**Joint Video Experts Team (JVET)
of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**
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Title: **BoG on assessment of HOP proposals**

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Purpose: Proposal

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Source: E. Alshina, F. Galpin

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Abstract

This report summarizes the discussion during BoG on assessment of HOP proposals established during JVET-AF meeting.

First session of BoG conducted on Oct. 16, 13:00-16:00.

First session of BoG conducted on Oct. 17, 08:30-11:00.

Mandates

Status of EE proposals:

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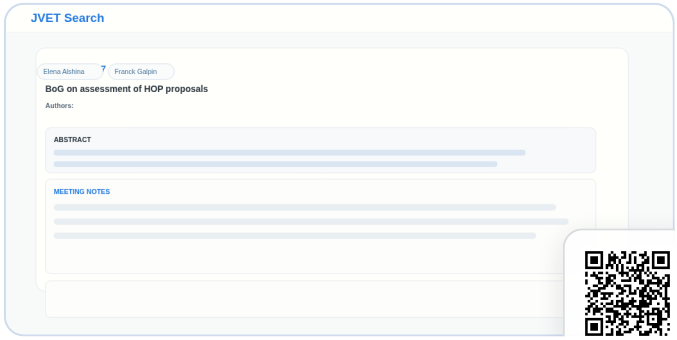

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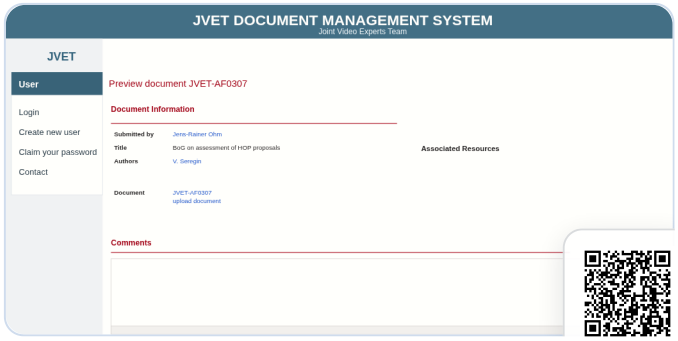

ARCHIVE

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MEETING NOTES

external meeting notes

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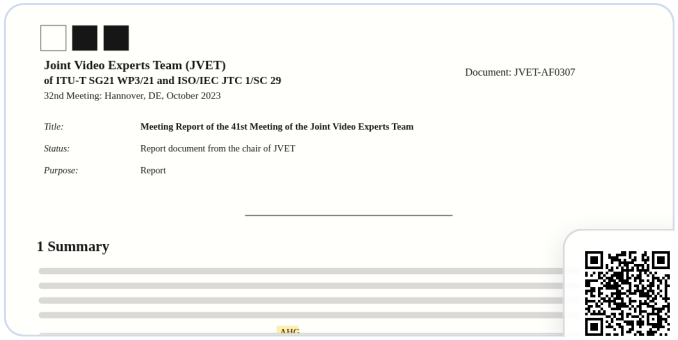

MEETING NOTES

JVET-AF0307 BoG on assessment of HOP proposals [E. Alshina, F. Galpin]

This was presented in JVET Wed. 18 Oct. at 1305 (chaired by JRO)

The following categories of proposals had been discussed:

1. Filter usage aspects (section 1);
2. Training aspects (section 2);
3. Design elements of HOP for future NNVC (section 3).

Recommendations

- Adoption to NNVC-7.0
- Decision (software): Adopt JVET-AF0085 (EE1-1.2.1), enable by default for LOP and HOP;
- Decision (software fix): Adopt JVET-AF0172 (redundant signalling removal);
- Decision (software, encoder only): Adopt JVET-AF0193 (disable by default);
- Decision (training): Adopt JVET-AF0180 and JVET-AF0155 (12:1:1 distortion weight in HOP training)
- Decision (CTC): Adopt JVET-AF0155 (Chroma QP offset +1 for HOP inference)
- Next EE1:
- Agreement: stay with single models for HOP
- EE1-0: HOP re-train with 12:1:1 loss (in inference Chroma QP offset +1 and JVET-AF0085);
    - JVET-AF0150 and JVET-AF0296 (batch size 32 for HOP training and new learning rate)
    - Training must be completed by Nov. 17
- EE1-1.2:
    - Training as EE1-0
        - NN design: NNVC-6 HOP with following changes:
            - EE1-1.1.2b (alternation of 3x1 and 1x3 CONV, C_{31}=48)
            - EE1-1.1.3 (1x1 CONV in Head Block for IPB and BS)
            - One of the 2 variants:

