

Waveform Annotation SR

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**Digital Imaging and Communications in Medicine (DICOM)**

*Supplement 239: Waveform Annotation SR*

*Prepared by: Working Group 32 Neurophysiology Waveforms*

**DICOM Standards Committee, Working Group 6**

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28		
		<b>Table of Contents</b>
29	Document History .....	3
30	Scope and Field of Application .....	3
31	Changes to NEMA Standards Publications PS3.3 Digital Imaging and Communications in Medicine	
32	(DICOM) Part 3: Information Object Definitions .....	4
33	A.35.xx Waveform Annotation SR IOD .....	4
34	A.35.xx.1 Waveform Annotation SR IOD Description .....	4
35	A.35.xx.2 Waveform Annotation SR IOD Entity-Relationship Model .....	5
36	A.35.xx.3 Waveform Annotation SR IOD Module Table.....	5
37	A.35.xx.3.1 Waveform Annotation SR IOD Content Constraints .....	5
38	A.35.xx.3.1.1 Template.....	5
39	A.35.xx.3.1.4 Value Type.....	5
40	A.35.xx.3.1.5 Relationship Constraints.....	6
41	Changes to NEMA Standards Publications PS 3.4 Digital Imaging and Communications in Medicine	
42	(DICOM) Part 4: Service Class Specifications .....	7
43	Changes to NEMA Standards Publications PS 3.6 Digital Imaging and Communications in Medicine	
44	(DICOM) Part 6: Data Dictionary .....	7
45	Changes to NEMA Standards Publications PS3.15 Digital Imaging and Communications in Medicine	
46	(DICOM) Part 15: Security and System Management Profiles .....	9
47	Changes to NEMA Standards Publications PS3.16 Digital Imaging and Communications in Medicine	
48	(DICOM) Part 16: Content Mapping Resource.....	9
49	TID XXXX Waveform Annotations.....	9
50	Content Item Description .....	13
51	TID XXX2 Waveform Pattern or Event .....	13
52	Content Item Description .....	14
53	TID XXX3 Waveform Measurement .....	14
54	Content Item Description .....	15
55	TID XXX4 Annotation Note .....	15
56	Content Item Description .....	16
57	TID XXX5 Waveform Library .....	16
58	TID XXX6 Waveform Library Entry.....	17
59	TID XXX7 Waveform Library Entry Descriptors .....	17
60	TID XXX8 Waveform Library Entry Multiplex Group Descriptors .....	18
61	CID ccc2 Waveform Annotation Classification.....	19
62	CID ccc3 Waveform Annotations Document Title.....	19
63	CID ccc4 EEG Procedure .....	19
64	CID ccc5 Patient Consciousness.....	20
65	CID 3035 EEG Annotation – Neurophysiologic Enumeration.....	20
66	CID 3038 Pattern Event .....	21
67	CID 3039 Device-related and Environment-related Event.....	21
68	D DICOM Controlled Terminology Definitions .....	22
69		

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## Document History

2023/05/17	Version 0		Initial version, fragmentary
2023/06/12	Version 1		Prepared for WG-32, before First Read
2023/06/17	Version 2		After discussion with WG-32; prepared for First Read
2023/08/24	Version 3		Prepared for WG-06, before Public Comment <ul style="list-style-type: none"> <li>• Added Waveform Library</li> <li>• Added CID for SR Titles</li> <li>• Added CID for EEG Procedures</li> <li>• Added CID for Patient Consciousness</li> </ul>
2023/08/29	Version 4		Added PS3.6 and PS3.4 changes
2023/08/31	Version 5		Changes resulting from discussion with WG-06
2023/10/12	Version 6		Minor adaptations due to discussion in wg-32
2023/11/03	Version 7		Feedback from WG-32 / J.Halford incorporated, added example, update for some CIDs
2023/11/13	Version 8		Result of review with WG-06 in Nov.2023, prepared for PC
2023/11/20	Version 9		Worked in some results from discussion with WG-32, prepared for PC
2024/02/15	Version 10		Incorporated public comments
2024/03/18	Version 11		Letter Ballot
2024/05/17	Version 12		Changes due to Letter Ballot
2024/05/27	Version 13		Final Text

71

## Scope and Field of Application

72 This supplement introduces SOP Classes for storage and exchange of waveform annotations. It applies  
73 to all modalities in which waveform objects are created and applications used to review them.

74 Waveform annotations can be stored in the waveform object itself expressing physical or environmental  
75 circumstances noted by the recording device at recording time.

76 The new IOD can be used to store additional clinical information added at recording time or later provided  
77 either by a human reviewer (for example a neurologist or a technologist) or by an automated analysis  
78 software.

