

MINUTES

MEETING NAME WG-32

MEETING PLACE/DIAL IN Via Zoom

DATE & TIME Thursday 21 November 2024
 10:00– 11:00 AM Eastern Daylight Time (EDT)

PRESIDING OFFICERS Jonathan J. Halford,
 Ralph H. Johnson VA Medical Center (Charleston, SC)
 User Co-Chair
 Andrew Ehrenberg, Nihon Kohden Corporation,
 Vendor Co-Chair

IFCN SECRETARIAT Kim Zaiss

DICOM SECRETARIAT Shayna Knazik

Present	First Name	Last Name	Organization	Voting Status
	Emmanuel	Cordonnier	b<>com	Voting
	Kevin	O'Donnell	Canon Medical Research USA, Inc.	Voting
	Felix	Rosenow M.D.	DGKN (German Society of Clinical Neurophysiology and Functional Imaging)	Voting
	Jan	Remi	Ludwig-Maximilians-University of Munich	Voting
X	Ben	Brinkmann	Mayo Clinic	Voting
x	Jonathan	Halford	Medical University of South Carolina	Voting
x	Andrew	Ehrenberg	Nihon Kohden Corporation	Voting
	Alan	Huang	Philips	Voting
	Wim	Corbijn van Willenswaard	Philips	Alt. Voting
	Justin	Dauwels	TU Delft	Voting
	Jeroen	Medema	Philips	Alt. Voting
x	Raymond	Kraskinski	Philips	Observer
	David	Clunie	PixelMed Publishing	Voting
x	Silvia	Winkler	Sigma Software Solutions	Voting
	Ana	Alves	CortexXus Inc.	Observer
x	Giuseppe	Campobello	University of Messina	Observer
	David	Alves	CortexXus Inc.	Observer
	Babak	Razavi	CortexXus Inc.	Observer
	Matt	Stead	Dark Horse Neuro, Inc.	Observer
	Andrea	Bigazzi	EB Neuro	Observer
	Gritsch	Gerhard	AIT Austrian Institute of Technology GmbH	Observer
	Mateo	Pratesi	EB Neuro	Observer

	Ignacio Ramírez	Paulino	Facultad de Ingeniería - Universidad de la República	Observer
	Sandor	Benizcky	Filadelfia	Observer
	Steve	Nichols	GE Healthcare	Observer
	Gardar	Thorvardsson	Kvikna / Stratus EEG	Observer
	Richard	Moberg	Moberg Research, Inc.	Observer
	Desire	Jean		Observer
	Casey	Stengel	Neuralynx	Observer
	Bill	Antilla	Nihon Kohden Corporation	Observer
	Ryuzo	Mase	Nihon Kohden Corporation	Observer
X	Koichiro	Matsumoto	Nihon Kohden Corporation	Observer
	Pedro Fernando	Arizpe Gomez	OFFIS e. V.	Observer
	Daniel	Crepeau	Dark Horse Neuro	Observer
	Andrey	Pirozhenko	Persyst	Observer
x	Shane	Ponzikoff	Persyst	Observer
	Wouter	Potters	Amsterdam UMC, Netherlands	Observer
X	Stefan	Rampp	University Klinikum Erlangen	Observer
	Dagmar	Krefting	University Medical Center Göttingen	Observer
	Marco	Rossi	University of Milan, Italy	Observer
	Gloria	Menegaz	University of Verona, Italy	Observer
	Matan	Oppenheim	Zebra Medical Vision	Observer
x	Jonathan	Pfaff	Fraunhofer Heinrich Hertz Institute HHI	Observer
x	Gary	Sullivan	ITU-Rapporteur	Observer
	Kristian	Bernard Nilsen	Oslo University Hospital	Observer
X	NS	Nagarajan	GE Healthcare	Observer
	Bruno	Monnerat		Observer

1. CALL TO ORDER AND REVIEW OF ANTI-TRUST RULES AND DICOM PATENT POLICY

The meeting was called to order at 10:00 AM EDT. Participants were reminded that the Guidelines for Conducting NEMA Meetings and Patent Disclosure Policy are in effect and they may be found here: <https://www.dicomstandard.org/patent>.

2. WELCOME/ATTENDANCE/INTRODUCTION

Attendance was taken.

3. REVIEW AND APPROVE AGENDA

The agenda was reviewed, motion to approve by JH and seconded by SW.

4. REVIEW MINUTES

The minutes of the 17 Oct 2024 meeting were reviewed, motion to approve by JH and seconded by SP.

5. OLD BUSINESS

- **Supplement 236 (Presentation State for montage and visualization filters).** Silvia Winkler (SW) reported that Elekta provided one question about MEG as a comment and SW requested the Jon Halford (JH) provide a response to Shayna Knazik that could be sent to Elekta. SW reported that the Letter Ballot phase would close today so that was a possibility that a few more comments could come, but that was unlikely. Silvia reported that this supplement would be finalized during the WG-06 meeting during the second week of January 2025.