(1) Group convolution in BBB, location and size as in EE1-1.1.4b

(2) Group convolution in BBB, location size as in EE1-1.1.1-t1

- - Complexity:
        - kMAC/pxl <=477
        - adjustment of number of BBBs, if mode parameters modified must be same form in (1) and (2)
    - Final training starts after Nov. 20
- EE1-3:

    - Only inference test for HOP-6 (single model) and EE1-1.1.4c (two models), no retraining foreseen, memory usage, accurate time measurement w/o AVX512, same inference/usage. (Note: It was agreed during the discussion to also perform another subtest with retraining the models, for details see EE1 description JVET-AF2023.)
- EE1-4: Study joint design of JVET-AF0154 (rotation) and JVET-AF0086 (flipping)
- EE1-5: Deep Reference Frame Generation for Inter Prediction Enhancement, training is crosschecked.
- + EE tests discussed during JVET plenary

Additional agreement:

- Decision: Adopt JVET-AF0205 (decided Thursday 19 Oct. at 1630, after confirmation of successful completion of the crosscheck).

All recommendations of the BoG were confirmed by the JVET plenary.

Liaison communications (2)

JPEG liaison m65594 provided an update on the JPEG AI project. The JPEG AI Verification Model 3 has two operation points, called base and high. In the most powerful configuration, VM3 reportedly reaches 29% compression gain over its VVC anchor based on an average of 7 metrics. The major change is the attention mechanism simplification for the high operation point, which reduces decoder complexity from 735 to 194 kMAC/pixel. Regions of interest functionality was also added. After the 100th JPEG meeting, JPEG AI was reported to be reaching Committee Draft (CD) stage. (Elena Alshina was asked to coordinate preparation of a response.)

A reply was drafted as WG 5 N 251. It provided an update on the exploration of neural network-based video coding (NNVC) and on the exploration of potential tools extensions using more conventional video coding technologies for coding efficiency improvements with the Enhanced Compression Model (ECM).

3GPP liaison m65645 provided information that 3GPP TSG SA WG4 (SA4) has an activity on Film Grain Synthesis that started in June this year. The Study Item Description was attached for information. This activity is a follow-up of the SA4 Study on 5G Video Codec Characteristics (FS_5Gvideo), documented in TR 26.955 on the video codec performance evaluation on scenarios of relevance for 3GPP. The purpose of the new Study Item on Film Grain Synthesis is for 3GPP to consider upgrading specifications to support profiles, levels, and possibly features available in HEVC. This work is planned to be completed by November 2023 as part of the 5G Video Codec Characteristics 3GPP Technical Report TR 26.955. 3GPP SA4 asked JVET to provide information on its respective activity on similar evaluation of Film Grain Synthesis technologies and to inform SA4 on any planned/underway/completed similar activity that could be of interest, and share results (or inform by when such work would be completed). (Walt Husak was asked to coordinate preparation of a response.)

A reply was drafted as WG 5 N 252. It provided information on the work in JVET for developing a technical report on film grain synthesis technologies as ISO/IEC DTR 23002-9 “Film grain synthesis technologies for video applications”. It also noted a report on subjective film grain performance that may be of interest to 3GPP as found in JVET-AD0382, containing an assessment of subjective quality with and

> without film grain synthesis. This assessment evaluates the benefits of film grain synthesis as a tool for improving the visual quality of a compressed video sequence. The results of this assessment indicate a significant visual benefit by applying film grain synthesis. Finally, it noted a recent input contribution, JVET-AF0262 “New Film Grain Material based on a Ground Truth approach”, which has provided film grain content material that was generated using a “ground truth” method (discussed further in prior contributions JVET-AD0369 and JVET-AE0250).

> The liaison responses were reviewed in JVET on Thursday 19 Oct. at 0830-1000. The draft replies were also presented in the MPEG AG 3 Communication meeting Thursday 19 Oct. at 1000.

Project planning

Software timeline

ECM 11 software (including all adoptions) was planned to be available 3 weeks after the meeting.

The NNVC 7.0 codebase software was planned to be available 2 weeks after the meeting. An update 7.1 (including potentially the reduced-complexity intra prediction, and an update ofHOP) was planned to be available 5 weeks after the meeting.

VTM23.0 software was planned to be available on 2023-11-24. (Note that further updates may be released later)

Updates on top of HM17.0 software were not planned, but might be released after merging pending requests, as appropriate.