79 This supplement

- 80 • adds a SOP Class to store observations and measurements in a Waveform Annotation SR
- 81 • defines a new Root Template derived from TID 1500, a waveform analogy to TID 1600 Image
- 82 Library, and some included templates to store annotations as codes or free text and
- 83 measurements.
- 84 • Defines the Context Groups used in these Templates
- 85

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

89

90 *Add new IODs to Overview Table PS3.3 Table A.1-7b:*

91 **Table A.1-7b. Composite Information Object Modules Overview – More Structured Reports**

IODs Modules	RD SR	...	Perf IA Admin SR	Waveform Annotation SR
Patient	M		M	<u>M</u>
Clinical Trial Subject	U		U	<u>U</u>
General Study	M		M	<u>M</u>
Patient Study	U		U	<u>U</u>
Clinical Trial Study	U		U	<u>U</u>
Clinical Trial Series	U		U	<u>U</u>
SR Document Series	M		M	<u>M</u>
Key Object Document Series				
Sync.	C		M	<u>C</u>
General Equip.	M		M	<u>M</u>
Enhanced General Equip.	M		M	<u>M</u>
SR Document General	M		M	<u>M</u>
SR Document Content	M		M	<u>M</u>
Key Object Document				
Timezone				
SOP Common	M		M	<u>M</u>

92

93 *Add the following new content to PS3.3 Section A.35.xx ...*

94 **A.35.xx Waveform Annotation SR IOD**

95 **A.35.xx.1 Waveform Annotation SR IOD Description**

96 The Waveform Annotation SR Information Object Definition (IOD) conveys observations and  
 97 measurements detected in waveform data by either a human reviewer or analysis software. The content

## Waveform Annotation SR

98 may include both text and encoded information, numerical measurements, time coordinates or intervals,  
99 and references to waveform SOP instances and dedicated channels within them.

### 100 **A.35.xx.2 Waveform Annotation SR IOD Entity-Relationship Model**

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

### 102 **A.35.xx.3 Waveform Annotation SR IOD Module Table**

103 Table A.35.xx-1 specifies the Modules of the Waveform Annotation SR IOD.

104 **Table A.35.xx-1 Waveform Annotation SR 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	SR Document Series	C.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	C – shall be present if system time is synchronized to an external reference. May be present otherwise.
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
SR Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

105

### 106 **A.35.xx.3.1 Waveform Annotation SR IOD Content Constraints**

#### 107 **A.35.xx.3.1.1 Template**

108 The document shall be constructed from TID XXXX “Waveform Annotations” invoked at the root node.

#### 109 **A.35.xx.3.1.4 Value Type**

110 Value Type (0040,A040) in Content Sequence (0040,A730) of the SR Document Content Module is constrained to  
111 the following Enumerated Values (see Table C.17.3-7 for Value Type definitions):

112 Enumerated Values:

113 **TEXT**

114 **CODE**

115 **NUM**

116 **TCOORD**

117 **WAVEFORM**

118 **CONTAINER**

119 **DATE**

120 **TIME**

121 **UIDREF**

122 **PNAME**

123 **DATETIME**

124

125

126 **A.35.xx.3.1.5 Relationship Constraints**

127 The Waveform Annotation SR IOD allows for by-reference INFERRED FROM and by-reference  
 128 SELECTED FROM relationships. Other relationships in the content of this IOD shall be conveyed by-  
 129 value. Table A.35.xx-2 specifies the relationship constraints of this IOD. See Table C.17.3-8 for  
 130 Relationship Type definitions.

131

132

**Table A.35.xx-2. Relationship Content Constraints for Waveform Annotation SR IOD**

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, TCOORD, WAVEFORM, CONTAINER
CONTAINER, CODE, NUM, TEXT	HAS OBS CONTEXT	CODE, PNAME, TEXT, UIDREF, DATE, NUM, CONTAINER
CONTAINER, WAVEFORM <sup>1</sup>	HAS ACQ CONTEXT	CODE, DATE, TIME, DATETIME, NUM, UIDREF
CONTAINER, CODE, NUM, TEXT	HAS CONCEPT MOD	CODE <sup>2</sup> , TEXT
CODE, NUM, TEXT	HAS PROPERTIES	CODE, TEXT, NUM
CODE, NUM, TEXT	INFERRED FROM	WAVEFORM, TCOORD
TCOORD	SELECTED FROM	WAVEFORM

133

134 Note:

- 135 1. Which SOP Classes the WAVEFORM Value Type may refer to, is documented in the Conformance Statement  
 136 for an Application (See PS3.2 and PS3.4).
- 137 2. The HAS CONCEPT MODE relationship is used to modify the meaning of the Concept Name of a Source  
 138 Content Item, for example to provide a more descriptive explanation, a different language translation, or  
 139 to define a post-coordinated concept.

