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| **Joint Video Experts Team (JVET)**  **of ITU-T SG21 WP3/21 and ISO/IEC JTC 1/SC 29**  37th Meeting, Geneva, CH, 14–22 January 2025 | Document: JVET-AK\_notes\_d0 |

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| *Title:* | **Meeting Report of the 37th Meeting of the Joint Video Experts Team (JVET), Geneva, 14–22 January 2025** | | |
| *Status:* | Report document from the chair of JVET | | |
| *Purpose:* | Report | | |
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| *Source:* | Chair of JVET | | |

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# Summary

The Joint Video Experts Team (JVET) of ITU-T WP3/21 and ISO/IEC JTC 1/‌SC 29 held its thirty-seventh meeting during 14–22 January 2025 meeting at the ITU headquarters facilities in Geneva, Switzerland. The meeting was held as a hybrid meeting, where remote participation was provided on best-effort basis for experts who were unable to travel.

For ISO/IEC purposes, JVET is alternatively designated ISO/IEC JTC 1/‌SC 29/‌WG 5, and this was the eighteenth meeting as WG 5. The JVET meeting was held under the chairmanship of Dr Jens-Rainer Ohm (RWTH Aachen/Germany). For rapid access to particular topics in this report, a subject categorization is found (with hyperlinks) in section 2.16 of this document. It is further noted that work items which had originally been conducted by the Joint Collaborative Team on Video Coding (JCT-VC) were continued in JVET as a single joint team, and explorations towards possible future need of standardization in the area of video coding are also conducted by JVET, as negotiated by the parent bodies.

The JVET meeting began at approximately 0930 CET on Tuesday 14 January 2025. Meeting sessions were held on all days including the weekend days of Saturday and Sunday 18 and 19 January 2025, until the meeting was closed at approximately XXXX hours CET on Wednesday 22 January 2025. Approximately XXX people attended the JVET meeting (XXX in person and XXX remotely), and approximately XXX input documents (not counting crosschecks, reports, and summary documents), 17 AHG reports, 2 EE summary reports, X BoG reports, and X incoming liaison document(s) were discussed. The meeting took place in a collocated fashion with a meeting of SG21 – one of the two parent bodies of the JVET, under whose auspices this JVET meeting was held. Various SC29 Working Groups and Advisory Groups were also meeting in Geneva with partial temporal overlap – where WG 5 is representing the Joint Video Experts Team and its activities from the perspective of the SC 29 parent body. The subject matter of the JVET meeting activities consisted of work on further development and maintenance of the twin-text video coding technology standards *Advanced Video Coding* (AVC), *High Efficiency Video Coding* (HEVC), *Versatile Video Coding* (VVC)*, Coding-independent Code Points (Video)* (CICP), and *Versatile Supplemental Enhancement Information Messages for Coded Video Bitstreams* (VSEI), as well as related technical reports, reference software and conformance testing packages. Further important goals were reviewing the results of the Exploration Experiment (EE) on Neural Network-based Video Coding, of the EE on Enhanced Compression beyond VVC capability, of other technical input on novel aspects of video coding technology, and to plan next steps for investigation of candidate technology towards further standard development.

As a primary goal, the JVET meeting reviewed the work that had been performed in the interim period since the thirty-sixth JVET meeting in producing the following documents:

a) JVET documents

* JVET-AJ1004 Errata report items for VVC, VSEI, HEVC, AVC, and Video CICP
* JVET-AJ1006 HEVC extensions and corrections
* JVET-AJ1011 HEVC white paper, also issued as AG 3 N 174
* JVET-AJ1012 Overview of IT systems used in JVET
* JVET-AJ2003 Guidelines for VTM-based software development
* JVET-AJ2005 Additions and corrections for VVC version 4 (Draft 10), also issued as WG 5 preliminary DAM N 330
* JVET-AJ2006 Additional SEI messages for VSEI version 4 (Draft 4), also issued as WG 5 preliminary DAM N 319
* JVET-AJ2007 Guidelines for NNVC software development
* JVET-AJ2009 Reference software for versatile video coding 2nd edition (Draft 2), also issued as WG 5 DIS N 322
* JVET-AJ2016 Common test conditions and evaluation procedures for neural network-based video coding technology
* JVET-AJ2019 Description of algorithms version 9 and software version 11 in neural network-based video coding (NNVC)
* JVET-AJ2020 Film grain synthesis technology for video applications ed. 2 (Draft 1)
* JVET-AJ2021 Verification test plan for VVC multilayer coding (update 5)
* JVET-AJ2022 Plan for subjective quality testing of the FGC SEI message (update 4)
* JVET-AJ2023 Exploration experiment on neural network-based video coding (EE1)
* JVET-AJ2024 Exploration experiment on enhanced compression beyond VVC capability (EE2)
* JVET-AJ2025 Algorithm description of Enhanced Compression Model 15 (ECM 15)
* JVET-AJ2026 Testing of video coding technology beyond conditions of exploration experiments
* JVET-AJ2027 Common test conditions for gaming applications
* JVET-AJ2030 Optimization of encoders and receiving systems for machine analysis of coded video content (draft 7), also issued as WG 5 CDTR N 323
* JVET-AJ2032 Technologies under consideration for future extensions of VSEI (version 6)
* JVET-AJ2035 Test conditions and evaluation procedures for generative face video coding
* JVET-AJ2037 Report on subjective quality testing of the FGC SEI message, also issued as AG 5 N 140

b) documents produced as WG 5 documents only:

* WG 5 N 318 Draft disposition of comments received on ISO/IEC 23002-7:202x/CDAM1
* WG 5 N 320 Request for ISO/IEC 23008-2:202x (6th ed.) Amd.1 Additional profiles and SEI messages
* WG 5 N 321 Disposition of comments received on ISO/IEC CD 23090-16:202x
* WG 5 N 324 Liaison statement to ISO/IEC JTC 1/SC 29/WG 1 (JPEG) on JPEG AI and explorations on video coding
* WG 5 N 325 Liaison statement to DVB on film grain synthesis
* WG 5 N 326 Liaison statement to ARIB, ATSC, SBTVD, and SCTE on film grain synthesis evaluation
* WG 5 N 327 Liaison statement to ATSC on multi-layer coding
* WG 5 N 329 Draft disposition of comments received on ISO/IEC 23090-3:202x/CDAM1

As main results, the JVET produced XX output documents from the current meeting (update):

* JVET-AJ1004 Errata report items for VVC, VSEI, HEVC, AVC, and Video CICP
* JVET-AJ1006 HEVC extensions and corrections
* JVET-AJ1011 HEVC white paper, also issued as AG 3 N 174
* JVET-AJ1012 Overview of IT systems used in JVET
* JVET-AJ2003 Guidelines for VTM-based software development
* JVET-AJ2005 Additions and corrections for VVC version 4 (Draft 10), also issued as WG 5 preliminary DAM N 330
* JVET-AJ2006 Additional SEI messages for VSEI version 4 (Draft 4), also issued as WG 5 preliminary DAM N 319
* JVET-AJ2007 Guidelines for NNVC software development
* JVET-AJ2009 Reference software for versatile video coding 2nd edition (Draft 2), also issued as WG 5 DIS N 322
* JVET-AJ2016 Common test conditions and evaluation procedures for neural network-based video coding technology
* JVET-AJ2019 Description of algorithms version 9 and software version 11 in neural network-based video coding (NNVC)
* JVET-AJ2020 Film grain synthesis technology for video applications ed. 2 (Draft 1)
* JVET-AJ2021 Verification test plan for VVC multilayer coding (update 5)
* JVET-AJ2022 Plan for subjective quality testing of the FGC SEI message (update 4)
* JVET-AJ2023 Exploration experiment on neural network-based video coding (EE1)
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* JVET-AJ2030 Optimization of encoders and receiving systems for machine analysis of coded video content (draft 7), also issued as WG 5 CDTR N 323
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* JVET-AJ2037 Report on subjective quality testing of the FGC SEI message, also issued as AG 5 N 140

The following X documents were produced as WG 5 or SG21 documents only, without a corresponding JVET output document or direct repetition of their content in this meeting report:

* WG 5 N 275 Disposition of comments received on ISO/IEC DIS 14496-10:202x
* WG 5 N 277 Request for ISO/IEC 23002-7:2023/Amd.1
* WG 5 N 280 Disposition of comments received on ISO/IEC 23008-2:2023 (5th ed.) DAM 1
* WG 5 N 282 Request for ISO/IEC 23090-3:2023/Amd.1
* WG 5 N 285 Request for ISO/IEC 23090-16:202x
* WG 5 N 287 Disposition of comments received on ISO/IEC DIS 23091-3:202X
* WG 5 N 295, included in SG16-TD237/WP3, Liaison statement to ISO/IEC JTC 1/SC 29/WG 1 (JPEG) on JPEG AI and explorations on video coding
* WG 5 N 296, included in SG16-TD237/WP3, Liaison statement to 3GPP SA 4 on feasibility study on film grain synthesis
* WG 5 N 297, included in SG16-TD237/WP3, Liaison statement to ITU-R WP 6B on use cases of VVC multilayer profiles for broadcasting applications
* WG 5 N 298, included in SG16-TD237/WP3, Liaison statement to ARIB, ATSC, DVB, SBTVD, and SCTE on film grain synthesis investigations
* WG 5 N 299 List of AHGs established at the 15th WG 5 meeting

The following X draft revised ITU-T Recommendations were forwarded by JVET and Q6/21 for ITU-T Consent:

* [TD276/Plen](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T22-SG16-240415-TD-PLEN-0276) ITU-T H.264 (V15) "*Advanced video coding for generic audiovisual services*" (Rev.)
* [TD278/Plen](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T22-SG16-240415-TD-PLEN-0278) ITU-T H.266.2 (V2) "*Reference software for ITU-T H.266 versatile video coding*" (Rev.)
* [TD279/Plen](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T22-SG16-240415-TD-PLEN-0279) ITU-T H.265 (V10) "*High efficiency video coding*" (Rev.)
* [TD283/Plen](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=T22-SG16-240415-TD-PLEN-0283) ITU-T H.273 (V4) "*Coding-independent code points for video signal type identification*" (Rev.)

For the organization and planning of its future work, the JVET established XX “ad hoc groups” (AHGs) to progress the work on particular subject areas. At this meeting, X Exploration Experiments (EE) were defined. The next eight JVET meetings were planned for 26 March – 4 April 2025 under ISO/IEC JTC 1/‌SC 29 auspices, to be conducted as teleconference meeting; during 26 June – 4 July 2025 under ISO/IEC JTC 1/‌SC 29 auspices in Daejeon, KR; during 2 – 10 October 2025 under ITU-T SG21 auspices in Geneva, CH; during 14 – 23 January 2026 under ISO/IEC JTC 1/‌SC 29 auspices, to be conducted as teleconference meeting; during 24 April – 1 May 2026 under ISO/IEC JTC 1/‌SC 29 auspices in Santa Eulària, ES; during July 2026 under ITU-T SG21 auspices, date and location t.b.d.; during October 2026 under ISO/IEC JTC 1/‌SC 29 auspices, date and location t.b.d.; and during January 2027 under ISO/IEC JTC 1/‌SC 29 auspices, date and location t.b.d.

The document distribution site <https://jvet-experts.org/> was used for distribution of all documents. It was noted that the previous sites <http://phenix.int-evry.fr/jvet/>, <http://phenix.int-evry.fr/jct/>, and <http://phenix.int-evry.fr/jct3v/> were shut down, but the most recent version of JCT-VC and JCT-3V documents can now be accessed directly via the JVET site.

The reflector to be used for discussions by the JVET and all its AHGs is the JVET reflector:  
[jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de) hosted at RWTH Aachen University. For subscription to this list, see <https://lists.rwth-aachen.de/postorius/lists/jvet.lists.rwth-aachen.de/>.

# Administrative topics

## Organization

The ITU-T/ISO/IEC Joint Video Experts Team (JVET) is a group of video coding experts from the ITU-T Study Group 21 Visual Coding Experts Group (VCEG) and ISO/IEC JTC 1/‌SC 29/‌WG 5. The parent bodies of the JVET are ITU-T WP3/21 and ISO/IEC JTC 1/‌SC 29.

The Joint Video Experts Team (JVET) of ITU-T WP3/21 and ISO/IEC JTC 1/‌SC 29 held its thirty-seventh meeting during 14–22 January 2025 meeting at the ITU headquarters facilities in Geneva, Switzerland. The meeting was held as a hybrid meeting, where remote participation was provided on best-effort basis for experts who were unable to travel.

It is further noted that the unabbreviated name of JVET was formerly known as “Joint Video *Exploration* Team”, but the parent bodies modified it when entering the phase of formal development of the *Versatile Video Coding* (VVC) and *Versatile Supplemental Enhancement Information Messages for Coded Video Bitstreams* (VSEI) standards, as well as associated conformance test sets, reference software, verification testing, and non-normative guidance information. Furthermore, starting from the twentieth meeting, work items which had originally been conducted by the Joint Collaborative Team on Video Coding (JCT-VC) were continued to be conducted in JVET as a single joint team, as negotiated by the parent bodies. This particularly consists of work on:

* *High Efficiency Video Coding* (HEVC) and its extensions, the development of associated conformance test sets, reference software, verification testing, and non-normative guidance information,
* Specification of *Coding-independent Code Points (Video)* (CICP), and associated technical report(s),
* Maintenance and enhancement work on the *Advanced Video Coding* (AVC) standard, associated conformance test sets and reference software.

Furthermore, explorations towards possible future need of standardization in the area of video coding are also conducted by JVET. Currently, the following topics are under investigation:

* Exploration on Neural Network-based Video Coding
* Exploration on Enhanced Compression beyond VVC capability

This report contains three important annexes, as follows:

* Annex A contains a list of the documents of the JVET meeting
* Annex B contains a list of the meeting participants, consisting of two parts, (B1) in-person attendees as recorded by a sign-in sheet circulated in meeting rooms, (B2) remote attendees as recorded by the teleconferencing tool used for the meeting
* Annex C contains the meeting recommendations of ISO/IEC JTC 1/‌SC 29/‌WG 5 for purposes of results reporting to ISO/IEC.

## Meeting logistics

Information regarding logistics arrangements for the meeting had been provided via the email reflector [jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de) and at <http://wftp3.itu.int/av-arch/jvet-site/2025_01_AK_Geneva/>.

## Primary goals

As a primary goal, the JVET meeting reviewed the work that was performed in the interim period since the thirty-sixth JVET meeting in producing the following output documents:

a) JVET documents

* JVET-AJ1004 Errata report items for VVC, VSEI, HEVC, AVC, and Video CICP
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* JVET-AJ2025 Algorithm description of Enhanced Compression Model 15 (ECM 15)
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* JVET-AJ2027 Common test conditions for gaming applications
* JVET-AJ2030 Optimization of encoders and receiving systems for machine analysis of coded video content (draft 7), also issued as WG 5 CDTR N 323
* JVET-AJ2032 Technologies under consideration for future extensions of VSEI (version 6)
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b) documents produced as WG 5 documents only:

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* WG 5 N 321 Disposition of comments received on ISO/IEC CD 23090-16:202x
* WG 5 N 324 Liaison statement to ISO/IEC JTC 1/SC 29/WG 1 (JPEG) on JPEG AI and explorations on video coding
* WG 5 N 325 Liaison statement to DVB on film grain synthesis
* WG 5 N 326 Liaison statement to ARIB, ATSC, SBTVD, and SCTE on film grain synthesis evaluation
* WG 5 N 327 Liaison statement to ATSC on multi-layer coding
* WG 5 N 329 Draft disposition of comments received on ISO/IEC 23090-3:202x/CDAM1

Further important goals were reviewing the results of the EE on Neural Network-based Video Coding, of the EE on Enhanced Compression beyond VVC capability, of other technical input on novel aspects of video coding technology, and planning next steps for investigation of candidate technology towards further standard development.

## Documents and document handling considerations

### General

The document distribution site <https://jvet-experts.org/> was used for distribution of all documents.

Document registration timestamps, initial upload timestamps, and final upload timestamps are listed in Annex A of this report.