As a general rule in software development, a person who is executing a merge shall not be from the same company as the person who submitted that merge request.

Core experiment and exploration experiment planning

An EE on neural network-based video coding was established, as recorded in output document JVET-AF2023.

An EE on enhanced compression technology beyond VVC capability using techniques other than neural-network technology was also established, as recorded in output document JVET-AF2024.

> Initial versions of these documents were presented and approved.

Drafting of specification text, encoder algorithm descriptions, and software

The following agreement has been established: the editorial team has the discretion to not integrate recorded adoptions for which the available text is grossly inadequate (and cannot be fixed with a reasonable degree of

effort), if such a situation hypothetically arises. In such an event, the text would record the intent expressed by the committee without including a full integration of the available inadequate text.

Plans for improved efficiency and contribution consideration

The group considered it important to have the full design of proposals documented to enable proper study.

Adoptions need to be based on properly drafted working draft text (on normative elements) and HM/VTM encoder algorithm descriptions – relative to the existing drafts. Proposal contributions should also provide a software implementation (or at least such software should be made available for study and testing by other participants at the meeting, and software must be made available to cross-checkers in EEs).

Suggestions for future meetings included the following generally-supported principles:

- Normative contributions (relating to changes in bitstream/decoder) shall include draft specification text
- Proposals shall contain all details relevant for understanding and be self-contained. In cases where the document is a follow-up of a previous contribution, the overall concept and the novelties should be highlighted at minimum
- Coding tool and encoder optimization proposals shall contain Excel sheets that allow assessment on a per-sequence basis
- Algorithm description text is strongly encouraged for non-normative contributions that are intended to be included in model description documents (VTM, ECM, etc.), and that is required for inclusion in TR drafts.
- Early upload deadline to enable substantial study prior to the meeting
- Using a clock timer to ensure efficient proposal presentations (5 min) and discussions (not exercised currently)

As general guidance, it was suggested to avoid usage of company names in document titles, software modules etc., and not to describe a technology by using a company name.

General issues for experiments

It was emphasized that those rules which had been set up or refined during the 12th JVET meeting should be observed. In particular, for some CEs of some previous meetings, results were available late, and some changes in the experimental setup had not been sufficiently discussed on the JVET reflector.

Group coordinated experiments have been planned as follows:

- “Core experiments” (CEs) are the coordinated experiments on coding tools which are deemed to be interesting but require more investigation and could potentially become part of a draft standard by the next meeting or in the near future.
- “Exploration experiments” (EEs) are also coordinated experiments. These are conducted on technology which is not foreseen to become part of a draft standard in the near future. The investigating methodology for assessment of such technology can also be an important part of an EE. (Further general rules for EEs,

as far as deviating from the CE rules below, should be discussed in a future meeting. For the current meeting, procedures as described in the EE description document are deemed to be sufficient.)

- A CE is a test of a specific fully described technology in a specific agreed way. It is not a forum for thinking of new ideas (like an AHG). The CE coordinators are responsible for making sure that the CE description is complete and correct and has adequate detail. Reflector discussions about CE description clarity and other aspects of CE plans are encouraged.
- A description of each experiment is to be approved at the meeting at which the experiment plan is established. This should include the issues that were raised by other experts when the tool was presented, e.g., interference with other tools, contribution of different elements that are part of a package, etc. The experiment description document should provide the names of individual people, not just company names.
- Software for tools investigated in a CE will be provided in one or more separate branches of the software repository. Each CE will have a "fork" of the software, and within the CE there may be multiple branches established by the CE coordinator. The software coordinator will help coordinate the creation of these forks and branches and their naming. All JVET members will have read access to the CE software branches (using shared read-only credentials as described below).
- During the experiment, revisions of the experiment plans can be made, but not substantial changes to the proposed technology. Withdrawing parts of experiments that were intended to show the individual benefits of a tool or parts of a tool is strongly discouraged. Combination tests may not be considered in such cases. Any changes made to individual tools in a combination shall be documented.
- The CE description must match the CE testing that is done. The CE description needs to be revised if there has been some change of plans.
- The CE summary report must describe any changes that were made in the process of finalizing the CE.
- By the next meeting it is expected that at least one independent cross-checker will report a detailed analysis of each proposed feature that has been tested and confirm that the implementation is correct. Commentary on the potential benefits and disadvantages of the proposed technology in cross-checking reports is highly encouraged. Having multiple cross-checking reports is also highly encouraged (especially if the cross-checking involves more than confirmation of correct test results). The reports of cross-checking activities may (and generally should) be integrated into the CE report rather than submitted as separate documents.
- It is mandatory to report encoder optimizations made for the benefit of a tool, and if an equivalent optimization could be applied on the anchor, a comparison against the improved anchor shall be provided.
- A new proposal can be included in a CE based on group decision, regardless if an independent party has already performed a cross-check in the meeting when it was first proposed.