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**Changes to NEMA Standards Publications PS 3.4**  
**Digital Imaging and Communications in Medicine (DICOM)**  
**Part 4: Service Class Specifications**

144 *Add new Elements to PS3.4 B.5 Table B.5-1. Standard SOP Classes*

145

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)	Specialization
...			
<b><u>1.2.840.10008.1.XX</u></b>	<b><u>Waveform Annotation SR Storage</u></b>	<b><u>Waveform Annotation SR IOD</u></b>	<b><u>B.5.1.5</u></b>

146

147 *Amend B.5.1.5*

148 The requirements of Annex O apply to the following SOP Classes:

- 149 • Basic Text SR
  - 150 • ...
  - 151 • **Waveform Annotation SR**
- 152

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**Changes to NEMA Standards Publications PS 3.6**  
**Digital Imaging and Communications in Medicine (DICOM)**  
**Part 6: Data Dictionary**

157 *Add new SOP Classes to PS3.6 Annex A Table A-1:*

158

UID Value	UID Name	UID Keyword	UID Type	Part
...				
<b><u>1.2.840.10008.1.XX</u></b>	<b><u>Waveform Annotation SR Storage</u></b>	<b><u>WaveformAnnotationSRStorage</u></b>	<b><u>SOP Class</u></b>	<b><u>PS3.4</u></b>
...				

159

160 *Add new Context Group UID Values to Table A-3:*

161

Waveform Annotation SR

<b>Context UID</b>	<b>Context Identifier</b>	<b>Context Group Name</b>	<b>Comment</b>
...	...	...	
<u>1.2.840.10008.6.1.ccc2</u>	<u>CID ccc2</u>	<u>Waveform Annotation Classification</u>	
<u>1.2.840.10008.6.1.ccc3</u>	<u>CID ccc3</u>	<u>Waveform Annotations Document Title</u>	
<u>1.2.840.10008.6.1.ccc4</u>	<u>CID ccc4</u>	<u>EEG Procedure</u>	
<u>1.2.840.10008.6.1.ccc5</u>	<u>CID ccc5</u>	<u>Patient Consciousness</u>	
...			

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**Changes to NEMA Standards Publications PS3.15**  
**Digital Imaging and Communications in Medicine (DICOM)**  
**Part 15: Security and System Management Profiles**

168 *Add new Codes to PS3.15 Annex E:*

169

170 **Table E.3.4-1. Application Level Confidentiality Profile Clean Structured Content Option Content**  
171 **Item Concept Name Codes**

Code Meaning	Code Value	Coding Scheme Designator	Value Type	Retd. (from PS3.16 )	In Std. Tmpl. (from PS3.16 )	Basic Prof.	Rtn. UIDs Opt.	Rtn. Dev. Id. Opt.	Rtn. Inst. Id. Opt.	Rtn. Pat. Chars. Opt.	Rtn. Long. Full Dates Opt.	Rtn. Long. Modif. Dates Opt.	Clean Desc. Opt.
...													
<u>Acquisition DateTime</u>	<u>xxx</u> f	<u>DCM</u>	<u>DATETIME</u>	<u>N</u>	<u>Y</u>	<u>X</u>					<u>K</u>	<u>C</u>	
<u>Synchronization Frame of Reference UID</u>	<u>xxx</u> g	<u>DCM</u>	<u>UIDREF</u>	<u>N</u>	<u>Y</u>	<u>X</u>	<u>K</u>						
...													

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**Changes to NEMA Standards Publications PS3.16**  
**Digital Imaging and Communications in Medicine (DICOM)**  
**Part 16: Content Mapping Resource**

177 *Amend Annex A by adding a new Section and the following Templates*

178 **TID XXXX Waveform Annotations**

179 This Root Template encodes a list of annotations for waveform data consisting of measurements or  
180 observations added at recording time or later provided either by a human reviewer (a cardiologist, a  
181 neurologist, or a technologist) or by an automated analysis algorithm.

182

183 **Type:** Extensible  
184 **Order:** Non-Significant

185 **Root: Yes**  
 186  
 187

**Table TID XXXX. Waveform Annotations**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	BCID ccc3 "Waveform Annotations Document Title"	1	M		Root node
2	>	HAS CONCEPT MOD	INCLUDE	DTID 1204 "Language of Content Item and Descendants"	1	U		
3	>	HAS OBS CONTEXT	INCLUDE	DTID 1001 "Observation Context"	1	M		
4	>	HAS CONCEPT MOD	CODE	EV (xxx2, DCM, "Procedure annotated")	1-n	U		BCID 3670 "ECG Procedure Type"  BCID ccc4 "EEG Procedure"
5	>	HAS OBS CONTEXT	CODE	EV (1185780006, SCT, "Relative Time")	1	U		DCID 61 "Time Relative to Procedure"
6	>	CONTAINS	INCLUDE	DTID XXX5 "Waveform Library"	1	U		
7	>	CONTAINS	CONTAINER	EV (xxx1, DCM, "Waveform Annotations")	1	M		
8	>>	HAS CONCEPT MOD	INCLUDE	DTID 4019 "Algorithm Identification"	1	U		
9	>>	CONTAINS	CONTAINER	EV (xxx3, DCM, "Waveform Annotation Group")	1-n	M		
10	>>>	HAS OBS CONTEXT	NUM	EV (xxx4, DCM, "Waveform Annotation Group Number")	1	M		UNITS = (1, UCUM, "no units")
11	>>>	HAS OBS	TEXT	EV (xxx5, DCM, "Waveform	1	U		

