General ~~**Electrocardiogram (ECG)**~~ **Waveform** Storage SOP Class is used to store digitized electrical signals from the patient cardiac conduction system collected on the body surface, which ~~**has**~~ **have** been acquired by an ECG modality or by an ECG acquisition function within an imaging modality or a**nother** recording device.
General 32-bit ECG Waveform Storage	**The General 32-bit ECG Waveform Storage SOP Class is used to store digitized electrical signals from the patient cardiac conduction system collected on the body surface, which have been acquired by an ECG modality or by an ECG acquisition function within an imaging modality or another recording device.**