It is possible to define sub-experiments within particular CEs, for example designated as CEX.a, CEX.b, etc., where X is the basic CE number.

As a general rule, it was agreed that each CE should be run under the same testing conditions using one software codebase, which should be based on the group test model software codebase. An experiment is not to be established as a CE unless there is access given to the participants in (any part of) the CE to the software used to perform the experiments.

> The general agreed common conditions for single-layer coding efficiency experiments for SDR video are described in the prior output document JVET-T2010.

Experiment descriptions should be written in a way such that it is understood as a JVET output document (written from an objective “third party perspective”, not a proponent perspective – e.g. not referring to methods as “improved”, “optimized”, “enhanced”, etc.). The experiment descriptions should generally not express opinions or suggest conclusions – rather, they should just describe what technology will be tested, how it will be tested, who will participate, etc. Responsibilities for contributions to CE work should identify individuals in addition to company names.

CE descriptions contain a basic description of the technology under test, but should not contain excessively verbose descriptions of a technology (at least not unless the technology is not adequately documented elsewhere). Instead, the CE descriptions should refer to the relevant proposal contributions for any necessary further detail. However, the complete detail of what technology will be tested must be available – either in the CE description itself or in documents that are referenced in the CE description that are also available in the JVET document archive.

Any technology must have at least one cross-check partner to establish a CE – a single proponent is not enough. It is highly desirable have more than just one proponent and one cross-checker.

The CE development workflow is described at:

https://vcgit.hhi.fraunhofer.de/jvet/VVCSoftware_VTM/wikis/Core-experiment-development-workflow

CE read access is available using shared accounts: One account exists for MPEG members, which uses the usual MPEG account data. A second account exists for VCEG members with account information available in the TIES informal ftp area (IFA) system at:

https://www.itu.int/ifa/t/2017/sg16/exchange/wp3/q06/vceg_account.txt

Some agreements relating to CE activities were established as follows:

- Only qualified JVET members can participate in a CE.
- Participation in a CE is possible without a commitment of submitting an input document to the next meeting. Participation was requested by contacting the CE coordinator.
- All software, results, and documents produced in the CE should be announced and made available to JVET in a timely manner.
- A JVET CE reflector will be established and announced on the main JVET reflector. Discussion of logistics arrangements, exchange of data, minor refinement of the test plans, and preparation of documents shall be conducted on the JVET CE reflector, with subject lines prefixed by “[CEx:]”, where “x” is the number of the CE. All substantial communications about a CE other than such details shall take place on main JVET reflector. In the case that large amounts of data are to be distributed, it is recommended to send a link to the data rather than the data itself, or upload the data as an input contribution to the next meeting.

General timeline for CEs

> T1= 3 weeks after the JVET meeting: To revise the CE description and refine questions to be answered. Questions should be discussed and agreed on JVET reflector. Any changes of planned tests after this time need to be announced and discussed on the JVET reflector. Initially assigned description numbers shall not be changed later. If a test is skipped, it is to be marked as “withdrawn”.

T2 = Test model software release + 2 weeks: Integration of all tools into a separate CE branch of the VTM is completed and announced to JVET reflector.

- Initial study by cross-checkers can begin.
- Proponents may continue to modify the software in this branch until T3.
- 3rd parties are encouraged to study and make contributions to the next meeting with proposed changes

T3: 3 weeks before the next JVET meeting or T2 + 1 week, whichever is later: Any changes to the CE test branches of the software must be frozen, so the cross-checkers can know exactly what they are cross-checking. A software version tag should be created at this time. The name of the cross-checkers and list of specific tests for each tool under study in the CE plan description shall be documented in an updated CE description by this time.

T4: Regular document deadline minus 1 week: CE contribution documents including specification text and complete test results shall be uploaded to the JVET document repository (particularly for proposals targeting to be promoted to the draft standard at the next meeting).