The document registration and upload times and dates listed in Annex A and in headings for documents in this report are in Paris/Geneva time. Dates mentioned for purposes of describing events at the meeting follow the CEST timezone (local time in Geneva), except as otherwise noted.

Highlighting of recorded decisions in this report is practised as follows:

* Decisions made by the group that might affect the normative content of a future standard are identified in this report by prefixing the description of the decision with the string “Decision:”.
* Decisions that affect one of the various software packages but have no normative effect on text are marked by the string “Decision (SW):”.
* Decisions that fix a “bug” in one of the test model descriptions such as VTM, HM, etc. (an error, oversight, or messiness) or in the associated software package are marked by the string “Decision (BF):”.
* Decisions that are merely editorial without effect on the technical content of a draft standard are marked by the string "Decision (Ed.):". Such editorial decisions are merely suggestions to the editor, who has the discretion to determine the final action taken if their judgment differs.
* Other parenthetical comments may be used for describing the impact or motivation of a decision. Some decisions are recorded with the word “agreed” rather than “Decision:”, especially for work items under study, non-normative, editorial and planning matters.

This meeting report is based primarily on notes taken by the JVET chair. The preliminary notes were also circulated publicly by ftp and http during the meeting on a daily basis. It should be understood by the reader that 1) some notes may appear in abbreviated form, 2) summaries of the content of contributions are often based on abstracts provided by contributing proponents without an intent to imply endorsement of the views expressed therein, and 3) the depth of discussion of the content of the various contributions in this report is not uniform. Generally, the report is written to include as much information about the contributions and discussions as is feasible (in the interest of aiding study), although this approach may not result in the most polished output report. Expressions such as “X.XX%” indicate that the desired results were not available at the time the information was recorded.

### Late and incomplete document considerations

The formal deadline for registering and uploading non-administrative contributions had been announced as Tuesday, 7 January 2025. Any documents uploaded after 1159 hours Paris/Geneva time on Wednesday 8 January 2025 were considered “officially late”, with a grace period of 12 hours (to accommodate those living in different time zones of the world). The deadline does not apply to AHG reports and other such reports which can only be produced after the availability of other input documents.

All contribution documents with registration numbers higher than JVET-AK0239 were registered after the “officially late” deadline (and therefore were also uploaded late). However, some documents in the “late” range might include break-out activity reports that were generated during the meeting, or documents which were requested to be produced for the purpose of improving specification text, and are therefore better considered as report documents rather than as late contributions.

In many cases, contributions were also revised after the initial version was uploaded. The contribution document archive website retains publicly accessible prior versions in such cases. The timing of late document availability for contributions is generally noted in the section discussing each contribution in this report.

One suggestion to assist with the issue of late submissions has been to require the submitters of late contributions and late revisions to describe the characteristics of the late or revised (or missing) material at the beginning of discussion of the contribution. This has been agreed to be a helpful approach to be followed at the meeting.

The following technical design proposal contributions were registered and/or uploaded late:

* JVET-AK0XXX (a proposal on …), uploaded 01-XX,
* … .

It may be observed that some of the above-listed contributions were submissions made in response to issues that arose in discussions during the meeting or from the study of other contributions, and thus could not have been submitted by the ordinary deadline.

The following other documents not proposing normative technical content, but with some need for consideration, were registered and/or uploaded late:

* JVET-AK0XXX (a document describing …), uploaded 01-XX,
* … .

All cross-verification reports at this meeting were registered late, and/or uploaded late. In the interest of brevity, these are not specifically identified here. Initial upload times for each document are recorded in Annex A of this report.

The following contribution registrations were noted that were later cancelled, withdrawn, never provided, were cross-checks of a withdrawn contribution, or were registered in error: JVET-AK0046, JVET-AK0051, JVET-AK0116, JVET-AK0120, JVET-AK0143, JVET-AK0144, JVET-AK0145, and JVET-AK0163.

The following cross-verification reports were still missing by the end of the meeting, but were uploaded later: JVET-AK0XXX, …. (not applicable for current meeting, kept for future use) The following reports had not become available yet three weeks after the end of the meeting: JVET-AK0XXX, … . These were marked as withdrawn by the JVET chair, assuming the registration had become obsolete.

“Placeholder” contribution documents that were basically empty of content, or lacking any results showing benefit for the proposed technology, and obviously uploaded with an intent to provide a more complete submission as a revision, had been agreed to be considered unacceptable and to be rejected in the document management system until a more complete version was available (which would then be counted as a late contribution if the update was after the document deadline). At the current meeting, this situation did apply to documents JVET-AK0077, JVET-AK0078, and JVET-AK0220 which were empty of results and were flagged as late in the list above, based on the time of the first reasonable document upload.

It was remarked that documents that are substantially revised after the initial upload can also be a problem, as this becomes confusing, interferes with study, and puts an extra burden on synchronization of the discussion. This can especially be a problem in cases where the initial upload is clearly incomplete, and in cases where it is difficult to figure out what parts were changed in a revision. For document contributions, revision marking is very helpful to indicate what has been changed. Also, the “comments” field on the web site can be used to indicate what is different in a revision, although participants tend to seldom notice what is recorded there.

As a general policy, missing documents were not to be presented, and late documents (and substantial revisions) could only be presented when there was a consensus to consider them and there was sufficient time available for their review. Again, an exception is applied for AHG reports, CE and HLS topic summaries, and other such reports which can only be produced after the availability of other input documents. There were no objections raised by the group regarding presentation of late contributions, although there may have been some expression of annoyance and remarks on the difficulty of dealing with late contributions and late revisions.

A few contributions may have had some problems relating to IPR declarations in the initial uploaded versions (missing declarations, declarations saying they were from the wrong companies, etc.). Any such issues were corrected by later uploaded versions in a reasonably timely fashion in all cases (to the extent of the awareness of the responsible coordinators).

Some other errors may have also noticed in other initial document uploads (wrong document numbers or meeting dates or meeting locations in headers, etc.) which were generally sorted out in a reasonably timely fashion. The document web site contains an archive of each upload.

### Outputs of the preceding meeting

All output documents of the previous meeting, particularly the meeting report JVET-AJ1000, the Errata report items for VVC, VSEI, HEVC, AVC, and Video CICP JVET-AJ1004, the HEVC extensions and corrections (draft 1) JVET-AJ1006, the White paper on HEVC JVET-AJ1011, the Overview of IT systems used in JVET JVET-AJ1012, the Guidelines for VTM-based software development JVET-AJ2003, the Additions and corrections for VVC version 4 (Draft 10) JVET-AJ2005, the Additional SEI messages for VSEI version 4 (Draft 4) JVET-AJ2006, the Guidelines for NNVC software development JVET-AJ2007, the Reference software for versatile video coding 2nd edition (Draft 2) JVET-AJ2009, the Common test conditions and evaluation procedures for neural network-based video coding technology JVET-AJ2016, the Description of algorithms version 9 and software version 11 in neural network-based video coding (NNVC) JVET-AJ2019, the Film grain synthesis technology for video applications ed. 2 (Draft 1) JVET-AJ2020, the Verification test plan for VVC multilayer coding (update 5) JVET-AJ2021, the Plan for subjective quality testing of the FGC SEI message (update 4) JVET-AJ2022, the Description of the EE on Neural Network-based Video Coding JVET-AJ2023, the Description of the EE on Enhanced Compression beyond VVC capability JVET-AJ2024, the Algorithm description of Enhanced Compression Model 15 (ECM 15) JVET-AJ2025, the Testing of video coding technology beyond conditions of exploration experiments JVET-AJ2026, the Common test conditions for gaming applications JVET-AJ2027, the Optimization of encoders and receiving systems for machine analysis of coded video content (draft 7) [JVET-AJ2030](https://jvet-experts.org/doc_end_user/current_document.php?id=12584), the Technologies under consideration for future extensions of VSEI (version 6) JVET-AJ2032, the Test conditions and evaluation procedures for generative face video coding JVET-AJ2035, and the Report on subjective quality testing of the FGC SEI message JVET-AJ2037, had been completed and were approved. In a few cases, the corresponding WG 5 N-numbered documents had not yet been uploaded, and this was requested to be done as soon as possible. The software implementations of VTM version 23.X, ECM version 15.0, and NNVC version 11.0 were also approved.

Only minor editorial issues were found in the meeting report JVET-AJ1000; no need to produce an update was identified (see section 2.14 for details).

The available output documents of the previous meeting and the software had been made available in a reasonably timely fashion.

## Attendance

The list of participants in the JVET meeting can be found in Annexes B1 and B2 of this report.

The meeting was open to those qualified to participate either in ITU-T WP3/21 or ISO/IEC JTC 1/‌SC 29/‌WG 5 (including experts who had been personally invited as permitted by ITU-T or ISO/IEC policies).

Participants had been reminded of the need to be properly qualified to attend. Those seeking further information regarding qualifications to attend future meetings may contact the responsible coordinators.

It was further announced that it is necessary to register for the meeting through the ISO Meetings website for ISO/IEC experts the Q6/21 rapporteur for ITU-T experts. The password for meeting access had been sent to registered participants via these channels. Links to the Zoom sessions (without the necessary password) were available in the posted meeting logistics information and the calendar of meeting sessions in the JVET web site. On-site participants furthermore were required to register via the ITU-T website in order to get access to the headquarter facilities.

The following rules were established for those participating remotely via Zoom teleconference meeting:

* Use the “hand-raising” function to enter yourself in the queue to speak (unless otherwise instructed by the session chair). If you are dialed in by phone, request your queue position verbally. The online queue will be interleaved with the room queue, though it may not always be guaranteed that the sequence perfectly follows the sequence by which hand raising occurred.
* Stay muted unless you have something to say. People are muted by default when they join and need to unmute themselves to speak. The chair may mute anyone who is disrupting the proceedings (e.g. by forgetting they have a live microphone while chatting with their family or by causing bad noise or echo).
* Identify who you are and your affiliation when you begin speaking. The same applies for speakers in the room to let online participants know who is speaking.
* Use your full name and company/organization and country affiliation in your joining information, since the participation list of Zoom would also be used to compile the online part of attendance records.
* Turn on the chat window and watch for chair communication and side commentary there as well as by audio.
* Generally, do not use video for the teleconferencing calls in order to avoid overloading internet connections; enable only voice and screen sharing.
* Extensive use of screen sharing is encouraged, to enable participants to view the presented material and the meeting notes. At times, multiple sources of screen sharing may be enabled, so it may be necessary for participants to understand that this is happening and to understand how to select which shared screen they want to see.

## Agenda

The agenda for the meeting, for the further development and maintenance of the twin-text video coding technology standards *Advanced Video Coding* (AVC), *High Efficiency Video Coding* (HEVC), *Versatile Video Coding* (VVC)*, Coding-independent Code Points (Video)* (CICP), and *Versatile Supplemental Enhancement Information Messages for Coded Video Bitstreams* (VSEI), as well as related technical reports, software and conformance packages, was as follows:

* Opening remarks and review of meeting logistics and communication practices
* Roll call of participants
* Adoption of the agenda
* Code of conduct policy reminder
* IPR policy reminder and declarations
* Contribution document allocation
* Review of results of the previous meeting
* Review of target dates
* Reports of ad hoc group (AHG) activities
* Report of exploration experiments on neural-network-based video coding
* Report of exploration experiments on enhanced compression beyond VVC capability
* Consideration of contributions on high-level syntax
* Consideration of contributions and communications on project guidance
* Consideration of video coding technology contributions
* Consideration of contributions on conformance and reference software development
* Consideration of contributions on coding-independent code points for video signal type identification
* Consideration of contributions on film grain synthesis technology
* Consideration of contributions on optimization of encoders and receiving systems for machine analysis of coded video content
* Consideration of contributions on errata relating to standards in the domain of JVET
* Consideration of contributions on technical reports relating to standards and exploration study activities in the domain of JVET
* Consideration of contributions providing non-normative guidance relating to standards and exploration study activities in the domain of JVET
* Consideration of information contributions
* Consideration of future work items
* Coordination of visual quality testing
* Liaisons, coordination activities with other organizations
* Review of project editor and liaison assignments
* Approval of output documents and associated editing periods
* Future planning: Determination of next steps, discussion of working methods, communication practices, establishment of coordinated experiments (if any), establishment of AHGs, future meeting planning, other planning issues
* Other business as appropriate for consideration
* Closing

The agenda was approved as suggested.

The times of meeting sessions followed the needs of the face-to-face meeting, with highest priority given to the aim of achieving the goals of the meeting. Typical meeting hours were expected to be 0900-2000 CET with coffee breaks and lunch breaks as appropriate, however some early morning or late-night sessions were anticipated to be necessary. Sessions were announced in the online JVET calendar in advance as far as possible, but it was anticipated that some activities (such as breakout sessions) could be held at short notice.

## ISO and IEC Code of Conduct reminders

Participants were reminded of the ISO and IEC Codes of Conduct, found at

<https://www.iso.org/publication/PUB100011.html>.

<https://www.iec.ch/basecamp/iec-code-conduct-technical-work>

These include points relating to:

* Behave ethically
* Promote and enable all voices to be heard
* Engage constructively in ISO and IEC activities
* Respect others (in meetings, when writing, on social media)
* Declare actual and potential conflicts of interest and manage them appropriately
* Protect confidential information
* Protect ISO and IEC assets
* Avoid and prevent any form of bribery or corruption
* Uphold the consensus process
* When disputes arise, escalate, resolve and uphold agreed resolution

## IPR policy reminder

Participants were reminded of the IPR policy established by the parent organizations of the JVET and were referred to the parent body websites for further information. The IPR policy was summarized for the participants.

The ITU-T/ITU-R/ISO/IEC common patent policy shall apply. Participants were particularly reminded that contributions proposing normative technical content shall contain a non-binding informal notice of whether the submitter may have patent rights that would be necessary for implementation of the resulting standard. The notice shall indicate the category of anticipated licensing terms according to the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form.

This obligation is supplemental to, and does not replace, any existing obligations of parties to submit formal IPR declarations to ITU-T/ITU-R/ISO/IEC.

Participants were also reminded of the need to formally report patent rights to the top-level parent bodies (using the common reporting form found on the database listed below) and to make verbal and/or document IPR reports within the JVET necessary in the event that they are aware of unreported patents that are essential to implementation of a standard or of a draft standard under development.

Some relevant links for organizational and IPR policy information are provided below:

* <http://www.itu.int/ITU-T/ipr/index.html> (common patent policy for ITU-T, ITU-R, ISO, and IEC, and guidelines and forms for formal reporting to the parent bodies)
* <http://ftp3.itu.int/av-arch/jvet-site> (JVET contribution templates)
* <http://www.itu.int/ITU-T/dbase/patent/index.html> (ITU-T IPR database)

The responsible coordinators invited participants to make any necessary verbal reports of previously-unreported IPR in technology that might be considered as prospective candidate for inclusion in future standards, and opened the floor for such reports: No such verbal reports were made.

## Software copyright disclaimer header reminder

It was noted that the VTM and ECM software implementation packages use the same software copyright license header as the HEVC reference software, where the latter had been agreed at the 5th meeting of the JCT-VC and approved by both parent bodies at their collocated meetings at that time. This license header language is based on the BSD license with a preceding sentence declaring that other contributor or third party rights, including patent rights, are not granted by the license, as recorded in [N 10791](https://dms.mpeg.expert/doc_end_user/documents/89_London/wg11/w10791.zip) of the 89th meeting of ISO/IEC JTC 1/‌SC 29/‌WG 11 of June/July 2009. Both ITU and ISO/IEC will be identified in the <OWNER> and <ORGANIZATION> tags in the header. This software header is also used in the process of designing the VTM and ECM software, and for evaluating proposals for technology to be potentially included in these designs. This software or parts thereof might be published by ITU-T and ISO/IEC as an example implementation of a future video coding standard and for use as the basis of products to promote adoption of such technology.

Different copyright statements shall not be committed to the committee software repository (in the absence of subsequent review and approval of any such actions). As noted previously, it must be further understood that any initially-adopted such copyright header statement language could further change in response to new information and guidance on the subject in the future.

These considerations apply to the 360Lib video conversion software and HDRTools as well. The SADL and NNVC packages for neural network-based video coding use the same licensing terms.