- **International Telecommunication Union Standardization Sector (ITU-T) Call for Proposals (CfP) for Biomedical Waveform Coding**
 - Ben Brinkmann (BB) reported that WG-32 participants would try to provide additional testing data to ITU. He reported that his institution already had intracranial EEG data which was in the public domain and could be shared. The idea is that WG-32 participants would share intracranial EEG data in EDF or BDF format. BB asked JP how many datasets VCEG would need. JP reported that as much data as possible would be good. Ray Kraskinski suggested that it would be good to get data which are for different use cases. JP reported that his HHI server had a large amount of free storage space, so they could accept as much data as was available and he had already conveyed the upload password for this FTP site to several WG-32 participants. JH reported that he had been working with Martijn Tannemmat to prepare needle EMG data sampled at 4.8 kHz which Martijn could upload to the HHI server once regulatory approval was granted.
 - JP and Gary Sullivan (GS) reported that a preliminary version of reference software for the Call for Proposals would be ready for testing in January 2025. GS reported that ITU-T VCEG had a meeting two weeks ago and the group decided on a starting basis for the design of the codec reference software and were interested in collaborating with WG-32 participants as much as possible on testing. GS reported that the reference software would have a default setting and additional features from multiple companies which could be switched on and off. GS reported that ITU-T VCEG could make reference software available to WG-32 in January 2025. GS suggested that WG-32 think about what kinds of testing would be needed. JP suggested that testing which compared codec output with original data to verify that there is not a clinically significant difference to clinical experts would be useful. JH stated that his EEGnet web-based server software for doing this testing (which has already been used for testing audio codecs) was already developed and ready to facilitate this when needed. BB suggested that data

quality should be compared at several set compression levels (like 2x and 5x) and that clinical evaluation of waveforms by neurology experts should be performed at a late stage when only one or two agreed-upon reference software approaches remained.

- GS reported that ITU-T had been using the CHB-MIT EEG dataset for testing. JP reported that they wanted to use the Temple University dataset, but some companies had a problem with the licensing which stated that the data should not be modified and redistributed (which would be a problem if the data was compressed and shared). BB suggested that a letter of permission from the data owners at Temple might be used to overcome this and offered to reach out to Temple staff about this. Andrew Ehrenberg stated that Temple had recently changed its process for giving access to data such that a request was necessary before data access was granted, and this might help since we could specify how we wanted to use the data in our request.
- SW brought up that we would be using EDF and BDF files to provide data for the codec software, but that we need to keep in mind how this software will interact with DICOM encoded data. JH asked if ITU-T needed a description from WG-32 of what features and specifications the codec needed. BB suggested that we write a list of requirements for the codec for it to interact with DICOM objects. GS stated that ITU-T had drafted a list of requirements/features for the codec and he could provide a copy of these requirements to WG-32.
- SW asked if the codec would cover all bit rates in current applications, including 8 bit data. GS stated that the current plan was for the codec to be able to act on data up to 24 bit data and BB and JH stated that they had not seen higher than 24 bit EEG data. It was agreed that supporting up to 32 bit data was sufficient. JP inquired of SW if there was DICOM encoded EEG data that ITU-T could use with novel codec software. SW stated that she had a lot of DICOM encoded EEG data but since this data was from clinical recordings, she could not share this data with ITU, but she did have software which could convert EDF data to DICOM which she could provide to ITU.
- **Development of IOD for Long-term EEG and Sleep Monitoring.** JH discussed how in imaging the DICOM structure of Patient--> Study--> Series--> Frames/Instance--> Fragments usually involves one frame/instance being an image, which could be broken up into fragments. SW pointed out that fragmentation of an instance/frame would only result from use of a codec, which specifies how fragmentation is performed. SW also pointed about that in certain applications, such as video, many image frames could be stored in a single frame/instance and be converted to fragments based on properties of the codec.
- JH discussed scenarios which would cause multiple series to be created for a single neurophysiology study. SW stated that multiple series would not be created in cases where there were different data streams from different sets of EEG channels with

different sampling rates. This would just lead to the creation of multiple multiplex groups. SW stated that different series would be created only if there were different devices which provided recording data for the object. (Examples would be data from different modality types, with different modality attributes, such as EEG, ECG, EOG, and body position.) If EEG data came from the same device but was encoded using different DICOM objects (such as scalp EEG and intracranial EEG), then since different IODs would be used to encode the DICOM data, and different object instances would be created. (Unless a future intracranial EEG IOD included description for how scalp EEG could also be encoded in the object, in which case the EEG data with different channels and sampling frequencies would go into different multiplex groups.) If one study was created and then recorded stopped and electrode sources were changed (like adding additional electrodes) SW stated that it would probably be best for a new study to be created, although two objects in a study could be created in the same series (since the data came from the same device and shared the same frame of reference).

- There was discussion about how in imaging, the frame size is often set as one image, but the size of data for a frame in neurophysiology would need to be configurable and would likely split objects into defined sizes. SW discussed that in imaging, when a codec is applied and encapsulated fragments are included in the DICOM sequence, the first item in the sequence is an offset table which allows access to the compressed fragments, which can be either an extended offset table or a basic offset table. If there are multiple objects which are time-synchronized and are part of the same series, timestamps are aligned to have the objects fit together temporally. BB pointed out that for data compression, if the entire study is compressed into one frame, the entire study would need to be decompressed in order to access any one part, which is not efficient, so blocking and indexing is important to provide rapid access so that decompression of just one part of the recording is possible.

6. UPCOMING WG-32 FACE-TO-FACE MEETINGS

- DICOM WG-32 will also plan to meet in person at ICCN 2026 in Cartagena, Columbia.

7. DATE AND TIME OF NEXT MEETINGS

Thursday 19 December 2024	10:00- 11:00 am UD ET
Thursday 19 January 2025	10:00- 11:00 am UD ET