Waveform Annotation SR

		CONTEXT		Annotation Group Label")				
12	>>>	CONTAINS	INCLUDE	DTID XXX2 "Waveform Pattern or Event"	1-n	U		\$Annotation Classification = EV (ccc2- 1, DCM, "Pattern Event")  \$Annotation Code = BCID 3038 "Pattern Event"
13	>>>	CONTAINS	INCLUDE	DTID XXX2 "Waveform Pattern or Event"	1-n	U		\$Annotation Classification = EV (ccc2- 2, DCM, "EEG Annotation")  \$Annotation Code = BCID 3035 "EEG Annotation – Neurophysiol ogic Enumeration"
14	>>>	CONTAINS	INCLUDE	DTID XXX2 "Waveform Pattern or Event"	1-n	U		\$Annotation Classification = EV (ccc2- 3, DCM, "EMG Annotation")  \$Annotation Code = BCID 3036 "EMG Annotation – Neurophysiol ogic Enumeration"
15	>>>	CONTAINS	INCLUDE	DTID XXX2 "Waveform Pattern or Event"	1-n	U		\$Annotation Classification = EV (ccc2- 4, DCM, "EOG Annotation")  \$Annotation Code = BCID 3037 "EOG Annotation –

Waveform Annotation SR

								Neurophysiological Enumeration”
16	>>>	CONTAINS	INCLUDE	DTID XXX2 “Waveform Pattern or Event”	1-n	U		\$Annotation Classification = EV (ccc2-5, DCM, “Device-related and Environment-related Event”)  \$Annotation Code = BCID 3039 “Device-related and Environment-related Event”
17	>>>	CONTAINS	INCLUDE	DTID XXX2 “Waveform Pattern or Event”	1-n	U		\$Annotation Classification = EV (ccc2-6, DCM, “Patient Consciousness”)  \$Annotation Code = BCID ccc5 “Patient Consciousness”
18	>>>	CONTAINS	INCLUDE	DTID XXX2 “Waveform Pattern or Event”	1-n	U		\$Annotation Classification = EV (ccc2-7, DCM, “ECG Annotation”)  \$Annotation Code = BCID 3335 “ECG Annotation”
19	>>>	CONTAINS	INCLUDE	DTID XXX3 “Waveform Measurement”	1-n	U		\$Measurement = BCID 3040 “EEG Annotation – Neurological Monitoring Measurement”

								t
20	>>>	CONTAINS	INCLUDE	DTID XXX4 "Annotation Note"	1-n	U		

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189 **Content Item Description**

Row 4	A coded descriptor of the sort of procedure the annotations apply to.
Row 5	Indicates the point in time when the annotations have been made relative to the waveform recording procedure.
Row 6	The Waveform Library provides potentially relevant characteristics of the waveform objects associated with the annotations. There is no requirement to include all, or any, of the waveform objects referenced in the annotations and measurements elsewhere in this template. The template may also include waveform objects that are associated with, but not directly referenced in, the annotations and measurements.  The Waveform Library is not replicating the content of the SOP Instance Reference Macro.
Row 10	Defines an identifier for a group of annotations analogously to Annotation Group Number (0040,A180) see C.10.10.1.4, which may be used for example for display purposes.  The number itself is not semantically significant, no ordering is required.
Row 11	A descriptive label for a group of annotations, e.g. to be used for display purpose.

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192 **TID XXX2 Waveform Pattern or Event**

193 This Template encodes a Waveform Annotation represented by a coded concept.

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**Table TID XXX2. Parameters**

Parameter Name	Parameter Usage
\$AnnotationClassification	A coded term or Context Group for Concept Name of annotation type that determines the value set constraint.
\$AnnotationCode	A code or a context group with codes representing the observation.

196

197 **Type:** Non-Extensible

198 **Order:** Significant

199 **Root:** No

200

201

**Table TID XXX2. Waveform Pattern or Event**

	N L	Rel with Parent	VT	Concept Name	V M	Req Type	Condition	Value Set Constraint
1			CODE	\$AnnotationClassification	1	M		\$AnnotationCode

Waveform Annotation SR

2	>	HAS PROPERTIE S	CODE	EV (xxx6, DCM, "Waveform Annotation Modifier"	1- n	U		
3	>	HAS OBS CONTEXT	INCLUD E	DTID 1001 "Observation Context"	1	U		
4	>	HAS CONCEPT MOD	INCLUD E	DTID 4019 "Algorithm Identification"	1	U		
5	>		INCLUD E	DTID 321 "Waveform or Temporal Coordinates"	1- n	M		\$Purpose = EV (260753009, SCT, "Source")
6	>	HAS PROPERTIE S	TEXT	EV (125309, DCM, "Short Label"	1	U		

202

203 **Content Item Description**

Row 2	Contains additional qualifiers, if the value in Row 1 does not fully define the annotation. For example, this might be information about the location of an observation or the frequentness of a pattern.
Row 6	This may be used to label the coded annotation when space is limited on the screen or report page.  Note Short Labels are not standardized and may omit details of the annotation; thus, it is not recommended to use them for purposes such as matching.