Software packages that had been developed in prior work of the JVT, the JCT-VC and the JCT-3V have similar considerations and are maintained according to the past practice in that work.

## Communication practices

The documents for the meeting can be found at <https://jvet-experts.org/>. The site contains links for creating a user account for document uploading and for contacting an administrator – e.g., to update the email address associated with an account, and experts were reminded to keep this information up to date. It was reminded to send a notice to the chairs in cases of changes to document titles, authors, etc.

It was noted that the previous document sites <http://phenix.int-evry.fr/jvet/>, <http://phenix.int-evry.fr/jct/>, and <http://phenix.int-evry.fr/jct3v/> were shut down, but the most recent version of JCT-VC and JCT-3V documents can now be accessed directly via the JVET site. A mirror for JCT-VC, JCT-3V and JVET document access (including all versions with original upload dates) will shortly be provided via the ITU ftp site, providing a “documents” subfolder in the directory of the respective meeting.

JVET email lists are managed through the site <https://lists.rwth-aachen.de/postorius/lists/jvet.lists.rwth-aachen.de/>, and to send email to the reflector, the email address is [jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de). Only members of the reflector can send email to the list. However, membership of the reflector is not limited to qualified JVET participants.

It was emphasized that reflector subscriptions and email sent to the reflector must use real names when subscribing and sending messages and subscribers must respond to inquiries regarding the nature of their interest in the work. The current number of subscribers on the JVET email list was 1277 (as of 13 January 2025). All discussions (including those on AVC, HEVC, VVC, CICP, etc.) shall be conducted on the JVET reflector rather than any of the old reflectors (including JVT, JCT-VC, and JCT-3V) which are retained for archiving purposes.

It is further emphasized that the document JVET-AJ1012 gives valuable hints about communication practices as well as other IT resources used in JVET, such as software, conformance, and test materials.

## Terminology

* **ACT**: Adaptive colour transform
* **AFF**: Adaptive frame-field
* **AI**: All-intra
* **AIF**: Adaptive interpolation filtering
* **ALF**: Adaptive loop filter
* **AMP**: Asymmetric motion partitioning – a motion prediction partitioning for which the sub-regions of a region are not equal in size (in HEVC, being N/2x2N and 3N/2x2N or 2NxN/2 and 2Nx3N/2 with 2N equal to 16 or 32 for the luma component)
* **AMVP**: Adaptive motion vector prediction
* **AMT or MTS**: Adaptive multi-core transform, or multiple transform selection
* **AMVR**: (Locally) adaptive motion vector resolution
* **APS**: Adaptation parameter set
* **ARC**: Adaptive resolution conversion (synonymous with DRC, and a form of RPR)
* **ARMC**: Adaptive re-ordering of merge candidates
* **ARSS**: Adaptive reference sample smoothing
* **ATM**: AVC-based multiview and 3D test model
* **ATMVP** or “subblock-based temporal merging candidates”: Alternative temporal motion vector prediction
* **AU**: Access unit
* **AUD**: Access unit delimiter
* **AVC**: Advanced video coding – the video coding standard formally published as ITU-T Recommendation H.264 and ISO/IEC 14496-10
* **BA**: Block adaptive
* **BC**: See CPR or IBC
* **BCW**: Biprediction with CU based weighting
* **BD**: Bjøntegaard-delta – a method for measuring percentage bit rate savings at equal PSNR or decibels of PSNR benefit at equal bit rate (e.g., as described in document VCEG-M33 of April 2001)
* **BDOF**: Bi-directional optical flow (formerly known as **BIO**)
* **BDPCM**: Block-wise DPCM
* **BL**: Base layer
* **BMS**: Benchmark set (no longer used), a former preliminary compilation of coding tools on top of VTM, which provide somewhat better compression performance, but are not deemed mature for standardzation
* **BoG**: Break-out group
* **BR**: Bit rate
* **BT**: Binary tree
* **BV**: Block vector (used for intra BC prediction)
* **CABAC**: Context-adaptive binary arithmetic coding
* **CBF**: Coded block flag(s)
* **CC**: May refer to context-coded, common (test) conditions, or cross-component
* **CCALF**: Cross-component ALF
* **CCLM**: Cross-component linear model
* **CCCM**: Cross-component convolutional model
* **CCP**: Cross-component prediction
* **CCSAO**:Cross-component SAO
* **CE**: Core Experiment – a coordinated experiment conducted toward assessment of coding technology
* **CG**: Coefficient group
* **CGS**: Colour gamut scalability (historically, coarse-grained scalability)
* **CIIP**: Combined inter/intra prediction
* **CIPF**: CABAC initialization from the previous frame
* **CL-RAS**: Cross-layer random-access skip
* **CPB**: Coded picture buffer
* **CPMV**: Control-point motion vector
* **CPMVP**: Control-point motion vector prediction (used in affine motion model)
* **CPR**: Current-picture referencing, also known as IBC – a technique by which sample values are predicted from other samples in the same picture by means of a displacement vector called a block vector, in a manner conceptually similar to motion-compensated prediction
* **CST**: Chroma separate tree
* **CTC**: Common test conditions
* **CVS**: Coded video sequence
* **DCI**: Decoder capability information
* **DCT**: Discrete cosine transform (sometimes used loosely to refer to other transforms with conceptually similar characteristics)
* **DCTIF**: DCT-derived interpolation filter
* **DF**: Deblocking filter
* **DIMD**: Decoder intra mode derivation
* **DMVR**: Decoder motion vector refinement
* **DoCR**: Disposition of comments report
* **DPB**: Decoded picture buffer
* **DPCM**: Differential pulse-code modulation
* **DPS**: Decoding parameter sets
* **DRC**: Dynamic resolution conversion (synonymous with ARC, and a form of RPR)
* **DT**: Decoding time
* **DQ**: Dependent quantization
* **ECS**: Entropy coding synchronization (typically synonymous with WPP)
* **EMT**: Explicit multiple-core transform
* **EOTF**: Electro-optical transfer function – a function that converts a representation value to a quantity of output light (e.g., light emitted by a display
* **EPB**: Emulation prevention byte (as in the emulation\_prevention\_byte syntax element)
* **ECM**: Enhanced compression model – a software codebase for future video coding exploration
* **ECV**: Extended Colour Volume (up to WCG)
* **EIP**: Extrapolation based intra prediction
* **EL**: Enhancement layer
* **EOS**: End of (coded video) sequence
* **ET**: Encoding time
* **FRUC**: Frame rate up conversion (pattern matched motion vector derivation)
* **GCI**: General constraints information
* **GDR**: Gradual decoding refresh
* **GFV**: Generative face video
* **GLM**: Gradient linear model
* **GOP**: Group of pictures (somewhat ambiguous)
* **GPM**: Geometry partitioning mode
* **GRA**: Gradual random access
* **HBD**: High bit depth
* **HDR**: High dynamic range
* **HEVC**: High Efficiency Video Coding – the video coding standard developed and extended by the JCT-VC, formalized by ITU-T as Rec. ITU-T H.265 and by ISO/IEC as ISO/IEC 23008-2
* **HLS**: High-level syntax
* **HM**: HEVC Test Model – a video coding design containing selected coding tools that conforms to the HEVC standard design (possibly with under-development extensions) – now also used especially in reference to the (non-normative) encoder algorithms (see WD and TM)
* **HMVP**: History based motion vector prediction
* **HOP**: High-complexity operating point for neural network-based filter.
* **HRD**: Hypothetical reference decoder
* **HTM**: HEVC-based multiview and 3D test model (developed by JCT-3V)
* **HyGT**: Hyper-cube Givens transform (a type of NSST)
* **IBC** (also **Intra BC**): Intra block copy, also known as CPR – a technique by which sample values are predicted from other samples in the same picture by means of a displacement vector called a block vector, in a manner conceptually similar to motion-compensated prediction
* **IBDI**: Internal bit-depth increase – a technique by which lower bit-depth (8 bits per sample) source video is encoded using higher bit-depth signal processing, ordinarily including higher bit-depth reference picture storage (ordinarily 12 bits per sample)
* **IBF**: Intra boundary filtering
* **ILP**: Inter-layer prediction (in scalable coding)
* **ILRP**: Inter-layer reference picture
* **IPCM**: Intra pulse-code modulation (similar in spirit to IPCM in AVC and HEVC)
* **IRAP**: Intra random access picture
* **ISP**: Intra subblock partitioning
* **JCCR**: Joint coding of chroma residuals
* **JCT-3V**: Joint collaborative team on 3D video (for AVC and HEVC)
* **JCT-VC**: Joint collaborative team on video coding (for HEVC)
* **JEM**: Joint exploration model – a software codebase previously used for video coding exploration
* **JM**: Joint model – the primary software codebase that has been developed for the AVC standard
* **JSVM**: Joint scalable video model – another software codebase that has been developed for the AVC standard, which includes support for scalable video coding extensions
* **JVET**: Joint video experts team (initially for VVC, later expanded)
* **JVT**: Joint video team (for AVC)
* **KLT**: Karhunen-Loève transform
* **LB** or **LDB**: Low-delay B – the variant of the LD conditions that uses B pictures
* **LD**: Low delay – one of two sets of coding conditions designed to enable interactive real-time communication, with less emphasis on ease of random access (contrast with RA). Typically refers to LB, although also applies to LP
* **LFNST**: Low-frequency non-separable transform
* **LIC**: Local illumination compensation
* **LM**: Linear model
* **LMCS**: Luma mapping with chroma scaling (formerly sometimes called “in-loop reshaping”)
* **LOP**: Low-complexity operating point for neural network-based filter.
* **LP** or **LDP**: Low delay P – the variant of the LD conditions that uses P frames
* **LUT**: Look-up table
* **LTRP**: Long-term reference picture
* **MANE**: Media-aware network element
* **MC**: Motion compensation
* **MCP**: Motion compensated prediction
* **MCTF**: Motion compensated temporal pre-filtering
* **MDNSST**: Mode dependent non-separable secondary transform
* **MIP**: Matrix-based intra prediction
* **MMLM**: Multi-model (cross component) linear mode
* **MMVD**: Merge with MVD
* **MPEG**: Moving picture experts group (an alliance of working groups and advisory groups in ISO/IEC JTC 1/‌SC 29, one of the two parent bodies of the JVET)
* **MPM**: Most probable mode (in intra prediction)
* **MRL**: Multiple reference line intra prediction
* **MV**: Motion vector
* **MVD**: Motion vector difference
* **NAL**: Network abstraction layer
* **NNPF**: Neural network post filter
* **NNVC**: Neural network-based video coding (experimental software package)
* **NSQT**: Non-square quadtree
* **NSPT**: Non-separable primary transform
* **NSST**: Non-separable secondary transform
* **NUH**: NAL unit header
* **NUT**: NAL unit type (as in AVC and HEVC)
* **OBMC**: Overlapped block motion compensation (e.g., as in H.263 Annex F)
* **OETF**: Opto-electronic transfer function – a function that converts to input light (e.g., light input to a camera) to a representation value
* **OLS**: Output layer set.
* **OOTF**: Optical-to-optical transfer function – a function that converts input light (e.g. l,ight input to a camera) to output light (e.g., light emitted by a display).
* **ONNX**: Open Neural Network Exchange – a format used to convert code from common neural network software packages into SADL code.
* **operation point**: A temporal subset of an OLS.
* **PDPC**: Position-dependent (intra) prediction combination.
* **PERP**: Padded equirectangular projection (a 360° projection format).
* **PH**: Picture header.
* **PHEC**: Padded hybrid equiangular cubemap (a 360° projection format).
* **PMMVD**: Pattern-matched motion vector derivation.
* **POC**: Picture order count.
* **PoR**: Plan of record.
* **PROF**: Prediction refinement with optical flow
* **PPS**: Picture parameter set (as in AVC and HEVC).
* **PTL**: Profile/tier/level combination.
* **QM**: Quantization matrix (as in AVC and HEVC).
* **QP**: Quantization parameter (as in AVC and HEVC, sometimes confused with quantization step size).
* **QT**: Quadtree.
* **RA**: Random access – a set of coding conditions designed to enable relatively-frequent random access points in the coded video data, with less emphasis on minimization of delay (contrast with LD).
* **RADL**: Random-access decodable leading (type of picture).
* **RASL**: Random-access skipped leading (type of picture).
* **R-D**: Rate-distortion.
* **RDO**: Rate-distortion optimization.
* **RDOQ**: Rate-distortion optimized quantization.
* **RDPCM**: Residual DPCM
* **ROI**: Region of interest.
* **ROT**: Rotation operation for low-frequency transform coefficients.
* **RPL**: Reference picture list.
* **RPLM**: Reference picture list modification.
* **RPR**: Reference picture resampling (e.g., as in H.263 Annex P), a special case of which is also known as ARC or DRC.
* **RPS**: Reference picture set.
* **RQT**: Residual quadtree.
* **RRU**: Reduced-resolution update (e.g. as in H.263 Annex Q).
* **RVM**: Rate variation measure.
* **SADL**: Small adhoc deep learning library
* **SAO**: Sample-adaptive offset.
* **SBT**: Subblock transform.
* **SbTMVP**: Subblock based temporal motion vector prediction.
* **SCIPU**: Smallest chroma intra prediction unit.
* **SD**: Slice data; alternatively, standard-definition.
* **SDH**: Sign data hiding.
* **SDT**: Signal-dependent transform.
* **SE**: Syntax element.
* **SEI**: Supplemental enhancement information (as in AVC and HEVC).
* **SH**: Slice header.
* **SHM**: Scalable HM.
* **SHVC**: Scalable high efficiency video coding.
* **SIF**: Switchable (motion) interpolation filter.
* **SIMD**: Single instruction, multiple data.
* **SMVD**: Symmetric MVD.
* **SPO**: SEI processing order.
* **SPS**: Sequence parameter set (as in AVC and HEVC).
* **SR**: Super resolution .
* **STMVP**: Spatial-temporal motion vector prediction.
* **STRP**: Short-term reference picture.
* **STSA**: Step-wise temporal sublayer access.
* **TBA/TBD/TBP**: To be announced/determined/presented/public.
* **TGM**: Text and graphics with motion – a category of content that primarily contains rendered text and graphics with motion, mixed with a relatively small amount of camera-captured content.
* **TIMD**: Template-based intra mode derivation
* **TM**: Template matching.
* **TMVP**: Temporal motion vector prediction.
* **TS**: Transform skip.
* **TSRC**: Transform skip residual coding.
* **TT**: Ternary tree.
* **UCBDS**: Unrestricted center-biased diamond search.
* **UGC**: User-generated content.
* **UWP**: Unequal weight prediction.
* **VCEG**: Visual coding experts group (ITU-T Q.6/16, the relevant rapporteur group in ITU-T WP3/16, which is one of the two parent bodies of the JVET).
* **VCM**: Video coding for machines.
* **VPS**: Video parameter set – a parameter set that describes the overall characteristics of a coded video sequence – conceptually sitting above the SPS in the syntax hierarchy.
* **VQA**: Visual quality assessment.
* **VT**: Verification testing.
* **VTM**: VVC Test Model.
* **VUI**: Video usability information.
* **VVC**: Versatile Video Coding, the standardization project developed by JVET.
* **WAIP**: Wide-angle intra prediction
* **WCG**: Wide colour gamut.
* **WG**: Working group, a group of technical experts (usually used to refer to WGs of ISO/IEC JTC 1/SC 29).
* **WPP**: Wavefront parallel processing (usually synonymous with ECS).
* Block and unit names in HEVC:
  + **CTB**: Coding tree block (luma or chroma) – unless the format is monochrome, there are three CTBs per CTU.
  + **CTU**: Coding tree unit (containing both luma and chroma, synonymous with LCU), with a size of 16x16, 32x32, or 64x64 for the luma component.
  + **CB**: Coding block (luma or chroma), a luma or chroma block in a CU.
  + **CU**: Coding unit (containing both luma and chroma), the level at which the prediction mode, such as intra versus inter, is determined in HEVC, with a size of 2Nx2N for 2N equal to 8, 16, 32, or 64 for luma.
  + **PB**: Prediction block (luma or chroma), a luma or chroma block of a PU, the level at which the prediction information is conveyed or the level at which the prediction process is performed in HEVC.
  + **PU**: Prediction unit (containing both luma and chroma), the level of the prediction control syntax within a CU, with eight shape possibilities in HEVC:
    - **2Nx2N**: Having the full width and height of the CU.
    - **2NxN (or Nx2N)**: Having two areas that each have the full width and half the height of the CU (or having two areas that each have half the width and the full height of the CU).
    - **NxN**: Having four areas that each have half the width and half the height of the CU, with N equal to 4, 8, 16, or 32 for intra-predicted luma and N equal to 8, 16, or 32 for inter-predicted luma – a case only used when 2N×2N is the minimum CU size.
    - **N/2x2N** paired with **3N/2x2N** or **2NxN/2** paired with **2Nx3N/2**: Having two areas that are different in size – cases referred to as AMP, with 2N equal to 16 or 32 for the luma component.
  + **TB**: Transform block (luma or chroma), a luma or chroma block of a TU, with a size of 4x4, 8x8, 16x16, or 32x32.
  + **TU**: Transform unit (containing both luma and chroma), the level of the residual transform (or transform skip or palette coding) segmentation within a CU (which, when using inter prediction in HEVC, may sometimes span across multiple PU regions).
* Block and unit names in VVC:
  + **CTB**: Coding tree block (luma or chroma) – there are three CTBs per CTU in a P or B slice or in an I slice that uses a single tree, and one CTB per luma CTU and two CTBs per chroma CTU in an I slice that uses separate trees.
  + **CTU**: Coding tree unit (synonymous with LCU, containing both luma and chroma in a P or B slice or in an I slice that uses a single tree, containing only luma or only chroma in an I slice that uses separate trees), with a size of 16x16, 32x32, 64x64, or 128x128 for the luma component.
  + **CB**: Coding block, a luma or chroma block in a CU.
  + **CU**: Coding unit (containing both luma and chroma in P/B slice, containing only luma or chroma in I slice), a leaf node of a QTBT. It’s the level at which the prediction process and residual transform are performed in JEM. A CU can be square or rectangle shape.
  + **PB**: Prediction block, a luma or chroma block of a PU.
  + **PU**: Prediction unit, has the same size as a CU in the VVC context.
  + **TB**: Transform block, a luma or chroma block of a TU.
  + **TU**: Transform unit, has the same size as a CU in the VVC context.