The CE summary reports shall be available by the regular contribution deadline. This shall include documentation about crosscheck of software, matching of CE description and confirmation of the appropriateness of the text change, as well as sufficient crosscheck results to create evidence about correctness (crosscheckers must send this information to the CE coordinator at least 3 days ahead of the document deadline). Furthermore, any deviations from the timelines above shall be documented. The numbers used in the summary report shall not be changed relative to the description document.

CE reports may contain additional information about tests of straightforward combinations of the identified technologies. Such supplemental testing needs to be clearly identified in the report if it was not part of the CE plan.

New branches may be created which combine two or more tools included in the CE document or the VTM (as applicable).

It is not necessary to formally name cross-checkers in the initial version of the CE description document. To adopt a proposed feature at the next meeting, JVET would like to see comprehensive cross-checking done, with analysis of whether the description matches the software, and a recommendation of the value of the tool and given tradeoffs.

The establishment of a CE does not indicate that a proposed technology is mature for adoption or that the testing conducted in the CE is fully adequate for assessing the merits of the technology, and a favourable outcome of CE does not indicate a need for adoption of the technology into a standard or test model.

Availability of specification text is important to have a detailed understanding of the technology and also to judge what its impact on the complexity of the specification will be. There must also be sufficient time to study this in detail. CE contributions without sufficiently mature draft specification text in the CE input document should not be considered for adoption.

Lists of participants in CE documents should be pruned to include only the active participants. Read access to software will be available to all members.

Establishment of ad hoc groups

> The ad hoc groups established to progress work on particular subject areas until the next meeting are described in the table below. The discussion list for all of these ad hoc groups was agreed to be the main JVET reflector (jvet@lists.rwth-aachen.de).

Review of AHG plans was conducted during the plenary on Friday 20 Oct. 2023 at 0935.

Title and Email Reflector	Chairs	Mtg
Project Management (AHG1) (jvet@lists.rwth-aachen.de) • Coordinate overall JVET interim efforts. • Supervise AHG and experiment studies. • Report on project status to JVET reflector. • Provide a report to the next meeting on project coordination status. • Supervise processing and delivery of output documents	J.-R. Ohm (chair), G. J. Sullivan (vice-chair)	N
Draft text and test model algorithm description editing (AHG2) (jvet@lists.rwth-aachen.de) • Produce and finalize draft text outputs of the meeting (JVET-AF1006, JVET-AF1016, and JVET-AF2027. • Collect reports of errata for the VVC, VSEI, HEVC, AVC, CICP, and the published related technical reports and produce the JVET-AF1004 errata output collection.	B. Bross, C. Rosewarne (co-chairs), F. Bossen, A. Browne, S. Kim, S. Liu, J.-R. Ohm, G. J. Sullivan, A. Tourapis, Y.-K. Wang, Y. Ye (vice-chairs)	N

• Coordinate with the test model software development AhG to address issues relating to mismatches between software and text. • Collect and consider errata reports on the texts.		
Test model software development (AHG3) (jvet@lists.rwth-aachen.de) • Coordinate development of test models (VTM, HM, SCM, SHM, HTM, MFC, MFCD, JM, JSVM, JMVM, 3DV-ATM, 360Lib, and HDRTools) software and associated configuration files. • Produce documentation of software usage for distribution with the software. • Enable software support for recently standardized additional SEI messages, and SEI messages in TuC (the latter in a separate branch of VTM). • Discuss and make recommendations on the software development process. • Perform comparative tests of test model behaviour using common test conditions, including HDR, high bit depth and high bit rate. • Suggest configuration files for additional testing of tools. • Investigate how to minimize the number of separate codebases maintained for group reference software. • Coordinate with AHG on Draft text and test model algorithm description editing (AHG2) to identify any mismatches between software and text, and make further updates and cleanups to the software as appropriate. • Prepare drafts of merged and updated CTC documents for HM and VTM, as applicable.	F. Bossen, X. Li, K. Sühring (co-chairs), E. François, Y. He, K. Sharman, V. Seregin, A. Tourapis (vice-chairs)	N