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206 **TID XXX3 Waveform Measurement**

207 This Template encodes a Waveform Annotation expressing a measurement.

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**Table TID XXX3. Parameters**

Parameter Name	Parameter Usage
\$Measurement	Coded term or Context Group for Concept Name of measurement.

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211

212 **Type: Non-Extensible**

213 **Order: Significant**

214 **Root: No**

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**Table TID XXX3. Waveform Measurement**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	\$Measurement	1	M		
2	>	HAS PROPERTIES	CODE	EV (xxx6, DCM, "Waveform Annotation Modifier"	1-n	U		

Waveform Annotation SR

3	>	HAS OBS CONTEXT	INCLUDE	DTID 1001 "Observation Context"	1	U		
4	>	HAS CONCEPT MOD	INCLUDE	DTID 4019 "Algorithm Identification"	1	U		
5	>		INCLUDE	DTID 321 "Waveform or Temporal Coordinates"	1-n	M		\$Purpose = EV (121112, DCM, "Source of Measurement")
6	>	HAS PROPERTIES	TEXT	EV (125309, DCM, "Short Label"	1	U		

217

218 **Content Item Description**

Row 6	<p>This may be used to label the measurement value when space is limited on the screen or report page.</p> <p>Note Short Labels are not standardized and may omit details of the measurement; thus, it is not recommended to use them for purposes such as matching.</p>
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220 **TID XXX4 Annotation Note**

221 This Template defines a Waveform Annotation in the form of a text note.

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223 **Type:**       **Non-Extensible**

224 **Order:**       **Significant**

225 **Root:**        **No**

226

227

**Table TID XXX4. Annotation Note**

	N L	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			TEXT	EV (xxx7, DCM, "Annotation Note"	1	M		
2	>	HAS OBS CONTEXT	INCLUDE	DTID 1001 "Observation Context"	1	U		
3	>	HAS CONCEPT MOD	INCLUDE	DTID 4019 "Algorithm Identification"	1	U		
4	>		INCLUDE	DTID 321 "Waveform or Temporal Coordinates"	1-n	M		\$Purpose = EV (260753009, SCT, "Source")

5	>	HAS PROPERTIES	TEXT	EV (125309, DCM, "Short Label")	1	U		
---	---	----------------	------	---------------------------------	---	---	--	--

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**Content Item Description**

Row 5	This may be used to label the text value when space is limited on the screen or report page.  Note Short Labels are not standardized and may omit details of the Annotation Note text; thus, it is not recommended to use them for purposes such as matching.
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**TID XXX5 Waveform Library**

The Waveform Library contains references to waveform objects and selected attributes describing them that facilitate analysis without having to retrieve the entire set of referenced objects.

**Type:** Extensible  
**Order:** Non-Significant  
**Root:** No

**Table TID XXX5. Waveform Library**

	N L	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (xxx8, DCM, "Waveform Library")	1	M		
2	>	CONTAINS	CONTAINER	EV (xxx9, DCM, "Waveform Library Group")	1-n	U		
3	>>	HAS ACQ CONTEXT	INCLUDE	DTID XXX7 "Waveform Library Entry Descriptors"	1	U		
4	>>	CONTAINS	INCLUDE	DTID XXX6 "Waveform Library Entry"	1-n	U		

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Row 3	These Waveform Library Entry Descriptors apply to all Waveform Library Entries in this Waveform Library Group.
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**TID XXX6 Waveform Library Entry**

Each instance of the Waveform Library Entry Template contains the SOP Class and Instance UIDs, and selected attributes for a waveform that facilitate analysis without having to retrieve the entire set of referenced waveforms.

**Type:** Extensible  
**Order:** Non-Significant  
**Root:** No



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**Table TID XXX6. Waveform Library Entry**

	N L	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			WAVEFORM		1	M		
2	>	HAS ACQ CONTEXT	INCLUDE	DTID XXX7 "Waveform Library Entry Descriptors"	1	U		

255

Row 2	These Waveform Library Entry Descriptors apply to the WAVEFORM in Row 1 and override descriptors in Row 3 of Section TID XXX5 in case of conflict.
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**TID XXX7 Waveform Library Entry Descriptors**

This Template contains selected attributes for a waveform or a group of waveforms. The descriptive information may be copied from the waveforms or derived.