## Standards, TRs, supplements and technical papers approval and publication status (update)

* MPEG-2 | H.262 (coding specification is common text)
  + ITU-T H.262 V3 was approved in 2012-02; Amd.1 was approved in 2013-03 and was not published separately; it was instead incorporated directly into the V3 text and published 2013-09
  + ISO/IEC 13818-2:2013 (Ed. 3) FDIS ballot closed 2012-05-08; FDAM 1 ballot closed 2013-04-12 and was not published separately; it was instead incorporated directly into the V3 text and published 2013-10
  + Conformance testing (not joint with ITU-T)
    - ISO/IEC 13818-4:2004 (Ed. 2) FDIS closed 2004-08-22, published 2004-12-12; it specifies conformance testing for Part 1 (Systems), Part 2 (Video), Part 3 (Audio), and Part 7 (AAC)
    - ISO/IEC 13818-4:2004/Amd 3:2009 Level for 1080@50p/60p conformance testing
    - Cor 1:2007, Cor 2:2009, Cor 3:2012, Cor 4:2011 may also have video relevance
  + Reference software (not joint with ITU-T)
    - ISO/IEC TR 13818-5:2005 (Ed. 2) FDIS closed 2005-07-24, published 2005-10; it specifies reference software for Part 1 (Systems), Part 2 (Video), Part 3 (Audio), Part 7 (AAC) and Part 11 (IPMP)
* AVC (twin text)
  + ITU-T H.264 V14 was Consented at 22nd meeting on 2021-04-30 (with annotated regions, shutter interval, and miscellaneous corrections), approved 2021-08-22, published 2021-10-13
  + ISO/IEC 14496-10:2020 (Ed. 9) FDIS ballot closed 2020-11-27, published 2020-12-15
  + ISO/IEC 14496-10:2022 (Ed. 10), had been forwarded from DIS directly for publication 2022-01-21 (with annotated regions, shutter interval, and miscellaneous corrections) with an editing period, submitted to ITTF in 2022-05 after consultation with ISO staff on format of graphics files, upgraded to “DIS approved for registration” in ISO Project system 2022-07-04, published 2022-11-07
  + Preliminary draft text for YCgCo-Re and YCgCo-Ro issued at 26th meeting, second draft including SMPTE ST 2128 IPT-PQ-C2 issued at 28th meeting 2022-10, third draft issued at 29th meeting 2023-01, fourth draft issued at 30th meeting 2023-04, formal project requested and CD of 11th edition issued at 31st meeting 2023-07, DIS issued at 32nd meeting 2023-10, DAM ballot closed 2024-04-15.
    - H.264 V15 Consented 2024-04-26, last call began 2024-07-16, approved 2024-08-13, published 2024-11-13 (after the current meeting)
    - ISO/IEC 14496-10 (Ed. 11) FDIS issued at 34th meeting 2024-04, DIS approved for registration as FDIS 2024-09-17, pending FDIS ballot
  + Conformance testing (twin text)
    - ITU-T H.264.1 V6 Approved 2016-02-13, published 2016-06-17
    - Various amendments of ISO/IEC 14496-4:2004, including:
      * ISO/IEC 14496-4:2004/AMD 6:2005 Advanced Video Coding conformance
      * ISO/IEC 14496-4:2004/AMD 9:2006 AVC fidelity range extensions conformance
      * ISO/IEC 14496-4:2004/AMD 30:2009 Conformance testing for new profiles for professional applications
      * ISO/IEC 14496-4:2004/AMD 31:2009 Conformance testing for SVC profiles
      * ISO/IEC 14496-4:2004/AMD 38:2010 Conformance testing for Multiview Video Coding
      * ISO/IEC 14496-4:2004/AMD 41:2014 Conformance testing of MVC plus depth extension of AVC
      * ISO/IEC 14496-4:2004/AMD 42:2014 Conformance testing of Multi-Resolution Frame Compatible Stereo Coding extension of AVC
      * ISO/IEC 14496-4:2004/AMD 43:2015 3D-AVC conformance testing
      * ISO/IEC 14496-4:2004/AMD 45:2016 Conformance Testing for the Multi-resolution Frame Compatible Stereo Coding with Depth Maps Extension of AVC
  + Reference software (twin text)
    - ITU-T H.264.2 V7 Approved 2016-02-13, published 2016-05-30
    - Various amendments of ISO/IEC 14496-5:2001 have been published, including:
      * ISO/IEC 14496-5:2001/AMD 6:2005 Advanced Video Coding (AVC) and High Efficiency Advanced Audio Coding (HE AAC) reference software
      * ISO/IEC 14496-5:2001/AMD 8:2006 AVC fidelity range extensions reference software
      * ISO/IEC 14496-5:2001/AMD 15:2010 Reference software for Multiview Video Coding
      * ISO/IEC 14496-5:2001/AMD 18:2008 Reference software for new profiles for professional applications
      * ISO/IEC 14496-5:2001/AMD 19:2009 Reference software for Scalable Video Coding
      * ISO/IEC 14496-5:2001/AMD 33:2015 Reference software for MVC plus depth extension of AVC
      * ISO/IEC 14496-5:2001/AMD 34:2014 Reference software of the multi-resolution frame compatible stereo coding of AVC
      * ISO/IEC 14496-5:2001/AMD 35:2015 3D-AVC Reference software
      * ISO/IEC 14496-5:2001/AMD 39:2016 Reference software for the Multi-resolution Frame Compatible Stereo Coding with Depth Maps of AVC
      * ISO/IEC 14496-5:2001/AMD 42:2017 Reference software for the alternative depth information SEI message extension of AVC
* HEVC (twin text)
  + ITU-T H.265 V7 approved 2019-11-29, published 2020-01-10
  + ISO/IEC 23008-2:2020 (Ed. 4) FDIS ballot closed 2020-07-16, published 2020-08-27
  + ITU-T H.265 V8 Consented at the 22nd meeting (shutter interval information SEI message and miscellaneous corrections), published 2020-10-13
  + ISO/IEC 23008-2:2020/AMD 1:2021 (shutter interval information SEI message) published 2021-07-12
  + ISO/IEC 23008-2:2023 (Ed. 5) began as CDAM 2 High-range levels output of 25th meeting of January 2022, CDAM ballot closed 2022-04-15, conversion to 5th edition with miscellaneous corrections planned at 26th meeting of 2022-04, text submitted for DIS ballot 2022-07-10, DIS ballot closed 2023-01-10, FDIS issued 29th meeting of 2023-01, FDIS ballot opened 2023-08-06, closed 2023-10-02, published 2023-10-30
  + ITU-T H.265 V9 Consented at 31st meeting 2023-07, approved 2023-09-13, and pre-published 2023-09, published 2023-11-24.
  + Preliminary draft HEVC text for YCgCo-Re and YCgCo-Ro issued at 26th meeting 2022-04, second draft including SMPTE ST 2128 issued at 28th meeting 2022-10, third draft at 29th meeting 2023-01, fourth draft at 30th meeting 2023-04, formal work item requested and CDAM1 issued 31st meeting 2023-07, DAM issued with new profiles and SEI messages at 32nd meeting 2023-10, DAM ballot closed 2024-04-08
    - H.265 V10 Consented 2024-04-26, last call opened 2024-07-01, closed 2024-07-28, approved 2024-07-29, pre-published 2024-08-06, published 2024-10-07
    - ISO/IEC 23008-2 (Ed. 6) FDIS issued from 35th meeting 2024-04, DIS approved for registration as FDIS 2024-10-03, FDIS registered for formal approval 2024-10-13, pending FDIS ballot
  + Conformance testing (twin text)
    - ITU-T H.265.1 V3 approved 2018-10-14, published 2019-01-15
    - ISO/IEC 23008-8:2018 (Ed. 2) Conformance specification for HEVC, published 2018-08-06
    - ISO/IEC 23008-8:2018/AMD 1:2019 Conformance testing for HEVC screen content coding (SCC) extensions and non-intra high throughput profiles, published 2019-10-15
  + Reference software (twin text)
    - ITU-T H.265.2 V4 approved 2016-12-22, published 2017-04-10
    - ISO/IEC 23008-5:2017 (Ed. 2) Reference software for high efficiency video coding, published 2017-03-01
    - ISO/IEC 23008-5:2017/AMD 1:2017 Reference software for screen content coding extensions, published 2017-11-09
* VVC (twin text)
  + ITU-T H.266 V1 approved 2020-08-29, published 2020-11-10
  + ISO/IEC 23090-3:2021 (Ed. 1) published 2021-02-16
  + ITU-T H.266 V2 with operation range extensions, Consented 2022-01-28, Last Call began 2022-04-01, Approved 2022-04-29, pre-published 2022-06-06, published 2022-07-12
  + ISO/IEC 23090-3:2022 (Ed. 2) with operation range extensions, approval at WG level to proceed to FDIS 2022-01-21, FDIS ballot opened 2022-06-29, closed 2022-08-24, published 2022-09-25
  + ISO/IEC 23090-3:2024 (Ed. 3), initated as (Ed. 2) / Amd.1 New level and systems-related supplemental enhancement information, CDAM 1 issued from 26th meeting, ballot closed 2022-07-14, DAM 1 issued from 27th meeting, ballot closed 2023-01-03, FDIS issued at WG level 2023-07, FDIS ballot opened 2024-05-11, closed 2024-06-26, published 2024-07-17
  + ITU-T H.266 V3 Consented 2023-07, approved 2023-09-29 and pre-published 2023-09, published 2023-11-29
  + ISO/IEC 23090-3:2024/CDAM 1 Request & CDAM issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, consultation initiated 2024-09-05, closed 2024-10-31, ready for action at the current meeting
  + Conformance testing (twin text)
    - ITU-T H.266.1 V1 Consented 2022-01-28, Last Call began 2022-04-01, Approved 2022-04-29, pre-published 2022-05-17, published 2022-07-12
    - ISO/IEC 23090-15:2022 (Ed. 1) approval at WG level to proceed to FDIS 2022-10-15, upgraded to “DIS approved for registration” in ISO Projects system 2021-10-24, upgraded to “FDIS registered for formal approval” 2022-07-11, FDIS ballot closed 2022-11-04, published 2022-11-24
    - ISO/IEC 23090-15:2024 (Ed. 2) began as Amd.1 Operation range extensions – CDAM 1 issued from 24th meeting 2021-10, DAM 1 issued from 25th meeting 2022-01-21, upgraded to “CD approved for registration as DIS” status in ISO Projects system 2022-05-31, upgraded to “DIS registered” 2022-06-22, DAM ballot closed 2022-11-15, consolidated into FDIS 2nd edition issued as an output of the 29th meeting in January 2023, ballot opened 2024-04-08, closed 2024-06-03, published 2024-07-04.
    - ITU-T H.266.1 V2 Consented 2023-07, approved 2023-09-13 and pre-published 2023-09, published 2023-10-19
  + Reference software (twin text)
    - ITU-T H.266.2 V1 Consented 2022-01-28, Last Call began 2022-04-01, Approved 2022-04-29, pre-published 2022-05-17, published 2022-07-12
    - ISO/IEC 23090-16:2022 V1 approval at WG level to proceed to FDIS 2022-01-21, upgraded to “DIS approved for registration” status in ISO Projects system 2022-04-21, upgraded to “FDIS registered for formal approval” 2022-04-22, FDIS ballot initiated 2022-07-24, FDIS ballot closed 2022-09-19, published 2022-10-23
    - H.266.2 V2 Consented 2024-04-26, last call opened 2024-05-16, closed 2024-06-12, approved 2024-06-13, pre-published 2024-08-06, published 2024-10-09
    - ISO/IEC 23090-16:202x (Ed. 2) Request & CD issued 2024-04, consultation deferred due to meeting timing, consultation initiated 2024-09-06, closed 2024-11-01, ready for action at the current meeting (Roughly corresponding H.266.2 V2 already approved and published in ITU-T)
* VSEI (twin text)
  + ITU-T H.274 V1 approved 2020-08-29, published 2020-11-10
  + ISO/IEC 23002-7:2021 (Ed. 1) published 2021-01-28
  + ITU-T H.274 V2 Consented 2022-01-28, Last Call began 2022-04-01, Approved 2022-05-22 (after 1 Last Call comment and Additional Review), pre-published 2022-06-17, published 2022-07-25
  + ISO/IEC 23002-7:2022 (Ed. 2) approval at WG level to proceed to FDIS 2022-01-21, upgraded to “DIS approved for registration” status in ISO Projects system 2022-05-05 and “FDIS registered for formal approval” 2022-05-08, FDIS ballot closed 2022-09-27, published 2022-10-30
  + ISO/IEC 23002-7:2024 (Ed. 3) began as (2nd Ed.) Amd.1 Request for new edition and CD for additional SEI messages issued at 27th meeting, ballot closed 2022-10-10, DAM registered 2022-11-13, DAM ballot closed 2022-04-06, FDIS 3rd edition issued 2023-07, FDIS ballot began 2024-07-25, closed 2024-09-20, published 2024-10-30
  + ITU-T H.274 V3 Consent 2023-07, approved 2023-09-29, pre-published 2023-10-11, published 2024-03-12.
  + ISO/IEC 23002-7:202x (Ed. 3) Request & CDAM 1 issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, CD consultation initiated 2024-09-05, closed 2024-10-31, ready for action at the current meeting
* CICP (twin text)
  + ISO/IEC 23091-2:2021 (Ed. 2) had been forwarded from DIS directly for publication in 2021-04 and published 2021-10-18
  + ITU-T H.273 V2 (with 4:2:0 sampling alignment and corrections for range of values for sample aspect ratio, ICTCP equations for HLG, and transfer characteristics function for sYCC of IEC 61966-2-1) Consented on 2021-04-30, Last Call closed during the 23rd meeting with approval on 2021-07-14, published 2021-09-24
  + ISO/IEC 23091-2:202x (Ed. 3) Request for new edition and CD for new edition (including YCgCo-Re and YCoCg-Ro) issued at 27th meeting, ballot closed 2022-10-10, DIS registered 2022-11-13, DIS ballot closed 2023-04-06, preliminary draft text for including SMPTE ST 2128 issued at 28th meeting, incorporated into preliminary FDIS at 30th meeting 2023-04, FDIS issued 2024-04 (after waiting for publication of SMPTE ST 2128, then proceeding), FDIS registered for formal approval 2024-10-24, pending FDIS ballot.
  + ITU-T H.273 V3 Consent 2023-07, approved 2023-09, not published due to waiting for publication of SMPTE ST 2128.
  + ITU-T H.273 V4 Consented 2024-04-26, last call opened 2024-06-16, closed 2024-07-13, approved 2024-07-14, pre-published 2024-08-06, published 2024-10-07.
* Conversion and coding practices for HDR/WCG Y′CbCr 4:2:0 video with PQ transfer characteristics (twin text)
  + H.Sup15 V1, approved 2017-01-27, published 2017-04-12
  + ISO/IEC TR 23008-14:2018 (Ed. 1) published 2018-08-06
* Signalling, backward compatibility and display adaptation for HDR/WCG video coding (twin text)
  + H.Sup18 V1, approved 2017-10-27, published 2018-01-18
  + ISO/IEC TR 23008-15:2018 (Ed. 1) published 2018-08
* Usage of video signal type code points (twin text)
  + H.Sup19 V3 approved 2021-04-30, published 2021-06-04
  + ISO/IEC TR 23091-4 (Ed. 3) published 2021-05-23
* Working practices using objective metrics for evaluation of video coding efficiency experiments (twin text)
  + HSTP-VID-WPOM V1 approved 2020-07-03, published 2020-11
  + ISO/IEC TR 23002-8 (Ed. 1) published 2021-05-20
* Film grain synthesis technologies for video applications (twin text)
  + ISO/IEC TR 23002-9:2024 (Ed. 1) Request for subdivision and WD 1 issued at 25th meeting 2022-01-21, WD 2 issued at 27th meeting, WD 3 issued at 28th meeting, CDTR issued at 29th meeting 2023-01, consultation period ended 2023-07-09, DTR text was issued from the 31st meeting in July 2023, put on hold by ISO staff editors, DTR ballot opened 2024-03-05, closed 2024-04-30, NB comments handled by ISO staff editor in consultation with project editors, published 2024-07-24
  + ITU-T provisional name H.Sup-FGST
* Optimization of encoders and receiving systems for machine analysis of coded video content (twin text)
  + ISO/IEC 23888-3 (Ed. 1) Request for subdivision issued from 33rd JVET meeting 2024-01, CDTR issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, consultation further deferred due to meeting timing, ready for action at the current meeting
  + ITU-T provisional name H.Sup-MACVC
* The following freely available standards are published here in ISO/IEC:  
  <https://standards.iso.org/ittf/PubliclyAvailableStandards/index.html> as of the time of the current meeting:
  + ISO/IEC 13818-4:2004 Conformance for MPEG-2
  + ISO/IEC 13818-4:2004/Amd 3:2009 Level for 1080@50p/60p conformance testing
  + ISO/IEC TR 13818-5:2005 Software simulation for MPEG-2
  + Various amendments of ISO/IEC 14496-4:2004 Conformance for AVC
  + Various amendments of ISO/IEC 14496-5:2001 Reference software for AVC
  + ISO/IEC 14496-10:2022 (Ed. 10) AVC
  + ISO/IEC 23090-16:2022 (Ed. 1) Reference software for VVC
  + ISO/IEC 23091-2:2021 (Ed. 2) Video CICP
* The following standards that have been intended by JVET to be publicly available were not available at <https://standards.iso.org/ittf/PubliclyAvailableStandards/index.html> as of the time of the current meeting. (These should be checked for previously issued requests for free availability.)
  + ISO/IEC 23002-7:2024 (Ed. 3) – VSEI
  + ISO/IEC 23008-2:2023 (Ed. 5) HEVC, published 2023-10-30
  + ISO/IEC 23008-5:2017 (Ed. 2) Reference software for HEVC, published 2017-03-01
  + ISO/IEC 23008-5:2017/AMD 1:2017 Reference software for HEVC screen content coding extensions, published 2017-11-09
  + ISO/IEC 23008-8:2018 (Ed. 2) Conformance specification for HEVC, published 2018-08-06
  + ISO/IEC 23008-8:2018/AMD 1:2019 Conformance testing for HEVC screen content coding (SCC) extensions and non-intra high throughput profiles, published 2019-10-15
  + ISO/IEC 23090-3:2024 (Ed. 3) VVC, published 2024-07-17
  + ISO/IEC 23090-15:2024 (Ed. 2) Conformance specification for VVC, published 2024-07-04.
* It appears necessary to check if all older software and conformance packages are publicly available – it might be that it was never requested, e.g. for those that were produced by JCT-3V. This topic was left TBD until the next meeting – perhaps it would be best to compile a list of all relevant software and conformance parts of AVC, HEVC, MPEG-2 aka H.262, CICP, and request these in bulk.

