

MEETING RECORD

Video Compression Measurements Subcommittee G-2.1.6
Audio Video Techniques Committee G-2.1

Broadcast Technology Society
Institute of Electrical and Electronics Engineers
Twenty-first Meeting

Hotel Sofitel, Minneapolis
5601 West 78th Street
Bloomington, MN 55439
July 9-10, 2001

Item 1 - Welcome and Introduction by Interim Chairman, of IEEE G-2.1.6

Interim Chairman Alan Godber called the meeting to order at 11:30 AM, July 9. Attendees introduced themselves. See Appendix B for a list of attendees.

Item 2 - Approval of Draft Agenda

A report on further activities related to test material selection for the VQEG testing was added after Item 5 as Item 5A.

Item 3 - Review and Approval of Minutes of the Previous Meeting #20, May 11, 2001

The minutes from meeting #20 were accepted as prepared.

Item 4 - Matters Arising from the Minutes

There were no matters arising from the Minutes.

Item 5 - Update Report of ITU Video Quality Experts Group (VQEG) re ongoing testing plans - Arthur Webster, David Fibush, Phil Corriveau, Ann Marie Rohaly and other participants

A meeting to discuss VQEG Reduced Reference (RR)/No Reference (NR) tests for multimedia video quality is planned for July 25-27 in Orlando. The goal of the meeting is to define application areas, decide the multimedia formats to be used in the tests, and formulate an initial test plan.

Item 5A - Report on VQEG activity related to test material selection – Alexander Woerner

Alexander Woerner volunteered to work on generating the HRC sequences. This was done at the MSTV Model Station WHD-TV. A Rohde and Schwarz SFQ and EFM digital transmission test system was set up with an MPEG encoder. When sequences were encoded at 6 Mbps, no degradation was noticed. At 4 Mbps, there were a few degradations. For generating the HRCs, data rates of 6 Mbps, 3 Mbps, 2 Mbps and 1.5 Mbps were used.

Fifty-two minutes of material was processed. Specific scenes will have to be selected from this material. Individual minutes will be taken out and shown to the viewers for the DSCQE testing. It was proposed that independent labs be given extra material and allowed to pick out individual minutes for the testing.

Tests were also conducted with transmission noise added at the modulation (QAM) level to simulate transmission impairments. The added noise resulted in decoder failures, with some MPEG slices and freeze frames. There was a question whether this type of degradation was within the scope of the VQEG work. Due to forward error correction in the decoder, the decoded video is usually perfect or absent. An attempt was made to set the C/N ratio on the SFQ on the edge of this cliff so that occasional errors and freeze-frames resulted.

5.1 Further Discussion and Recommendations from the Subcommittee to the next meeting of VQEG

Leon Stanger mentioned he had produced a 8mm home video showing desirable sequences for determining compression artifacts. The tape contained video of water in a stream and a wall with uneven lighting. He was looking for scenes with smoke or fire. Doug Lung had DV compressed images of red lava entering the ocean on his laptop and offered that as an example of this. While it was thought this material could be useful, there was concern that source material from 8mm or DV formats probably would not be suitable for VQEG work, since the original was not clean.

The quality range of material for the tests was discussed. Should it be limited to broadcast quality or should the full quality range – from excellent to very bad – be considered? It was noted that very degraded material with errors could be monitored using error detection. Quality measurement isn't needed to detect freeze frames. It was suggested that quality measurement could be used if the picture includes blocking or MPEG slice errors. There was agreement this committee should not spend time looking at broken pictures. In multimedia applications, freeze frames and latency are issues. In broadcast applications, these are errors.

Leon Stanger pointed out he was trying to come up with boring, simple sequences where it was easy to see the degradations.

There was some discussion about using bit rates less than 1 Mbps. Alexander Woerner said he would have liked to have had an HRC at 1 Mbps, but the equipment couldn't handle it. It was noted, however, that there is no point in considering rates below 1 Mbps if the stat-muxes in use couldn't go that low.

Item 6 – Draft Standard for the Measurement of Visual Impairments in Digital Video Using a JND Scale, P1486 – Ad Hoc Committee Chair, Leon Stanger*6.1 Report of replies received with comments on Draft Standard*

The Draft Standard and a request for comments were sent to the G-2.1.6 list, Vittorio Baroncini (for ITU 6Q), VQEG and T1A1. As of this meeting, no comments had been received. It was recommended the draft standard be resent with another request for comments when it was ready to ballot.

6.4 Review of first Draft of Standard, prepared by Dr. Andrew B. Watson

Andrew Watson presented the latest version of the *Draft Standard for the Measurement of Visual Impairments in Digital Video Using a JND Scale*.

The document was reviewed item by item. Numerous editorial changes to improve accuracy and understanding were agreed to by the committee. Only those items that elicited discussion from committee are reported here.

Discussion

The word “subjective” was added to the title to avoid confusion with objective measurements. The new title is the *Draft Standard for the Subjective Measurement of Visual Impairments in Digital Video Using a JND Scale*.

It was agreed that Andrew Watson would shorten the *History* to one paragraph and simplify it off-line after the meeting. The paragraph should include the date the standard effort stated, the date of the conceptual idea and the dates of more specific ideas. Documents associated with these dates should also be mentioned.