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**Type:** Extensible  
**Order:** Non-Significant  
**Root:** No

**Table TID XXX7. Waveform Library Entry Descriptors**

	NL	Rel with Parent	VT	Concept Name	V M	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	CODE	EV (121139, DCM, "Modality")	1	U		DCID 29 „Acquisition Modality“
2		HAS ACQ CONTEXT	DATE	EV (111060, DCM, "Study Date")	1	U		
3		HAS ACQ CONTEXT	TIME	EV (111061, DCM, "Study Time")	1	U		
4		HAS ACQ CONTEXT	DATE	EV (111018, DCM, "Content Date")	1	U		
5		HAS ACQ CONTEXT	TIME	EV (111019, DCM, "Content Time")	1	U		
6		HAS ACQ CONTEXT	DATETIM E	EV (xxx f, DCM, "Acquisition DateTime")	1	U		
7		HAS ACQ CONTEXT	UIDREF	EV (xxx g, DCM, "Synchronization Frame of	1	U		

				Reference UID")				
8		CONTAINS	INCLUDE	DTID XXX8 "Waveform Library Entry Multiplex Group Descriptors"	1-n	U		

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**TID XXX8 Waveform Library Entry Multiplex Group Descriptors**

This Template contains selected attributes for a waveform multiplex group within a waveform object or a group of waveform objects. The descriptive information may be copied from the waveform objects or derived.

**Type:** Extensible  
**Order:** Non-Significant  
**Root:** No

**Table TID XXX8. Waveform Library Entry Multiplex Group Descriptors**

	N L	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (xxxa, DCM, "Waveform Library Entry Multiplex Group Descriptors")	1-n			
2	>	HAS ACQ CONTEXT	NUM	EV (xxxb, DCM, "Multiplex Group Number")	1	U		UNITS = (1, UCUM, "no units")
3	>	HAS ACQ CONTEXT	UIDREF	EV (xxxc, DCM, "Multiplex Group UID")	1	U		
4	>	HAS ACQ CONTEXT	NUM	EV (xxxd, DCM, "Sampling Frequency")	1	U		UNITS = (Hz, UCUM, "Hz")
5	>	HAS ACQ CONTEXT	NUM	EV (xxxe, DCM, "Number of Channels")	1	U		UNITS = EV ({channels}, UCUM, "channels")

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<i>Add new context groups to annex C</i>
--

**CID ccc2 Waveform Annotation Classification**

This Context Group lists codes to classify Waveform Annotations.

286

287 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML  
 288 **Keyword:** WaveformAnnotationClassification  
 289 **FHIR Keyword:** dicom-cid-ccc2-WaveformAnntotationClassification  
 290 **Type:** Extensible  
 291 **Version:** yyyyymmdd  
 292 **UID:** 1.2.840.10008.6.1.ccc2  
 293

294 **Table CID ccc2 Waveform Annotation Classification**

Coding Scheme Designator	Code Value	Code Meaning
DCM	ccc2-1	Pattern Event
DCM	ccc2-2	EEG Annotation
DCM	ccc2-3	EMG Annotation
DCM	ccc2-4	EOG Annotation
DCM	ccc2-5	Device-related and Environment-related Event
DCM	ccc2-6	Patient Consciousness

295

296 **CID ccc3 Waveform Annotations Document Title**

297 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML  
 298 **Keyword:** WaveformAnnotationsDocumentTitle  
 299 **FHIR Keyword:** dicom-cid-ccc3-WaveformAnnotationsDocumentTitle  
 300 **Type:** Extensible  
 301 **Version:** yyyyymmdd  
 302 **UID:** 1.2.840.10008.6.1.ccc3  
 303

304 **Table CID ccc3 Waveform Annotations Document Title**

Coding Scheme Designator	Code Value	Code Meaning
DCM	ccc3-1	Neurophysiology Recording Annotations
DCM	ccc3-2	Neurophysiology Post-hoc Review Annotations
DCM	ccc3-3	Neurophysiology Automated Analysis Annotations

305

306 **CID ccc4 EEG Procedure**

307 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML  
 308 **Keyword:** EEGProcedure  
 309 **FHIR Keyword:** dicom-cid-ccc4-EEGProcedure  
 310 **Type:** Extensible  
 311 **Version:** yyyyymmdd  
 312 **UID:** 1.2.840.10008.6.1.ccc4  
 313

314 **Table CID ccc4 EEG Procedure**

Coding Scheme Designator	Code Value	Code Meaning
--------------------------	------------	--------------

SCT	54550000	EEG
SCT	252735006	Ambulatory EEG
SCT	252721009	Scalp EEG
SCT	18648009	Sleep EEG
SCT	252738008	Video EEG

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**CID ccc5 Patient Consciousness**

318 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML

319 **Keyword:** PatientConsciousness

320 **FHIR Keyword:** dicom-cid-ccc5-PatientConsciousness

321 **Type:** Extensible

322 **Version:** yyyyymmdd

323 **UID:** 1.2.840.10008.6.1.ccc5

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**Table CID ccc5 Patient Consciousness**

Coding Scheme Designator	Code Value	Code Meaning
SCT	248220008	Asleep
SCT	248218005	Awake
SCT	271782001	Drowsy

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*Amend existing context groups, correct inconsistent naming of Context Group 3038*

329 **CID 3035 EEG Annotation – Neurophysiologic Enumeration**

330 This Context Group comprises codes for Neurophysiologic Enumerations related to  
331 electroencephalography. MDC codes come from the corresponding table of ISO/IEEE 11073-10101.  
332 MDC terms included in the table below may not constitute the complete list; see the ISO/IEEE Standard.