## Draft standards progression status (update)

* VVC ISO/IEC 23090-3:2024/CDAM 1, Request & CDAM issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, consultation initiated 2024-09-05, closed 2024-10-31, ready for action at the current meeting.
* VVC reference software ISO/IEC 23090-16:202x (Ed. 2) Request & CD issued 2024-04, consultation deferred due to meeting timing, consultation initiated 2024-09-06, closed 2024-11-01, ready for action at the current meeting. (Roughly corresponding H.266.2 V2 already approved and published in ITU-T.)
* VSEI ISO/IEC 23002-7:202x (Ed. 3) / CDAM 1 Request & CDAM issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, CD consultation initiated 2024-09-05, closed 2024-10-31, ready for action at the current meeting.
* Film grain synthesis technology for video applications – JVET draft 4 and the ISO/IEC 23002-9 CDTR were issued at the 29th meeting (JVET-AC2020) (a request to start work on the TR had been made at the 25th meeting), and the CDTR consultation period ended 2023-07-09. A DTR text was issued from the 31st meeting in July 2023, put on hold by ISO staff editors, DTR ballot opened 2024-03-05, closed 2024-04-30, NB comments handled by ISO staff editor in consultation with project editors, published 2024-07-24. ITU-T provisional name H.Sup-FGST. ITU-T approval delayed to January 2025 due to the delay on the ISO/IEC side.
* Optimization of encoders and receiving systems for machine analysis of coded video content – ISO/IEC 23888-3 Request for subdivision issued from 33rd JVET meeting 2024-01, CDTR issued 2024-04, consultation deferred due to meeting timing, updated text issued 2024-07, consultation further deferred due to meeting timing, ready for action at the current meeting. ITU-T provisional name H.Sup-MACVC.
* A request for free availability in ISO/IEC has to be made for each edition, amendment and corrigendum, and the request needs to be approved in the WG 5 Recommendations. A request form also needs to be filled out (but the form does not need to be issued as a WG 5 document). A freely available URL for the ITU publication should be provided for the following parts:
  + For the ongoing work items, when they become finalized
  + ISO/IEC 23008-2:2020/Amd.1:2021 – HEVC FDAM issued 20th meeting (October 2020), public availability not yet requested but may not be necessary as it becomes included in next edition

## Opening remarks

Remarks during the opening session of the meeting Tuesday 14 January at 0930 CET were as follows.

* Timing and organization of the meeting and online access and calendar posting of session plans were reviewed
  + The initial number of documents was slightly lower than in last meeting (approximately 205 vs. 220 by the time of opening the meeting) – parallel sessions were announced to be necessary.
  + Evening sessions may also be necessary, typically expecting to meet until around 2000.
  + Parallel sessions starting the afternoon of the first day (EE and HLS), and probably continuing until the weekend.
  + Friday 1400-1830: Joint ITU/ISO workshop on “Future video coding – advanced signal processing, AI and standards” – no JVET meeting in parallel with that, but sessions may resume thereafter. Separate registration is necessary for the workshop.
* In the context of registration for JVET in the ITU website, it was found that some experts (also some who had participated in-person in the previous meeting) were neither listed as WG 5 nor as ITU members. In most cases this could be clarified, confirming that the process of becoming member of one of the parent bodies was experiencing delays. It will be necessary to enforce this check for qualification more severely in the future, also for online participants.
* It was noted that the JVET document template has a new header with WP3/21 as ITU parent body. Roughly half of the uploaded inputs obviously used own edits of old documents with the old header.
* Plans for subsequent hybrid meetings (with best-effort remote access) were reviewed:June/July 2025 (Daejeon), Oct. 2025 (Geneva), April 2026 (Santa Eulària), June/July 2026 (Geneva, dates to be clarified).
* March/April 2025 and January 2026 meetings will be virtual. Considering the rigid time constraints of virtual meetings, and considering the increased number of input documents since the last virtual meeting in January 2024, it my be necessary to extend them by one or two days, or meet over weekends.
* Depending on the status of preparing future standardization activities, it may be necessary to extend the duration of meetings, anyway (both for hybrid and virtual)
* Significant workload can be expected at this meeting for AHG17 activities – possible need of having a hybrid AHG meeting in Aachen during second week of March
* The meeting logistics, agenda, working practices, policies, and document allocation considerations were reviewed.
  + Access to the meeting was provided using Zoom. The meeting notes by the session chair were to be continually shared via zoom screen sharing. In the meeting room C, it is also possible to show them on a separate projection screen in parallel with another presentation.
  + Having text and software available is crucial (and not just arriving at the end of the meeting).
* The results of the previous meeting and the meeting report JVET-AJ1000 were reviewed. Only minor issues in the meeting report were noted and were not considered sufficient to warrant issuing a revision.
* At the current meeting, on-site attendance will be recorded via the traditional sign-in sheet. Participants were asked to correct their affiliation and email in case these changed.
* All cross-check documents were, but number of late non-cross-check documents seemed to have slightly increased relative to the last meeting. Several contributions did not report any results initially, and were also flagged as late. There were no objections voiced in the opening plenary to the consideration of late contributions.
* There were again a few documents registered where authors’ given names were not abbreviated according to the JVET custom (which helps produce shorter headings in the JVET meeting report), and/or company affiliation was missing in the authors’ list. Participants were reminded to stick to JVET’s conventions.
* Experts were asked not to pick a specific JVET number for regular documents – this function is reserved for AHG reports, summary reports, and output docs. Reserving numbers without filling a precise title shall also be avoided – the chair may flag such documents as withdrawn, as they cannot be allocated to a certain category in the meeting notes.
* Experts were asked to always register JVET documents via the “jvet-experts.org” site, not via the MPEG DMS site, as WG 5 docs (as that feature of the DMS site has not been working properly).
* Experts were asked to inform the chair when the title of a document is changed, or if authors are added. Otherwise, that might not be correct in the meeting notes. Provisional titles such as “EEx contribution” shall be avoided.
* The practice introduced in the last meeting, submitting WG 5 N-numbered output documents only in cases of standards text submitted for ballot, DoCs, standards/parts requests, and meeting reports has turned out to be useful. It is basically the same practice that had always been exercised on the ITU side.
* Document JVET-AJ1012 was produced, which includes the changes in the sites for hosting the JVET test sequences, as well as the new location of JCT-VC and JCT-3V documents. Only the newest versions of the JCT-VC and JCT-3V documents are available from the links in the JVET site, but it is still planned to provide all approved versions in the future (although this may take some time). During or after the current meeting, It is further planned to set up a second source for JVET, JCT-VC and JCT-3V docs in the ITU ftp directories of each meeting. This will include all versions of documents with original upload times.
* The following ballot results had become available through the SC 29 secretariat (kept for future use).
  + …
* DAM/DIS for VVC and VSEI could be done at the current meeting, but we no ballot results could become available in time for the March/April meeting. The FDAM/FDIS could be in July 2025 at the earliest. This might be achieved with a very long editing period (potentially reaching into the next meeting). Another option would be to target the 4th editions for October 2025, both for ITU-T and ISO/IEC, and send them to ballot early in April, such that still improvements might be made during the March/April meeting.
* The CDTR on machine analysis was submitted, but it would be necessary that the VSEI v4 Amd. reaches DAM/DIS stage before it is promoted to TR (as SEI messages in VSEI v4 are referred to in the draft of the TR). Procedurally, no discussions about this document can be conducted during the current meeting (or new elements to be foreseen for a future edition?).
* DIS of VVC software was submitted for ballot – matching the ITU edition that was issued in April. A next edition could be targeted for October, considering implementations of new SEI messages.
* The primary goals of the meeting were:
  + Film grain TR to be submitted for ITU consent – which version?
  + New versions of VVC and VSEI (JVET-AK2005/2006, <preliminary> DAM texts, not for ITU consent yet)
  + In the last meeting, a new edition of HEVC software was considered to be possible at the current meeting. This would however depend on the implementation status of the software for the new multiview profiles (provided they would be complete).
  + Any action items on reference software JM?
  + Lot of activity in AHG17 – planning of viewing sessions needed.
  + Any viewing for film grain and multi-layer?
  + Exploration Experiments
    - Neural network-based video coding
    - Enhanced compression beyond VVC
  + Any liaison communication (through ITU)?
* New training materials for NNVC – extended BVI set.
* It was suggested that the VVC white paper could benefit from an update, and generating a separate one on VSEI would be useful – first draft in the current meeting?
* Joint meetings were expected with MPEG AG 5 (on matters involving visual quality assessment), with MPEG WG 2 Requirements and ITU-T VCEG on future video standardization. Joint meetings will be held in ITU premises, not in Crowne Plaza Hotel where other MPEG WGs will meet. (see section 7.3).
* JVET cannot meet during plenaries of the ITU parent body (and will need to finish by Wednesday next week around lunchtime). Due to time constraints, JVET sessions will be held during MPEG WGs’ information exchange meetings on Monday morning and Wednesday morning.
* As a follow-up to liaison communication after the April meeting, parent bodies should conduct discussion about future JVET management structures. SC 29 had requested all MPEG WGs to appoint convener support teams by January 2025 at latest.
* Principles of standards development were discussed.
* Scheduling of sessions was discussed – see under sections 2.6 and 2.12.

## Scheduling of discussions

The times of the meeting sessions followed the needs of the onsite meeting arrangements, with highest priority given to the aim of achieving the goals of the meeting. Typical meeting hours were expected to be in the range of 0900-2000 CET with coffee breaks and lunch breaks as appropriate. Sessions were announced in the JVET calendar and the ITU schedule system as far as possible in advance, although it was acknowledged that some activities (such as breakout sessions) might be held at short notice.

Particular scheduling notes are shown below, although not necessarily 100% accurate or complete. Times are recorded in the local timezone of the meeting venue, except as otherwise noted:

* Tue. 14 Jan., 1st day
  + Morning session:
    - 0930–XXXX Opening remarks, review of practices, agenda, IPR policy reminder
    - XXXX–XXXX Reports of AHGs XX-XX
  + Afternoon sessions:
    - XXXX–XXXX Reports of AHGs XX
    - XXXX–XXXX EEX review (XX room)
    - XXXX–XXXX HLS (XX room, chaired by XXX)
* Wed. 15 Jan., 2nd day
  + Morning sessions:
    - …
  + Afternoon sessions:
    - …
* Thu. 16 Jan., 3rd day
  + Morning sessions:
    - …
  + Afternoon sessions:
    - …
* Fri. 17 Jan., 4th day
  + Morning sessions:
    - …
  + 1400–1830 Workshop on “Future video coding – advanced signal processing, AI and standards” – announcement/registration [on the ITU website](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2025/0117/Pages/default.aspx)
  + Evening sessions:
    - …
* …
* Wed. 22 Jan., 8th day
  + 0900–XXX Wrapup plenary:
    - Remaining revisits
    - EE descriptions, DoCRs
    - BoG reports
    - Establishment of AHGs
    - Review and approval of output docs
    - Software timelines
    - Approval of WG 5 meeting recommendations
    - Future planning, a.o.b.