Test material and visual assessment (AHG4) (jvet@lists.rwth-aachen.de) • Consider plans for additional verification testing of VVC capability, particularly target conducting a first test for VVC multi-layer features by the next meeting, and update the test plan according to subsequent tests. • Coordinate with AHG13 on assessing new test material and investigating metrics that could be used to assess quality of synthesized film grain; improve and update the draft test plan for subjective quality testing of the FGC SEI message. • Maintain the video sequence test material database for testing the VVC and HEVC standards and potential future extensions, as well as exploration activities. • Study coding performance and characteristics of available and proposed video test material. • Identify and recommend appropriate test material for testing the VVC standard and potential future extensions, as well as exploration activities. • Identify and characterize missing types of video material, solicit contributions, collect, and make available a variety of video sequence test material, in coordination with other AHGs, as appropriate. • Maintain and update the directory structure for the test sequence repository, as necessary. • Collect information about test sequences that have been made available by other organizations. • Prepare and conduct expert viewing for purposes of subjective quality evaluation. • Coordinate with AG 5 in studying and developing further methods of subjective quality evaluation, e.g. based on crowd sourcing. • Coordinate with AHG15 on investigating sequences with gaming content, and make such sequences available for study.	V. Baroncini, T. Suzuki, M. Wien (co-chairs), W. Husak, S. Iwamura, P. de Lagrange, S. Liu, X. Meng, S. Puri, A. Segall, S. Wenger (vice-chairs)	Y (tel., 2 weeks notice)

• Prepare availability of viewing equipment and facilities arrangements for future meetings.		
Conformance testing (AHG5) (jvet@lists.rwth-aachen.de) • Study the draft of additional conformance bitstreams for VVC multilayer configurations JVET-AE2028, and investigate the need for future improvements of conformance testing specifications. • Study the conformance needs for HEVC multi-view profiles, and develop a set of conformance bitstreams as appropriate. • Study the requirements of VVC, HEVC, and AVC conformance testing to ensure interoperability. • Maintain and update the conformance bitstream database, and contribute to report problems, and suggest actions to resolve these. • Study additional testing methodologies to fulfil the needs for VVC conformance testing.	I. Moccagatta (chair), F. Bossen, K. Kawamura, P. de Lagrange, T. Ikai, S. Iwamura, H.-J. Jhu, S. Paluri, K. Sühring, Y. Yu (vice-chairs)	N
ECM software development (AHG6) (jvet@lists.rwth-aachen.de) • Coordinate development of the ECM software and associated configuration files. • Produce documentation of software usage for distribution with the software. • Prepare and deliver ECM-11.0 software version and the reference configuration encodings according to the ECM common test conditions. • Investigate encoder speedup and other software optimization such as reduction of memory consumption. • Coordinate with ECM algorithm description editors to identify any mismatches between software and text, make further updates and cleanups to the software as appropriate.	V. Seregin (chair), J. Chen, R. Chernyak, F. Le Léannec, K. Zhang (vice-chairs)	N

ECM tool assessment (AHG7) (jvet@lists.rwth-aachen.de) • Investigate methodology of tool assessment. • Coordinate with AHG6 on resolving tool-off test related software issues (missing tool controls and software bugs). • Prepare configuration files and generate bitstreams and results of tool-on/tool-off testing. • Prepare reporting of tool assessment results. • Collect simulation results on non-CTC sequences (e.g., those used in previous verification tests), and identify a set of non-CTC sequences that would be appropriate for additional testing. • Investigate the possibility of conducting subjective tests on subsets of tools in coordination with AHG4 and AG 5. • Develop methodology of more reliable runtime measurement	X. Li (chair), L.-F. Chen, Z. Deng, J. Gan, E. François, H.-J. Jhu, X. Li, H. Wang (vice-chairs)	N
Optimization of encoders and receiving systems for machine analysis of coded video content (AHG8) (jvet@lists.rwth-aachen.de) • Solicit and study non-normative encoder and receiving systems technologies that enhance performance of machine analysis tasks on coded video content. • Identify and collect test materials that are suitable to be used by JVET for machine analysis tasks. • Generate anchors according to the common test conditions JVET-AF2031. • Discuss improvements on the evaluation framework, including evaluation procedures and methodologies. • Coordinate software development, and continue to migrate the software basis used in AHG8 to newest VTM version.	C. Hollmann, S. Liu, S. Wang, M. Zhou (AHG chairs)	N