333 Note

334 Codes reprinted by permission of IEEE, Copyright 2004 by IEEE. ISO/IEEE 11073-10102 available through  
335 <http://standards.ieee.org/>.

336

337 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML

338 **Keyword:** EEGAnnotationNeurophysiologicEnumeration

339 **FHIR Keyword:** dicom-cid-3035-EEGAnnotationNeurophysiologicEnumeration

340 **Type:** Extensible

341 **Version:** 20200623

342 **UID:** 1.2.840.10008.6.1.1333

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**Table CID 3035. EEG Annotation – Neurophysiologic Enumeration**

Coding Scheme Designator	Code Value	Code Meaning	ISO/IEE 11073 MDC Equivalent Reference ID (Informative)
...			
<u>DCM</u>	<u>cid3035-c1</u>	<u>Line noise artifact</u>	
...			

345

346 **CID 3038 Pattern Event**

347 ...

348 **Table CID 3038. Pattern Events**

Coding Scheme Designator	Code Value	Code Meaning	ISO/IEE 11073 MDC Equivalent Reference ID (Informative)
...			

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351 **CID 3039 Device-related and Environment-related Event**

352 This Context Group comprises the nomenclature and codes for device-related and environment-related  
 353 events of ISO/IEEE 11073-10101. The terms included in the table below may not constitute the complete  
 354 list; see the ISO/IEEE Standard.

355 Note

356 Codes reprinted by permission of IEEE, Copyright 2004 by IEEE. ISO/IEEE 11073-10102 available through  
 357 <http://standards.ieee.org/>.

358

359 **Resources:** [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)  
 360 **Keyword:** [DeviceRelatedAndEnvironmentRelatedEvent](#)  
 361 **FHIR Keyword:** [dicom-cid-3039-DeviceRelatedAndEnvironmentRelatedEvent](#)  
 362 **Type:** [Extensible](#)  
 363 **Version:** [20200623](#)  
 364 **UID:** [1.2.840.10008.6.1.1337](#)

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**Table CID 3039. Device-related and Environment-related Event**

Coding Scheme Designator	Code Value	Code Meaning	ISO/IEE 11073 MDC Equivalent Reference ID (Informative)
...			
<u>DCM</u>	<u>cid3039-c1</u>	<u>Video recording on</u>	
<u>DCM</u>	<u>cid3039-c2</u>	<u>Video recording off</u>	
<u>DCM</u>	<u>cid3039-c3</u>	<u>Preamplifier connected</u>	
<u>DCM</u>	<u>cid3039-c4</u>	<u>Preamplifier disconnected</u>	
<u>DCM</u>	<u>cid3039-c5</u>	<u>Breakout box connected</u>	
<u>DCM</u>	<u>cid3039-c6</u>	<u>Breakout box disconnected</u>	
<u>DCM</u>	<u>cid3039-c7</u>	<u>Event button pressed</u>	
<u>DCM</u>	<u>cid3039-c8</u>	<u>Event button test</u>	
<u>DCM</u>	<u>cid3039-c9</u>	<u>Tap test begin</u>	
<u>DCM</u>	<u>cid3039-c10</u>	<u>Tap test end</u>	
...			

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372 *Amend Annex D Table D-1. with new Enumerated Values*

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## D DICOM Controlled Terminology Definitions

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Table D-1. DICOM Controlled Terminology Definitions (...)

Code Value	Code Meaning	Definition	Notes
...			
ccc2-1	Pattern Event	<u>Classification of a Waveform annotation as a pattern.</u>	
ccc2-2	EEG Annotation	<u>Classification of a Waveform annotation as belonging to EEG.</u>	
ccc2-3	EMG Annotation	<u>Classification of a Waveform annotation as belonging to ECG.</u>	
ccc2-4	EOG Annotation	<u>Classification of a Waveform annotation as belonging to EOG.</u>	
ccc2-5	Device-related and Environment-related Event	<u>Classification of a Waveform annotation as an event, which occurred in the recording device or in the environment (e.g. the room).</u>	
ccc2-6	Patient Consciousness	<u>Classification of a Waveform annotation as a description of the patient's consciousness.</u>	
ccc2-7	ECG Annotation	<u>Classification of a Waveform annotation as belonging to ECG.</u>	
<u>ccc3-1</u>	<u>Neurophysiology Recording Annotations</u>	<u>A Waveform annotation report comprising neurophysiology annotations added during recording.</u>	
<u>ccc3-2</u>	<u>Neurophysiology Post-hoc Review Annotations</u>	<u>A Waveform annotation report containing neurophysiology annotations resulting from post-hoc review.</u>	
<u>ccc3-3</u>	<u>Neurophysiology Automated Analysis Annotations</u>	<u>A Waveform annotation report containing neurophysiology annotations resulting from automated analysis.</u>	
<u>xxx1</u>	<u>Waveform Annotations</u>	<u>A container that groups waveform annotations.</u>	
<u>xxx2</u>	<u>Procedure annotated</u>	<u>The neurophysiology or cardiology procedure to which annotations apply.</u>	