## Contribution topic overview (update)

The approximate subject categories and quantity of contributions per category for the meeting were summarized as follows (note that the noted document counts do not include crosschecks and summary reports, and may not be completely accurate; documents which are allocated to multiple sections are only counted in one of them):

* AHG reports (16) (section 3)
* Project development (section 4)
  + AHG1: Development, deployment and advertisement of standards (6)
  + AHG2: Text development and errata reporting (2)
  + AHG3: Test conditions (0)
  + AHG3: Software development (2)
  + AHG4: Subjective quality testing and verification testing (2)
  + AHG4: Test and training material (3)
  + AHG4: Codec performance with alternative test material and non-CTC conditions (0)
  + AHG5: Conformance test development (0)
  + AHG7: ECM tool assessment (2)
  + AHG8: Optimization of encoders and receiving systems for machine analysis of coded video content (7)
  + AHG10: Encoding algorithm optimization (3)
  + AHG13: Film grain synthesis (0)
  + Implementation studies (3)
  + Profile/tier/level specification (3)
  + Gaming content compression (5)
  + Generative face video (1)
* Low-level tool technology proposals (section 5) with subtopics (number counts excluding BoG and summary reports)
  + AHG11/AHG14 and EE1: Neural network-based video coding (26) (section 5.1)
  + AHG6/AHG12 and EE2: Enhanced compression beyond VVC capability (94) (section 5.2)
* AHG9: High-level syntax (HLS) proposals (section 6) with subtopics
  + SEI messages in VSEIv4 (32) (section 6.1)
  + SEI messages in TuC doc (29) (section 6.2)
  + SEI messages on other topics (4) (section 6.3)
  + Non-SEI HLS aspects (0) (section 6.4)
* Joint meetings, plenary discussions, BoG reports (2) liaison (3), summary of actions (section 7)
* Project planning (section 8)
* Establishment of AHGs (section 9)
* Output documents (section 10)
* Future meeting plans and concluding remarks (section 11)

The document counts above do not include cross-checks and summary reports.

# AHG reports (16)

These reports were discussed during XXXX–XXXX on Tuesday 14 Jan. 2025 (chaired by JRO).

[JVET-AK0001](https://jvet-experts.org/doc_end_user/current_document.php?id=15168) JVET AHG report: Project Management (AHG1) [J.-R. Ohm (chair), G. J. Sullivan (vice chair)]

[JVET-AK0002](https://jvet-experts.org/doc_end_user/current_document.php?id=15169) JVET AHG report: Draft text and test model algorithm description editing (AHG2) [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)]

[JVET-AK0003](https://jvet-experts.org/doc_end_user/current_document.php?id=15170) JVET AHG report: Test model software development (AHG3) [F. Bossen, X. Li, K. Sühring (co-chairs), E. François, Y. He, K. Sharman, V. Seregin, A. Tourapis (vice chairs)]

[JVET-AK0004](https://jvet-experts.org/doc_end_user/current_document.php?id=15171) JVET AHG report: Test material and visual assessment (AHG4) [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)]

[JVET-AK0005](https://jvet-experts.org/doc_end_user/current_document.php?id=15172) JVET AHG report: Conformance testing (AHG5) [I. Moccagatta (chair), F. Bossen, T. Ikai, S. Iwamura, H.-J. Jhu, K. Kawamura, P. de Lagrange, S. Paluri, K. Sühring, Y. Yu (vice chairs)]

[JVET-AK0006](https://jvet-experts.org/doc_end_user/current_document.php?id=15173) JVET AHG report: ECM software development (AHG6) [V. Seregin (chair), J. Chen, R. Chernyak, F. Le Léannec, K. Zhang (vice-chairs)]

[JVET-AK0007](https://jvet-experts.org/doc_end_user/current_document.php?id=15174) JVET AHG report: ECM tool assessment (AHG7) [X. Li (chair), L.-F. Chen, Z. Deng, J. Gan, E. François, R. Ishimoto, H.-J. Jhu, X. Li, J. Pardo, H. Wang (vice chairs)]

[JVET-AK0008](https://jvet-experts.org/doc_end_user/current_document.php?id=15175) JVET AHG report: Optimization of encoders and receiving systems for machine analysis of coded video content (AHG8) [S. Liu, J. Ström, S. Wang, M. Zhou (AHG chairs)]

[JVET-AK0009](https://jvet-experts.org/doc_end_user/current_document.php?id=15176) JVET AHG report: SEI message studies (AHG9) [S. McCarthy, Y.-K. Wang (co-chairs), J. Boyce, T. Chujoh, S. Deshpande, C. Fogg, M. M. Hannuksela, P. de Lagrange, G. J. Sullivan, H. Tan, A. Tourapis, S. Wenger (vice-chairs)]

[JVET-AK0010](https://jvet-experts.org/doc_end_user/current_document.php?id=15177) JVET AHG report: Encoding algorithm optimization (AHG10) [P. de Lagrange, A. Duenas, R. Sjöberg, A. Tourapis (AHG chairs)]

[JVET-AK0011](https://jvet-experts.org/doc_end_user/current_document.php?id=15178) JVET AHG report: Neural network-based video coding (AHG11) [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)]

[JVET-AK0012](https://jvet-experts.org/doc_end_user/current_document.php?id=15179) JVET AHG report: Enhanced compression beyond VVC capability (AHG12) [M. Karczewicz, Y. Ye, L. Zhang (co-chairs), B. Bross, R. Chernyak, X. Li, K. Naser, Y. Yu (vice-chairs)]

[JVET-AK0013](https://jvet-experts.org/doc_end_user/current_document.php?id=15180) JVET AHG report: Film grain technologies (AHG13) [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)]

[JVET-AK0014](https://jvet-experts.org/doc_end_user/current_document.php?id=15022) JVET AHG report: NNVC software development (AHG14) [F. Galpin (chair), R. Chang, Y. Li, Y. Li, M. Santamaria, J. N. Shingala, Z. Xie (vice-chairs)]

[JVET-AK0015](https://jvet-experts.org/doc_end_user/current_document.php?id=15181) JVET AHG report: Gaming content compression (AHG15) [S. Puri, J. Sauer (co-chairs), R. Chernyak, A. Duenas, L. Wang (vice chairs)]

[JVET-AK0016](https://jvet-experts.org/doc_end_user/current_document.php?id=15182) JVET AHG report: Generative face video compression (AHG16) [Y. Ye (chair), H.-B. Teo, Z. Lyu, S. McCarthy, S. Wang (vice chairs)]

[JVET-AK0017](https://jvet-experts.org/doc_end_user/current_document.php?id=15183) JVET AHG report: Testing of video coding technology beyond CTC (AHG17) [M. Wien (chair), Y. Ye, V. Baroncini, E. Alshina (vice chairs)]

# Project development (37)

## AHG1: Development, deployment and advertisement of standards (1)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0178](https://jvet-experts.org/doc_end_user/current_document.php?id=15149) AHG9: Proposed plan for initiating version 5 of VSEI [A. T. Hinds, S. Wenger (Tencent), P. de Lagrange, E. François (InterDigital)]

## AHG2: Text development and errata reporting (0)

This section is kept as a template for future use.

## AHG3: Test conditions (0)

This section is kept as a template for future use.

## AHG3: Software development (0)

This section is kept as a template for future use.

## AHG4: Subjective quality testing and verification testing (0)

This section is kept as a template for future use.

## AHG4: Test and training material (0)

This section is kept as a template for future use.

Proposals on new test materials are also included in 4.17 and 5.1.4

## Codec performance under non-CTC conditions (5)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0057](https://jvet-experts.org/doc_end_user/current_document.php?id=15028) [AHG3]?: NAL unit loss software [S. Wenger, A. Hinds, G. Teniou (Tencent)]

[JVET-AK0193](https://jvet-experts.org/doc_end_user/current_document.php?id=15164) Low latency Wi-Fi transmission simulation and suggestions on codec requirements [S. Ikonin, X. Ma, I. Gribushin, M. Sychev, V. Khamidullin, R. Shabaev, E. Alshina (Huawei)]

[JVET-AK0201](https://jvet-experts.org/doc_end_user/current_document.php?id=15188) On additional operation point for the exploration model [T. Solovyev, J. Pardo, J. Sauer, Z. Li, E. Alshina (Huawei)]

[JVET-AK0232](https://jvet-experts.org/doc_end_user/current_document.php?id=15221) On real-time test condition for limited uplink/storage use case and MTT depth suggestions on common test condition [T. Ikai (Sharp)]

[JVET-AK0236](https://jvet-experts.org/doc_end_user/current_document.php?id=15225) Use cases and requirement of next generation video coding standard for broadcasting services [S. Iwamura, S. Nemoto, A. Ichigaya (NHK)]

## AHG5: Conformance test development (0)

This section is kept as a template for future use.

## AHG7: ECM tool assessment (6)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0047](https://jvet-experts.org/doc_end_user/current_document.php?id=15017) AHG7: Complexity and memory footprint assessment of PDP, Neural Network-based Intra Prediction, MTS and LFNST/NSPT, and ALF in ECM-15 [G. Boisson, T. Dumas, F. Galpin, S. Puri, K. Naser, C. Bonnineau (InterDigital)]

[JVET-AK0048](https://jvet-experts.org/doc_end_user/current_document.php?id=15018) Report of AHG7 conference call [X. Li]

[JVET-AK0049](https://jvet-experts.org/doc_end_user/current_document.php?id=15019) AHG7: Analysis of MTS memory footprint and complexity [J. Gan (OPPO)]

[JVET-AK0067](https://jvet-experts.org/doc_end_user/current_document.php?id=15038) AHG7: Tool-off test results of LFNST extension and NSPT [M. Koo, J. Zhao, J. Lim, S. Kim (LGE)]

[JVET-AK0092](https://jvet-experts.org/doc_end_user/current_document.php?id=15063) AHG7: Inter LDB tool assessments for each ECM version [R. Ishimoto, Z. Fan, T. Chujoh, T. Ikai (Sharp)]

[JVET-AK0138](https://jvet-experts.org/doc_end_user/current_document.php?id=15109) AHG7: Intra tool assessments between ECM14 and ECM15 [C.-Y. Teng, K.-W. Liang, Y.-H. Lin, Y.-C. Yang, T. Ikai (Sharp)]

[JVET-AK0228](https://jvet-experts.org/doc_end_user/current_document.php?id=15217) AHG7: Tool-off test results of ALF fixed filters [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)] [late]

## AHG8: Optimization of encoders and receiving systems for machine analysis of coded video content (3+1)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0094](https://jvet-experts.org/doc_end_user/current_document.php?id=15065) AHG8: On combination of adaptive temporal resampling, pre-processing, post-processing and ROI-based adaptive QP algorithm for machine vision [S. Wang, J. Chen, Y. Ye, B. Li (Alibaba), S. Wang (CityUHK)]

[JVET-AK0122](https://jvet-experts.org/doc_end_user/current_document.php?id=15093) AHG8: Dense QP results for joint software [C. Hollmann, J. Ström (Ericsson)]

[JVET-AK0272](https://jvet-experts.org/doc_end_user/current_document.php?id=15261) Cross-check of JVET-AK0122 on SFU-HW dataset (AHG8: Dense QP results for joint software) [S. Wang (Alibaba)] [late]

[JVET-AK0289](https://jvet-experts.org/doc_end_user/current_document.php?id=15278) Cross-check of JVET-AK0122 on TVD dataset (AHG8: Dense QP results for joint software) [M. Xu (Tencent)] [late] [miss]

[JVET-AK0140](https://jvet-experts.org/doc_end_user/current_document.php?id=15111) AHG9/AHG8: Showcase for Packed regions information SEI [J. Boyce, H. Zhang, M. M. Hannuksela (Nokia)]

[JVET-AK0141](https://jvet-experts.org/doc_end_user/current_document.php?id=15112) AHG8: Add Packed regions info SEI to TR on coding video for machine consumption [J. Boyce, H. Zhang, M. M. Hannuksela (Nokia)]

## AHG10: Encoding algorithm optimization (2)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0052](https://jvet-experts.org/doc_end_user/current_document.php?id=15023) AHG10: Teleconference on encoder optimization for multi-layer coding [P. de Lagrange]

[JVET-AK0181](https://jvet-experts.org/doc_end_user/current_document.php?id=15152) AHG10: Suggested upgrade of CTC for random access for VTM [K. Andersson, P. Wennersten, J. Ström, W. Ahmad, V. Shchukin, D. Liu, J. Enhorn (Ericsson)]

## AHG13: Film grain synthesis (2+2)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0058](https://jvet-experts.org/doc_end_user/current_document.php?id=15029) [AHG9/AHG13] Comments on Film grain regions characteristics SEI message [S. Xie, P. Wu, Y. Gao, Y. Bai, C. Huang (ZTE)]

[JVET-AK0169](https://jvet-experts.org/doc_end_user/current_document.php?id=15140) AHG13: Film grain synthesis improvement using frequency shaping [P. de Lagrange (InterDigital)] [late]

[JVET-AK0197](https://jvet-experts.org/doc_end_user/current_document.php?id=15184) AHG13: on picture size for the interpretation of the FGC SEI message [P. de Lagrange, E. François (InterDigital)]

[JVET-AK0211](https://jvet-experts.org/doc_end_user/current_document.php?id=15200) AHG9/AHG13: Proposed Film Grain Region SEI message for version 5 of VSEI [S. Wenger, G. Teniou, A. T. Hinds (Tencent)]

## Implementation studies (2)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0258](https://jvet-experts.org/doc_end_user/current_document.php?id=15247) AHG9: Demo of real-time NNPF inference for VVC decoding on consumer laptop [J. Funnell, M. Santamaria, F. Cricri, M. M. Hannuksela, M. Pedzisz, R. Yang, S. Schwarz (Nokia)] [late]

[JVET-AK0274](https://jvet-experts.org/doc_end_user/current_document.php?id=15263) Development of VVC live encoder with content layering capability [S. Nemoto, S. Iwamura (NHK)] [late] [miss]

## Profile/tier/level specification (0)

This section is kept as a template for future use.

## Gaming content compression (AHG15) (4)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0081](https://jvet-experts.org/doc_end_user/current_document.php?id=15052) AHG6: wPSNR log output for gaming content in ECM [X. Liang, K. Choi (Kyung Hee Univ.)]

[JVET-AK0082](https://jvet-experts.org/doc_end_user/current_document.php?id=15053) AHG15: Analysis of ECM 12-bit internal bit depth in gaming content [X. Liang, K. Choi (Kyung Hee Univ.), S. Lee (Atins)]

[JVET-AK0083](https://jvet-experts.org/doc_end_user/current_document.php?id=15054) AHG15: Analysis of high-level control of intra prediction methods in gaming content [X. Liang, K. Choi (Kyung Hee Univ.), S. Lee (Atins)]

[JVET-AK0170](https://jvet-experts.org/doc_end_user/current_document.php?id=15141) AHG15: On the compression of depth maps from auxiliary data [J. Sauer, T. Solovyev, E. Alshina (Huawei)]

## Generative face video (AHG16) (2)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0068](https://jvet-experts.org/doc_end_user/current_document.php?id=15039) AHG16: GFVC Extension of the VVC Standard [L. Liu, C. Jung (Xidian Univ.)]

[JVET-AK0069](https://jvet-experts.org/doc_end_user/current_document.php?id=15040) AHG16: QP-Adaptive GFVC [W. Kang, L. Liu, C. Jung (Xidian Univ.)]

## Testing for future standardization (AHG17) (10)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

Some aspects discussed under 4.7 could also be relevant here.