• Coordinate experiments on optimization of encoders and receiving systems for machine analysis of coded video content. • Maintain the software implementation example algorithms in the repository, including sufficient documentation in terms of operation and performance. • Evaluate proposed technologies and their suitability for machine analysis applications. • Propose improvements to the draft technical report JVET-AE2030 on optimization of encoders and receiving systems for machine analysis of coded video content. • Study the potentials of using SEI messages for the purpose of machine analysis in coordination with AHG9. • Coordinate with WG 4 VCM AHG on aspects such as common test conditions, evaluation metrics, test and training materials, usage of SEI messages, and on studying characteristics and requirements of targeted machine analysis tasks, etc.		
SEI message studies (AHG9) (jvet@lists.rwth-aachen.de) • Study the SEI messages in VSEI, VVC, HEVC and AVC. • Discuss the document for technologies under consideration for VSEI JVET-AF2032, and propose improvements as appropriate. • Collect software and showcase information for SEI messages, including encoder and decoder implementations and bitstreams for demonstration and testing. • Identify potential needs for additional SEI messages, including the study of SEI messages defined in HEVC and AVC for potential use in the VVC context. • Study the alignments of the same SEI messages in different standards	S. McCarthy, Y.-K. Wang (co-chairs), T. Chujoh, S. Deshpande, C. Fogg, M. M. Hannuksela, Hendry, P. de Lagrange, G. J. Sullivan, A. Tourapis, S. Wenger (vice-chairs)	N

• Coordinate with AHG8 and WG 4 to study mechanisms for signalling metadata in the context of machine analysis of coded video content. • Coordinate with AHG3 for software support of SEI messages.		

Encoding algorithm optimization (AHG10) (jvet@lists.rwth-aachen.de) • Study the impact of using techniques such as tool adaptation and configuration, and perceptually optimized adaptive quantization for encoder optimization. • Study the impact of non-normative techniques of preprocessing for the benefit of encoder optimization. • Study encoding techniques of optimization for objective quality metrics and their relationship to subjective quality. • Study optimized encoding for reference picture resampling and scalability modes in VTM. • Study optimized encoding and tool combinations for low latency and low complexity. • Consider neural network-based encoding optimization technologies for video coding standards. • Investigate other methods of improving objective and/or subjective quality, including adaptive coding structures and multi-pass encoding. • Study methods of rate control and rate-distortion optimization and their impact on performance, subjective and objective quality. • Study the potential of defining default or alternate software configuration settings and test conditions optimized for either subjective quality, or higher objective quality, and coordinate such efforts with AHG3 and AHG6. • Study the effect of varying configuration parameters depending on temporal layer, such as those related to deblocking, partitioning, chroma QP.	P. de Lagrange, A. Duenas, R. Sjöberg, A. Tourapis (AHG chairs)	N
Neural network-based video coding (AHG11) (jvet@lists.rwth-aachen.de)	E. Alshina, F. Galpin, S. Liu, A. Segall (co-chairs), J. Li, R.-L. Liao, D. Rusanovskyy, M. Santamaria, T. Shao, M. Wien, P. Wu (vice chairs)	Y (tel., 2 weeks notice),

• Evaluate and quantify the performance improvement potential of NN-based video coding technologies compared to existing video coding standards such as VVC, including both individual coding tools, architectures and content adaptation with NN parameters overfitting. • Discuss potential refinements of the test conditions for NN-based video coding in JVET-AF2016. Generate and distribute anchor encoding, and develop supporting software as needed. • Study the impact of training (including the impact of loss functions) on the performance of candidate technologies and identify suitable material for testing and training. • Analyse complexity characteristics for technologies under study, including transformers, perform complexity analysis, and develop complexity reductions of candidate technology. • Finalize and discuss the EE on neural network-based video coding. • Coordinate with other groups, including SC29/AG5 on the evaluation and assessment of visual quality, and AHG12 on the interaction with ECM coding tools. If possible, prepare encodings with combinations of tools included in the NNVC software for visual quality assessment at the next meeting. • Coordinate with AHG14 on items related to NNVC software development.		first on Nov. 16
Enhanced compression beyond VVC capability (AHG12) (jvet@lists.rwth-aachen.de) • Solicit and study non-neural-network video coding tools with enhanced compression capabilities beyond VVC. • Discuss and propose refinements to the ECM11 algorithm description JVET-AF2025.	M. Karczewicz, Y. Ye, L. Zhang (co-chairs), B. Bross, R. Chernyak, X. Li, K. Naser, Y. Yu (vice-chairs)	N