The definition of “JND” was discussed. While JND is defined for a single observer, how should it be defined for a group of observers? Is it a Thurstone JND? Should we define an “IEEE JND”? Is JND a generic term? Does JND always mean the same thing? Is the variation in observations based due to the observers or is it in their response to a specific experiment at different times. There was concern about having the words “certain probability” in a definition. After much discussion, the definition for JND was changed to include: “It is defined as the smallest distance along the scale that allows two intensities to be perceived as different.”

The nature of the “SRC” video was discussed. It was noted that the “SRC” would not be perfect video, since there is no such thing as perfect video. Many participants agreed that JND numbers should not be quoted without defining the SRC. The definition of “SRC” was agreed to as: “A particular sequence of video content which is the source video. While the definition of SRC has been considered to be high-quality video as defined by standard ITU-R BT.601, this method could also employ an SRC which contains pre-existing degradations.”

The application of the “HRC” (Hypothetical Reference Circuit) to this procedure received considerable discussion. The HRC determines how the SRC video is modified, but does not describe the result of the modification. The term “Processed Video Sequence” or “PVS” was added to describe the result of applying a particular HRC to the SRC.

There was concern that picture degradation not involved with video compression would affect the testing. To cover this, it was agreed to add this wording to the scope: “The method described in this standard is appropriate for measurements in which the SRC and PVS share a common spatial alignment, gain, picture size (cropping), DC level, and magnification, as described in T1 Technical Report [A2]. While the definition of SRC is considered to be high quality BT.601 video, it can also be video that has been degraded by some processing such as picture border modification.”

After a discussion about measurement of JND values less than one, it was pointed out that with a one JND HRC, the EASE procedure would present the end-points 0 and 1, repeatedly. If the measurement was repeated with four people, you should get two that will give valid results and two that don't see a JND, or an average of zero. Given this binomial variance, it was stated we probably can't estimate less than one JND and should screen the data appropriately. Dr. Watson will write the section on data screening later.

There was a question whether it was permissible to list manufacturers' names in an informative annex such as the one in the Draft Standard. Alan Godber will check with IEEE to see if there are any problems with listing manufacturers' names.

It was suggested the MatLab code used in the EASE method be included in the standard. There was some concern whether NASA would have a problem with this, but it was determined this could be resolved by putting to code into a NASA Technical Report, which would be in the public domain, and putting that in the Standard. While it was agreed that it would be a good idea to have the EASE code in the Standard, there was concern about the extra work this would put on Dr. Watson.

6.3 Selection of Other Test Labs to confirm first lab test results

Some labs have expressed an interest in testing the procedure, but it was decided some members of IEEE G-2.1-6 would visit NASA Ames Research Center to observe and participate in tests.

6.4 Further discussion and action

Alan Godber will check with IEEE to see if there are any problems listing manufacturers' names in an informative annex in this standard.

Andrew Watson will incorporate the changes discussed at this meeting and add Section 8.4.11, *Data Screening*, to the Draft Standard. If the MatLab code is included, this could take a month, without the code, he thought this could be completed within a week.

David Fibush will take the Draft Standard from T1A1 to ITU as Rapporteur. Arthur Webster can send it with his Rapporteur report.

Alan Godber needs to obtain IEEE permission to have the Draft Standard posted on the T1A1 FTP site. The Draft Standard can carry a copyright notice for protection.

Phil Corriveau at Intel will be approached to see if he is interested in attending the Ad-Hoc meeting at NASA in late July.

Doug Lung will post a copy of the Draft Standard with the revisions made during this meeting in the private working documents area of the G-2.1.6 web site. This will be replaced with the revised Draft Standard when it is available.

It was suggested a conference call be set up to finish the document. John Grigg offered to set up a bridge with 20 ports. The call was scheduled for 12-noon EDT on August 17.

Item 7 - Further Discussion of Compression Measurement Methodologies

Item 7.1 - Discussion of Future Work, Additional Assignments

There was no further discussion.

Item 8 - Any Other Business.

There was no other business.

Item 9 - Date(s) of Future Meeting(s).

An Ad Hoc meeting of the G-2.1.6 subcommittee is planned for NASA Ames Research Center in California at 8:30 AM, July 23, 2001.

A list of who will be attending will be required prior to the meeting. The list currently includes:

- Andrew Watson (host)
- Alan Godber
- Vittorio Baroncini
- Doug Lung
- Leon Stanger (tentative)

As noted above, there will be a conference call August 17, 2001 at 12-noon EDT to finalize the document.

The meeting was adjourned at 12:19 PM, July 10.

Submitted by:
H. Douglas Lung
Secretary

APPENDIX "A"

List of Documents Distributed

9-10 July 2001

Draft Agenda - IEEE Compression and Processing Subcommittee G-2.1.6, Twenty-First Meeting, Monday, July 9, 2001 and Tuesday, July 10, 2001, Alan Godber, Chairman, ([216m21an.pdf](#))

Draft Meeting Record, G-2.1.6, Compression and Processing Subcommittee, Twentieth Meeting, May 11, 2001, Boulder, CO, Doug Lung, Secretary, [IEEE Doc. G-2.1.6/126](#), July 5, 2001

APPENDIX "B"
ATTENDANCE RECORD
July 9-10, 2001

Name	Affiliation	Telephone	Fax	E-mail
Chairman: Alan Godber	Consultant	(732) 846-4476	(732) 846-4476	agodber@earthlink.net
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