[JVET-AK0041](https://jvet-experts.org/doc_end_user/current_document.php?id=15011) AHG17: Materials for assisting sequence selection for non-CTC testing [J. Pardo, J. Sauer (Huawei)]

[JVET-AK0042](https://jvet-experts.org/doc_end_user/current_document.php?id=15012) AHG17: AhG meeting notes [M. Wien]

[JVET-AK0043](https://jvet-experts.org/doc_end_user/current_document.php?id=15013) AHG17: Additional sequences for testing of video coding technology beyond CTC [R.-L. Liao, Y. Ye (Alibaba)]

[JVET-AK0044](https://jvet-experts.org/doc_end_user/current_document.php?id=15014) AHG17: Cropped HDR sequences for non-CTC testing [A. Filippov, J. Konieczny, Z. Zhi, V. Rufitskiy, H. Qin, T. Dong, X. Tang (TCL), S. Shen, Y. Qin, Y. Wang, X. Wang, Y. Guan (NERC-DTV)]

[JVET-AK0045](https://jvet-experts.org/doc_end_user/current_document.php?id=15015) AHG17: Test sequences from YouTube [X. Li, Y. Wang, N. Birkbeck, B. Adsumilli (Google)]

[JVET-AK0066](https://jvet-experts.org/doc_end_user/current_document.php?id=15037) AHG4/AHG17: 8K HDR sequences as a response to the call for new HDR test materials for future video coding [Y. Li (CMG), Q. Zhang, J. Ning (ABP)]

[JVET-AK0180](https://jvet-experts.org/doc_end_user/current_document.php?id=15151) On User Generated Content and non-pristine source videos [J. Samuelsson-Allendes (Sharp)]

[JVET-AK0196](https://jvet-experts.org/doc_end_user/current_document.php?id=15167) AHG17: Additional sequences for testing of video coding technology beyond CTC [J. Pardo (Huawei)]

[JVET-AK0246](https://jvet-experts.org/doc_end_user/current_document.php?id=15235) Crosscheck of JVET-AK0196 (AHG17: Additional sequences for testing of video coding technology beyond CTC) [Z. Xiang (Tencent)] [late]

[JVET-AK0218](https://jvet-experts.org/doc_end_user/current_document.php?id=15207) AHG17: UGC test sequences from Huawei [Y. Zhao, Y. Sun, P. Liu, Y. Lu, C. Wang, E. Alshina (Huawei)]

[JVET-AK0221](https://jvet-experts.org/doc_end_user/current_document.php?id=15210) [AHG17] JVET CTC and non-CTC sequences performance analysis [E. Alshina, J. Pardo, J. Sauer, T. Solovyev (Huawei)]

[JVET-AK0282](https://jvet-experts.org/doc_end_user/current_document.php?id=15271) AHG4/AHG17: Additional HDR sequences for non-CTC testing [A. Filippov, J. Konieczny, Z. Zhi, V. Rufitskiy, H. Qin, T. Dong, X. Tang (TCL), S. Shen, Y. Qin, Y. Wang, X. Wang, Y. Guan (NERC-DTV)] [late]

# Low-level tool technology proposals (XX)

## AHG11/AHG14: Neural network-based video coding (21)

### Summary and BoG reports

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0023](https://jvet-experts.org/doc_end_user/current_document.php?id=15189) EE1: Summary report of exploration experiment on neural network-based video coding [E. Alshina, F. Galpin, Y. Li, D. Rusanovskyy, M. Santamaria, J. Ström, R. Chang, Z. Xie (EE coordinators)]

[JVET-AK0050](https://jvet-experts.org/doc_end_user/current_document.php?id=15020) [AHG11] [AHG14] Teleconference on NNVC [E. Alshina, F. Galpin]

### EE1 contributions: Neural network-based video coding (10)

Contributions in this area were discussed in the context of the EE summary report JVET-AK0023.

[JVET-AK0077](https://jvet-experts.org/doc_end_user/current_document.php?id=15048) EE1-2.1: RA/LDB Unified Reference Frame Synthesis for VVC Inter Coding [Q. Qin, C. Jung (Xidian Univ.)] [late]

Initial version rejected as “placeholder”

[JVET-AK0078](https://jvet-experts.org/doc_end_user/current_document.php?id=15049) EE1-2.2: Transformer-Based Reference Frame Synthesis for VVC Inter Coding [Q. Qin, C. Jung (Xidian Univ.)] [late]

Initial version rejected as “placeholder”

[JVET-AK0093](https://jvet-experts.org/doc_end_user/current_document.php?id=15064) EE1-1.5: Adaptive skip of LOP filtering based on boundary strength partitions [H. Kwon, J. Seo, H. Ko (HYU), D. Kim, S.-C. Lim (ETRI)]

[JVET-AK0241](https://jvet-experts.org/doc_end_user/current_document.php?id=15230) Crosscheck of JVET-AK0093 (EE1-1.5: Adaptive skip of LOP filtering based on boundary strength partitions) [J. Pardo, E. Alshina (Huawei)] [late] [miss]

[JVET-AK0106](https://jvet-experts.org/doc_end_user/current_document.php?id=15077) EE1-1.1: Partial Convolution and Over-Parameterization [J. Chi, A. Li, C. Zhu, L. Luo, H. Guo (UESTC), Y. Huo, Y. Liu (Transsion)]

[JVET-AK0292](https://jvet-experts.org/doc_end_user/current_document.php?id=15281) Crosscheck of JVET-AJ0106 (EE1-1.1 Partial Convolution and Over-Parameterization) [J. Wang (Qualcomm)] [late] [miss]

[JVET-AK0139](https://jvet-experts.org/doc_end_user/current_document.php?id=15110) EE1-1.3: Multiscale blocks in LOP4 and VLOP3 filters [R. Yang, M. Santamaria, F. Cricri, H. Zhang, J. Lainema, M. M. Hannuksela (Nokia), Y. Li, D. Rusanovskyy, S. Eadie, M. Karczewicz, J. Wang, L. Kerofsky (Qualcomm), J. Chi, A. Li, C. Zhu, L. Lei, H. Guo (UESTC), Y. Huo, Y. Liu (Transsion)]

[JVET-AK0166](https://jvet-experts.org/doc_end_user/current_document.php?id=15137) Crosscheck of JVET-AK0139 (EE1-1.3: multiscale blocks in LOP4 and VLOP3 filters) [T. Dumas (InterDigital)] [late] [miss]

[JVET-AK0150](https://jvet-experts.org/doc_end_user/current_document.php?id=15121) EE1-1.2: LOP with improved Attention and residual groups [Y. Li, D. Rusanovskyy, S. Eadie, M. Karczewicz, J. Wang, L. Kerofsky (Qualcomm)]

[JVET-AK0263](https://jvet-experts.org/doc_end_user/current_document.php?id=15252) Crosscheck of JVET-AK0150 (EE1-1.2: LOP with improved Attention and residual groups) [Z. Ameur, T. Dumas, F. Galpin (InterDigital)] [late] [miss]

[JVET-AK0300](https://jvet-experts.org/doc_end_user/current_document.php?id=15289) Crosscheck of JVET-AK0150 (EE1-1.2: LOP with improved attention and residual groups) [Y. Li (Bytedance)] [late] [miss]

[JVET-AK0182](https://jvet-experts.org/doc_end_user/current_document.php?id=15153) EE1-1.6: Reduced complexity input feature extraction [D. Rusanovskyy, Y. Li, M. Karczewicz (Qualcomm)] [late] [miss]

[JVET-AK0195](https://jvet-experts.org/doc_end_user/current_document.php?id=15166) EE1-1.4: Cross-component enhanced LOP filter [Y. Li, J. Li, C. Lin, K. Zhang, L. Zhang (Bytedance)]

[JVET-AK0216](https://jvet-experts.org/doc_end_user/current_document.php?id=15205) Crosscheck of JVET-AK0195 (EE1-1.4: Cross-component enhanced LOP filter) [Y. Li (Qualcomm)] [late] [miss]

[JVET-AK0235](https://jvet-experts.org/doc_end_user/current_document.php?id=15224) EE1-4.1: A Neural Network Downscaling Filter for RPR [Y.-Q. Zhu, W.-X. He, X. Li, J.-D. Y, Q. Liu (HUST), Z. Lv (vivo)] [late]

[JVET-AK0247](https://jvet-experts.org/doc_end_user/current_document.php?id=15236) Crosscheck of JVET-AK0235 (EE1-4.1: A Neural Network Downscaling Filter for RPR) [Z. Li, J. Zhang (PKU)] [late] [miss]

[JVET-AK0212](https://jvet-experts.org/doc_end_user/current_document.php?id=15201) EE2-2.1: OBMC modifications [R. Yu, H. Huang, C.-C. Chen, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0256](https://jvet-experts.org/doc_end_user/current_document.php?id=15245) Crosscheck of JVET-AK0212 (EE2-2.1: OBMC modifications) [Y. Kidani, K. Kawamura (KDDI)] [late]

[JVET-AK0290](https://jvet-experts.org/doc_end_user/current_document.php?id=15279) Crosscheck of Test 2.1a and b in JVET-AK0212 (EE2-2.1: OBMC modifications) [Z. Deng (Bytedance)] [late] [miss]

### EE1 related and beyond-EE contributions: Neural network-based video coding (7)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0079](https://jvet-experts.org/doc_end_user/current_document.php?id=15050) EE1-Related: Combination Test of NNVC Tools and TRFS [Q. Qin, C. Jung (Xidian Univ.)]

[JVET-AK0071](https://jvet-experts.org/doc_end_user/current_document.php?id=15042) AHG11: Lightweight Multiscale Reference Frame Generation for VVC Inter Coding [P. Li, C. Jung, Q. Qin (Xidian Univ.)]

[JVET-AK0119](https://jvet-experts.org/doc_end_user/current_document.php?id=15090) AHG11: NNLF LOP3 improvement with parallel 1x3/3x1 Backbone [T. Shao, P. Yin, S. McCarthy (Dolby), J. N. Shingala, A. Shyam, A. Suneja, S. Badya (Ittiam)]

[JVET-AK0146](https://jvet-experts.org/doc_end_user/current_document.php?id=15117) [AHG11] A Hybrid Framework Integrating End-to-End Learned Image Codec with Conventional Codec [N. Zou, A. Hallapuro, F. Cricri, H. Zhang, M. M. Hannuksela (Nokia)]

[JVET-AK0175](https://jvet-experts.org/doc_end_user/current_document.php?id=15146) AhG11: Dimension-wise decomposed multiplier for content-adaptive loop-filter [Z. Xu, J. Konieczny (TCL)]

[JVET-AK0177](https://jvet-experts.org/doc_end_user/current_document.php?id=15148) AHG 11: Neural Network Coded Reference Frame for Intra Coding [F. Brand, T. Solovyev, E. Alshina (Huawei)]

[JVET-AK0242](https://jvet-experts.org/doc_end_user/current_document.php?id=15231) AHG11: Enhancing super-resolution with residual in NNVC [T. Yang, X. Li, W.-X. He, Y.-Q. Zhu, Q. Liu (HUST), Z.-Y. Lv (vivo)] [late]

### SADL and NNVC implementation, CTC (4)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0134](https://jvet-experts.org/doc_end_user/current_document.php?id=15105) AhG14: SADL update [F. Galpin (InterDigital)] [late]

[JVET-AK0151](https://jvet-experts.org/doc_end_user/current_document.php?id=15122) AhG14: On the impact of explicit full SIMD implementation for 1x3 and 3x1 DW convolution [Y. Li, D. Rusanovskyy, M. Karczewicz (Qualcomm)]

[JVET-AK0255](https://jvet-experts.org/doc_end_user/current_document.php?id=15244) [AHG11] Response to Call for training materials for neural network-based video coding tool development [F. Zhang, D. Bull, J. Nawala, Y. Jiang, X. Zhu, J. Sole, E. Alshina] [late]

[JVET-AK0257](https://jvet-experts.org/doc_end_user/current_document.php?id=15246) AHG14: The extension of SADL library [N. Fu, W. Bao, Z. Chen (Wuhan Univ.)] [late]

## AHG6/AHG12: Enhanced compression beyond VVC capability (73)

### Summary and BoG reports

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0024](https://jvet-experts.org/doc_end_user/current_document.php?id=15190) EE2: Summary report of exploration experiment on enhanced compression beyond VVC capability [V. Seregin, J. Chen, R. Chernyak, K. Naser, J. Ström, F. Wang, M. Winken, X. Xiu, K. Zhang (EE coordinators)]

### EE2 contributions: Enhanced compression beyond VVC capability (39)

There was no presentation or discussion about specific proposals in this category.

For actions decided to be taken, see section 5.2.1, unless otherwise noted.

[JVET-AK0056](https://jvet-experts.org/doc_end_user/current_document.php?id=15027) EE2-1.9: Weighted OBIC [P. Andrivon, M. Blestel, N. Zouidi (Ofinno)]

[JVET-AK0275](https://jvet-experts.org/doc_end_user/current_document.php?id=15264) Cross-check of JVET-AK0056 EE2-1.9: Weighted OBIC [F. Le Léannec (InterDigital)] [late]

[JVET-AK0059](https://jvet-experts.org/doc_end_user/current_document.php?id=15030) EE2-1.2: Intra mode coding based on HoG of neighboring templates [M. Hong, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0060](https://jvet-experts.org/doc_end_user/current_document.php?id=15031) EE2-1.7: Block vector guided DIMD [L. Zhang, Y. Yu, H. Yu, D. Wang (OPPO)]

[JVET-AK0267](https://jvet-experts.org/doc_end_user/current_document.php?id=15256) Crosscheck of JVET-AK0060 (EE2-1.7: Block vector guided DIMD) [N. Yan (Kwai)] [late] [miss]

[JVET-AK0061](https://jvet-experts.org/doc_end_user/current_document.php?id=15032) EE2-1.12: On MPM with matrix-based position dependent intra prediction [Z. Sun, Y. Yu, H. Yu, L. Xu, D. Wang (OPPO)]

[JVET-AK0231](https://jvet-experts.org/doc_end_user/current_document.php?id=15220) Crosscheck of JVET-AK0061 (EE2-1.12: On MPM with matrix-based position dependent intra prediction) [X. Li (Alibaba)] [late] [miss]

[JVET-AK0062](https://jvet-experts.org/doc_end_user/current_document.php?id=15033) EE2-1.14: block vector guided EIP [Z. Xie, Y. Yu, H. Yu, D. Wang (OPPO)]

[JVET-AK0299](https://jvet-experts.org/doc_end_user/current_document.php?id=15288) Crosscheck of JVET-AK0062 (EE2-1.14: block vector guided EIP) [Z. Zhang (Alibaba)] [late] [miss]

[JVET-AK0063](https://jvet-experts.org/doc_end_user/current_document.php?id=15034) EE2-2.4: GPM extension [H. Zhang, F. Wang, Y. Yu, H. Yu, D. Wang (OPPO)]

[JVET-AK0266](https://jvet-experts.org/doc_end_user/current_document.php?id=15255) Crosscheck of JVET-AK0063 (EE2-2.4: GPM extension) [Y. Ahn (LGE)] [late] [miss]

[JVET-AK0064](https://jvet-experts.org/doc_end_user/current_document.php?id=15035) EE2-3.2: LFNST/NSPT set derivation for CCP coded block [H. Huang, Y. Yu, H. Yu, D. Wang (OPPO)]

[JVET-AK0280](https://jvet-experts.org/doc_end_user/current_document.php?id=15269) Crosscheck of JVET-AK0064 (EE2-3.2: LFNST/NSPT set derivation for CCP coded block) [M. Hong (LGE)] [late] [miss]

[JVET-AK0065](https://jvet-experts.org/doc_end_user/current_document.php?id=15036) EE2-4.7: Temporal ALF [L. Xu, Y. Yu, H. Yu, N. Song, D. Wang (OPPO)]

[JVET-AK0230](https://jvet-experts.org/doc_end_user/current_document.php?id=15219) Crosscheck of JVET-AK0065(EE2-4.7: Temporal ALF) [W. Yin (Bytedance)] [late] [miss]

[JVET-AK0076](https://jvet-experts.org/doc_end_user/current_document.php?id=15047) EE2-1.1: Extended OBMC for non-inter blocks [Y. Kidani, H. Katou, K. Kawamura (KDDI), X. Li, R.-L. Liao, J. Chen, Y. Ye (Alibaba)]

[JVET-AK0269](https://jvet-experts.org/doc_end_user/current_document.php?id=15258) Crosscheck of Test 1.1a in JVET-AK0076 (EE2-1.1: Extended OBMC for non-inter blocks) [D. Kim, S.-C. Lim (ETRI)] [late]

[JVET-AK0293](https://jvet-experts.org/doc_end_user/current_document.php?id=15282) Crosscheck of Test 1.1a in JVET-AK0076 (EE2-1.1: Extended OBMC for non-inter blocks) [R. Yu (Qualcomm)] [late] [miss]

[JVET-AK0084](https://jvet-experts.org/doc_end_user/current_document.php?id=15055) EE2-1.13: Multiple filter taps for EIP [Z. Lv, C. Zhou, G. Wang (vivo)] [late]

[JVET-AK0291](https://jvet-experts.org/doc_end_user/current_document.php?id=15280) Crosscheck of JVET-AK0084 (EE2-1.13: Multiple filter taps for EIP) [Z. Deng (Bytedance)] [late] [miss]

[JVET-AK0085](https://jvet-experts.org/doc_end_user/current_document.php?id=15056) EE2-2.6: Template Matching Padding [N. Neumann (Nokia), M. Wien (RWTH Aachen Univ.)]