• Coordinate with AHG7 to study the performance and complexity tradeoff of these video coding tools. • Coordinate with AHG6 on ECM software development. • Support AHG6 in generating anchors according to the test conditions in JVET-AF2017. • Analyse the results of exploration experiments described in JVET-AF2024 in coordination with the EE coordinators. • Coordinate with AHG11 to study the interaction with neural network-based coding tools.		
Film grain technologies (AHG13) (jvet@lists.rwth-aachen.de) • Study the benefits and characteristics of film grain technologies, including autoregressive and frequency-filtering technologies. • Study alternative film grain models and their associated documentation. • In consultation with AHG4, study and define content characteristics and test conditions that are desirable for the study and testing of film grain technologies, and perform an assessment of newly available test materials in that regard. • Investigate metrics for measuring film grain fidelity in itself, or as present in a video. • Discuss the potential need for film grain conformance guidelines. • Given the study of desirable content characteristics, solicit or create new test material for further determining the operational characteristics of, testing, and developing any related technologies. • Study preprocessing and encoder technologies for determining values for FGC (Film Grain Characteristics) SEI message syntax elements. • Identify potential need for additional film grain technology and signalling, if needed.	W. Husak, P. de Lagrange (co-chairs), A. Duenas, D. Grois, Y. He, X. Meng, M. Radosavljević, A. Segall, G. Teniou, A. Tourapis (vice-chairs)	Y (tel., 2 weeks notice)

• Coordinate development of film grain technology software and configuration files. • Coordinate with AG 5 on improving the draft plan for subjective quality testing of the FGC SEI message JVET-AD2022, and conduct preparations for such testing. • Coordinate with AHG3 for software support of the FGC SEI message.		
NNVC software development (AHG14) (jvet@lists.rwth-aachen.de) • Coordinate development of the NNVC software and associated configuration files. • Prepare and deliver NNVC-7.0 and NNVC-7.1 software versions and the reference configuration encodings according to the NNVC common test conditions as described in JVET-AF2016. • Investigate combinations of tools included in the NNVC software, prepare and release anchor data for all configurations of the software, including anchors for High and Low Operation Point (HOP/LOP) configurations. • Study and maintain the SADL (Small Adhoc Deep-Learning Library). Identify gaps in functionality and develop improvements as needed. • Coordinate with NNVC algorithm and software description (JVET-AF2019) editors to identify any mismatches between software and description document, suggest further updates to the description document as appropriate. • Coordinate with AHG11 on items related to NNVC activities.	F. Galpin (chair), Y. Li, Y. Li, J. Shingala, L. Wang, Z. Xie (vice chairs)	Y (tel., 2 weeks notice), first on Nov. 16
Gaming content compression (AHG15) (jvet@lists.rwth-aachen.de) • Identify gaming content application scenarios and their requirements for codec operation.	S. Puri, J. Sauer (co-chairs), R. Chernyak, A. Duenas, L. Wang (vice chairs)	Y (tel., 2 weeks notice)

• Identify and characterize required types of content; solicit contributions, collect, and make a variety of gaming content available, in coordination with AHG4 and AG 5. • Propose test conditions appropriate for gaming applications. • Evaluate JVET test models (such as ECM, VTM, NNVC, etc.) under the proposed test conditions. • Investigate possibilities to enhance compression capability for gaming content.		
Generative face video compression (AHG16) (jvet@lists.rwth-aachen.de) • Establish testing conditions for evaluating the compression performance of generative face video compression (GFVC). • Identify and develop software tools for experimentation on GFVC, and make a software package available. • Study interoperability requirements, including study of the compression performance impact due to GFVC parameter translation. • Study compression performance using the VVC Main 10 profile. • Develop a document summarizing GFVC technologies.	Y. Ye (chair), H.-B. Teo, Z. Lyu, S. McCarthy, S. Wang (vice chairs)	Y (tel., 2 weeks notice)

It was confirmed that the rules which can be found in document ISO/IEC JTC 1/SC 29/AG 2 N 046 “Ad hoc group rules for MPEG AGs and WGs” (available at https://www.mpegstandards.org/adhoc/), are consistent with the operation mode of JVET AHGs. It is pointed out that JVET does not maintain separate AHG reflectors, such that any JVET member is implicitly a member of any AHG. This shall be mentioned in the related WG Recommendations. The list above was also issued as a separate WG 5 document (ISO/IEC JTC 1/SC 29/WG 5 N 253) in order to make it easy to reference.

Output documents

> The following documents were agreed to be produced or endorsed as outputs of the meeting. Names recorded below indicate the editors responsible for the document production. Where applicable, dates of planned finalization and corresponding parent-body document numbers are also noted.

It was reminded that in cases where the JVET document is also made available as a WG 5 output document, a separate version under the WG 5 document header should be generated. This version should be sent to GJS and JRO for upload.

> The list of JVET ad hoc groups was also issued as a WG 5 output document WG 5 N 253, as noted in section 9.

CITATION

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