## Waveform Annotation SR

<u>xxx3</u>	<u>Waveform Annotation Group</u>	<u>A container that groups a set of associated waveform annotations.</u>	
<u>xxx4</u>	<u>Waveform Annotation Group Number</u>	<u>A number identifying a set of associated annotations.</u>	
<u>xxx5</u>	<u>Waveform Annotation Group Label</u>	<u>A text describing a set of associated annotations.</u>	
<u>xxx6</u>	<u>Waveform Annotation Modifier</u>	<u>Coded modifier for a coded waveform annotation.</u>	
<u>xxx7</u>	<u>Annotation Note</u>	<u>A free text information.</u>	
<u>xxx8</u>	<u>Waveform Library</u>	<u>A container that references properties of involved waveforms</u>	
<u>xxx9</u>	<u>Waveform Library Group</u>	<u>A container that groups common information about a set of involved waveforms</u>	
<u>xxxa</u>	<u>Waveform Library Entry Multiplex Group Descriptors</u>	<u>A container that groups common information about a waveform multiplex group comprising a set of recording channel</u>	
<u>xxxb</u>	<u>Multiplex Group Number</u>	<u>Identifying number of a waveform multiplex group</u>	
<u>xxxc</u>	<u>Multiplex Group UID</u>	<u>Unique identifier of a waveform multiplex group</u>	
<u>xxxd</u>	<u>Sampling Frequency</u>	<u>Frequency of waveform digitalization</u>	
<u>xxxe</u>	<u>Number of Channels</u>	<u>Number of channels in a waveform multiplex group</u>	
<u>xxxf</u>	<u>Acquisition DateTime</u>	<u>Date and Time of an Acquisition</u>	
<u>xxxg</u>	<u>Synchronization Frame of Reference UID</u>	<u>UID of common synchronization environment.</u>	
<u>...</u>			
<u>cid3035-c1</u>	<u>Line noise artifact</u>	<u>50 Hz or 60 Hz line noise artifact from a power supply</u>	
<u>cid3039-c1</u>	<u>Video recording on</u>	<u>Video recording turned on automatically or by the operator</u>	
<u>cid3039-c2</u>	<u>Video recording off</u>	<u>Video recording turned off automatically or by the operator</u>	
<u>cid3039-c3</u>	<u>Preamplifier connected</u>	<u>Machine code for when the preamplifier (the headbox in case of EEG recordings) is connected to the recording device.</u>	
<u>cid3039-c4</u>	<u>Preamplifier disconnected</u>	<u>Machine code for when preamplifier (the headbox in case of EEG recordings) is disconnected.</u>	

<p><u>cid3039-c5</u></p>	<p><u>Breakout box connected</u></p>	<p><u>A breakout box was connected or reconnected.</u></p>	<p><u>A breakout box is a box into which electrode cables are plugged, but the analog electrical signal of those cables is passed from the breakout box to the preamplifier (the headbox in case of EEG recordings) through another cable, so there is no preamp or A/D conversion in the box.</u></p>
<p><u>cid3039-c6</u></p>	<p><u>Breakout box disconnected</u></p>	<p><u>A breakout box was disconnected.</u></p>	<p><u>A breakout box is a box into which electrode cables are plugged, but the analog electrical signal of those cables is passed from the breakout box to the preamplifier (the headbox in case of EEG recordings) through another cable, so there is no preamp or A/D conversion in the box.</u></p>
<p><u>cid3039-c7</u></p>	<p><u>Event button pressed</u></p>	<p><u>The event button was pressed for the purpose of capturing an event.</u></p>	<p><u>The event button is a button that a medical staff member, patient, or family/friend of patient can press when the patient (who is getting the recording) has an event (such as an abnormal movement or seizure).</u></p>



<u>cid3039-c8</u>	<u>Event button test</u>	<u>The event button was pressed for the purpose of testing.</u>	<u>Testing the event button usually occurs at the beginning of a neurophysiology recording to make sure the mechanism is working.</u>
<u>cid3039-c9</u>	<u>Tap test begin</u>	<u>A tap test has started.</u>	<u>A tap test is when the operator taps each electrode in sequence to verify that each electrode is plugged into the correct channel of the preamplifier (the headbox in case of EEG recordings).</u>
<u>cid3039-c10</u>	<u>Tap test end</u>	<u>A tap test has finished.</u>	<u>A tap test is when the operator taps each electrode in sequence to verify that each electrode is plugged into the correct channel of the preamplifier (the headbox in case of EEG recordings).</u>