[JVET-AK0244](https://jvet-experts.org/doc_end_user/current_document.php?id=15233) Crosscheck JVET-AK0085 on EE2-2.6 Template Matching Padding [X. Li (Google)] [late] [miss]

[JVET-AK0086](https://jvet-experts.org/doc_end_user/current_document.php?id=15057) EE2-1.2a: Improvement on non-MPM [G. Wang, C. Zhou, Z. Lv (vivo)]

[JVET-AK0245](https://jvet-experts.org/doc_end_user/current_document.php?id=15234) Crosscheck of JVET-AK0086 (EE2-1.2a: Improvement on non-MPM) [J. Fu (PKU)] [late]

[JVET-AK0087](https://jvet-experts.org/doc_end_user/current_document.php?id=15058) EE2-1.11: 8-tap interpolation filter for angular intra prediction [T. Dong, A. Filippov, V. Rufitskiy, J. Konieczny, H. Qin, J. Zhang (TCL)]

[JVET-AK0088](https://jvet-experts.org/doc_end_user/current_document.php?id=15059) EE2-4.9: ALF-CCCM [P. Astola, I. Jumakulyyev, D. Bugdayci Sansli, J. Lainema (Nokia)]

[JVET-AK0248](https://jvet-experts.org/doc_end_user/current_document.php?id=15237) Crosscheck of JVET-AK0088 (EE2-4.9: ALF-CCCM) [R. G. Youvalari (Xiaomi)] [late] [miss]

[JVET-AK0091](https://jvet-experts.org/doc_end_user/current_document.php?id=15062) EE2-4.2: Using Laplacian information in ALF [I. Jumakulyyev, D. Bugdayci Sansli, I. Zupancic, J. Lainema (Nokia)]

[JVET-AK0129](https://jvet-experts.org/doc_end_user/current_document.php?id=15100) Crosscheck of JVET-AK0091 (EE2-4.2: Using Laplacian information in ALF) [V. Shchukin (Ericsson)] [late]

[JVET-AK0095](https://jvet-experts.org/doc_end_user/current_document.php?id=15066) EE2-2.2: Enhanced derivation of affine merge candidates [L. Zhao, K. Zhang, Z. Deng, N. Zhang, Y. Wang, W. Yin, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0097](https://jvet-experts.org/doc_end_user/current_document.php?id=15068) EE2-3.4: Last significant coefficient position signaling with secondary prefix [F. Le Léannec, M. Balcilar, C. Salmon-Legagneur, F. Galpin (InterDigital)]

[JVET-AK0259](https://jvet-experts.org/doc_end_user/current_document.php?id=15248) Cross-check of JVET-AK0097 (EE2-3.4: Last significant coefficient position signaling with secondary prefix) [P. Nikitin (Qualcomm)] [late] [miss]

[JVET-AK0298](https://jvet-experts.org/doc_end_user/current_document.php?id=15287) Crosscheck of JVET-AK0097 (EE2-3.4: Last significant coefficient position signaling with secondary prefix) T. N. Canh (Dolby Labs) [late]

[JVET-AK0098](https://jvet-experts.org/doc_end_user/current_document.php?id=15069) EE2-3.6a/3.6b: combinations of tests 3.4 and 3.5a/3.5b [F. Le Léannec, M. Balcilar, C. Salmon-Legagneur, F. Galpin (InterDigital)]

[JVET-AK0261](https://jvet-experts.org/doc_end_user/current_document.php?id=15250) Cross-check of JVET-AK0098 (EE2-3.6a/3.6b: combinations of tests 3.4 and 3.5a/3.5b) P. Nikitin (Qualcomm)

[JVET-AK0101](https://jvet-experts.org/doc_end_user/current_document.php?id=15072) EE2-2.3: Regression-based GPM with intra and inter prediction [K. Jia, J. Chen, X. Li, R.-L. Liao, Y. Ye (Alibaba)]

[JVET-AK0268](https://jvet-experts.org/doc_end_user/current_document.php?id=15257) Crosscheck of JVET-AK0101 (EE2-2.3: Regression-based GPM with intra and inter prediction) [Y. Wang (Bytedance)] [late]

[JVET-AK0294](https://jvet-experts.org/doc_end_user/current_document.php?id=15283) Crosscheck of JVET-AK0101 (EE2-2.3: Regression-based GPM with intra and inter prediction) [C. Zhou (vivo)] [late] [miss]

[JVET-AK0102](https://jvet-experts.org/doc_end_user/current_document.php?id=15073) EE2-1.16: On intra interpolation filter [Z. Zhang, J. Chen, X. Li, R.-L. Liao, Y. Ye (Alibaba), C. Zhou, Z. Lv, G. Wang (vivo)]

[JVET-AK0104](https://jvet-experts.org/doc_end_user/current_document.php?id=15075) EE2-1.8: Non-adjacent DIMD for TMRL [V. Rufitskiy, A. Filippov, T. Dong, H. Qin, J. Konieczny, K. Ding (TCL)]

[JVET-AK0297](https://jvet-experts.org/doc_end_user/current_document.php?id=15286) Crosscheck of JVET-AK0104 (EE2-1.8: Non-adjacent DIMD for TMRL) [S. Blasi (Nokia)] [late] [miss]

[JVET-AK0105](https://jvet-experts.org/doc_end_user/current_document.php?id=15076) EE2-3.5: High Resolution Arithmetic Engine [M. Balcilar, F. Le Leannec, C. Salmon-Legagneur, F. Galpin (InterDigital)]

[JVET-AK0260](https://jvet-experts.org/doc_end_user/current_document.php?id=15249) Cross-check of JVET-AK0105 (EE2-3.5: High Resolution Arithmetic Engine) [[P. Nikitin (Qualcomm)](mailto:pnikitin@qti.qualcomm.com)] [late] [miss]

[JVET-AK0118](https://jvet-experts.org/doc_end_user/current_document.php?id=15089) EE2-1.10: Bilateral Filtering for Intra Prediction [W. Yin, K. Zhang, Y. Wang, Z. Deng, N. Zhang, L. Zhao, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0130](https://jvet-experts.org/doc_end_user/current_document.php?id=15101) Crosscheck of JVET-AK0118 (EE2-1.10: Bilateral Filtering for Intra Prediction) [V. Shchukin (Ericsson)] [late] [miss]

[JVET-AK0295](https://jvet-experts.org/doc_end_user/current_document.php?id=15284) Crosscheck of JVET-AK0118 (EE2-1.10: Bilateral Filtering for Intra Prediction) [C. Ma (Kwai)] [late] [miss]

[JVET-AK0121](https://jvet-experts.org/doc_end_user/current_document.php?id=15092) EE2-4.3: Boundary-Aware Offset Refinement for In-Loop-Filters [W. Yin, K. Zhang, Y. Wang, Z. Deng, N. Zhang, L. Zhao, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0229](https://jvet-experts.org/doc_end_user/current_document.php?id=15218) Crosscheck of JVET-AK0121 (EE2-4.3: Boundary-Aware Offset Refinement for In-Loop-Filters) [N. Hu (Qualcomm)] [late]

[JVET-AK0123](https://jvet-experts.org/doc_end_user/current_document.php?id=15094) EE2-4.1: Restrictions on ALF coefficient values [V. Shchukin, P. Wennersten, J. Ström (Ericsson)]

[JVET-AK0172](https://jvet-experts.org/doc_end_user/current_document.php?id=15143) Crosscheck of JVET-AK0123 (EE2-4.1: Restrictions on ALF coefficient values) [I. Jumakulyyev (Nokia)] [late] [miss]

[JVET-AK0131](https://jvet-experts.org/doc_end_user/current_document.php?id=15102) EE2-3.3: Advanced SBT with direction and position inference [G. Laroche, P. Onno (Canon)]

[JVET-AK0276](https://jvet-experts.org/doc_end_user/current_document.php?id=15265) Cross-check of JVET-AK0131 EE2-3.3: Advanced SBT with direction and position inference [F. Le Léannec (InterDigital)] [late]

[JVET-AK0148](https://jvet-experts.org/doc_end_user/current_document.php?id=15119) EE2-1.17: Combination of EE2-1.16, EE2-1.11 and EE2-1.10 [Z. Zhang, J. Chen, X. Li, R.-L. Liao, Y. Ye (Alibaba), C. Zhou, Z. Lv, G. Wang (vivo), T. Dong, A. Filippov, J. Konieczny, V. Rufitskiy, H. Qin, K. Ding (TCL), W. Yin, K. Zhang, Y. Wang, Z. Deng, N. Zhang, L. Zhao, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0296](https://jvet-experts.org/doc_end_user/current_document.php?id=15285) Crosscheck of JVET-AK0148 (EE2-1.17: Combination of EE2-1.16, EE2-1.11 and EE2-1.10) [C. Ma (Kwai)] [late] [miss]

[JVET-AK0149](https://jvet-experts.org/doc_end_user/current_document.php?id=15120) EE2-1.15: a combination of EE2-1.13 and EE2-1.14 [Z. Lv, C. Zhou, G. Wang (vivo), Z. Xie, Y. Yu, H. Yu, D. Wang (OPPO)]

[JVET-AK0240](https://jvet-experts.org/doc_end_user/current_document.php?id=15229) Crosscheck of JVET-AK0149 (EE2-1.15: a combination of EE2-1.13 and EE2-1.14) [Z. Zhang (Alibaba)] [late] [miss]

[JVET-AK0161](https://jvet-experts.org/doc_end_user/current_document.php?id=15132) EE2-1.6: Extended IntraTMP merge candidate list with an improved fusion mode [D. Ruiz Coll, J.-K. Lee (Ofinno)]

[JVET-AK0271](https://jvet-experts.org/doc_end_user/current_document.php?id=15260) Crosscheck of JVET-AK0161 (EE2-1.6: Extended IntraTMP merge candidate list with an improved fusion mode) [W. Lim, S.-C. Lim (ETRI)] [late]

[JVET-AK0176](https://jvet-experts.org/doc_end_user/current_document.php?id=15147) EE2-4.5: Reuse of ALF control information [M. Karczewicz, H. Wang, N. Hu, V. Seregin (Qualcomm)]

[JVET-AK0226](https://jvet-experts.org/doc_end_user/current_document.php?id=15215) Crosscheck of JVET-AK0176 (EE2-4.5: Reuse of ALF Control Information) [W. Yin (Bytedance)] [late] [miss]

[JVET-AK0183](https://jvet-experts.org/doc_end_user/current_document.php?id=15154) EE2-4.8: Integration of NN-based ILF in ALF [D. Rusanovskyy, Y. Li, M. Karczewicz (Qualcomm)]

[JVET-AK0264](https://jvet-experts.org/doc_end_user/current_document.php?id=15253) Crosscheck of JVET-AK0183 (EE2-4.8: Integration of NN-based ILF in ALF) [F. Galpin, T. Poirier (InterDigital)] [late] [miss]

[JVET-AK0185](https://jvet-experts.org/doc_end_user/current_document.php?id=15156) EE2-2.5: TMVP Candidate Selection [S. Hong, L. Wang, K. Panusopone (Nokia)]

[JVET-AK0249](https://jvet-experts.org/doc_end_user/current_document.php?id=15238) Crosscheck of JVET-AK0185 (EE2-2.5: TMVP Candidate Selection) [R. G. Youvalari (Xiaomi)] [late] [miss]

[JVET-AK0187](https://jvet-experts.org/doc_end_user/current_document.php?id=15158) EE2-3.8: Implicit MTS extension [P. Garus, M. Karczewicz, M. Coban, V. Seregin, H. Wang, P. Nikitin (Qualcomm)]

[JVET-AK0285](https://jvet-experts.org/doc_end_user/current_document.php?id=15274) Crosscheck of JVET-AK0187 (EE2-3.8: Implicit MTS extension) [M. Salehifar (Bytedance)] [late] [miss]

[JVET-AK0198](https://jvet-experts.org/doc_end_user/current_document.php?id=15185) EE2-4.6: Huffman coding and simulated annealing for CCALF [K. Takada, S. Deshpande (Sharp), V. Shchukin (Ericsson)]

[JVET-AK0227](https://jvet-experts.org/doc_end_user/current_document.php?id=15216) Crosscheck of JVET-AK0198 (EE2-4.6: Huffman Coding and Simulated Annealing for CCALF) [W. Yin (Bytedance)] [late] [miss]

[JVET-AK0217](https://jvet-experts.org/doc_end_user/current_document.php?id=15206) EE2-3.1: Multiple transform set selection for intra LFNST/NSPT with subsampled DIMD for transform set selection [M. Coban, M. Karczewicz, P. Nikitin, P. Garus, B. Ray, V. Seregin (Qualcomm), F. Wang, Y. Yu, H. Yu, D. Wang (OPPO), C. Bonnineau, K. Naser, S. Puri, F. Le Léannec (InterDigital), L. Zhao, K. Zhang, L. Zhang (Bytedance)]

[JVET-AK0233](https://jvet-experts.org/doc_end_user/current_document.php?id=15222) Crosscheck of JVET-AK0217 (EE2-3.1: Multiple transform set selection for intra LFNST/NSPT with subsampled DIMD for transform set selection) [M. Hong (LGE)] [late] [miss]

[JVET-AK0220](https://jvet-experts.org/doc_end_user/current_document.php?id=15209) EE2-1.3: Intra TMP improvements [M. Radosavljević, T. Dumas, K. Naser, F. Le Léannec (InterDigital)] [late]

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[JVET-AK0243](https://jvet-experts.org/doc_end_user/current_document.php?id=15232) Crosscheck of JVET-AK0220 (EE2-1.3: Intra TMP improvements) [D. Ruiz Coll, J.-K. Lee (Ofinno)] [late] [miss]

[JVET-AK0222](https://jvet-experts.org/doc_end_user/current_document.php?id=15211) EE2-3.7: Improved LFNST/NSPT kernel set selection for SGPM [S. Puri, C. Bonnineau, K. Naser, F. Le Léannec (InterDigital)]

[JVET-AK0273](https://jvet-experts.org/doc_end_user/current_document.php?id=15262) Crosscheck of JVET-AK0222 (EE2-3.7: Improved LFNST/NSPT kernel set selection for SGPM) [I. Zupancic (Nokia)] [late] [miss]

[JVET-AK0283](https://jvet-experts.org/doc_end_user/current_document.php?id=15272) EE2-1.18: Combination of EE2-1.7 and EE2-1.9 [P. Andrivon, M. Blestel, N. Zouidi (Ofinno), L. Zhang, Y. Yu, H. Yu, D. Wang (OPPO)] [late]

[JVET-AK0277](https://jvet-experts.org/doc_end_user/current_document.php?id=15266) Cross-check of EE2-1.18: EE2-1.7 + EE2-1.9 [F. Le Léannec (InterDigital)] [late] [miss]

[JVET-AK0284](https://jvet-experts.org/doc_end_user/current_document.php?id=15273) EE2-1.19: Combination of EE2-1.7 and EE2-1.8 [V. Rufitskiy, A. Filippov, T. Dong, H. Qin, J. Konieczny, K. Ding (TCL), L. Zhang, Y. Yu, H. Yu, D. Wang (OPPO)] [late] [miss]

### EE2 related contributions (1)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0184](https://jvet-experts.org/doc_end_user/current_document.php?id=15155) EE2-related: Additional results for NN-based ILF in ALF [D. Rusanovskyy, Y. Li, M. Karczewicz (Qualcomm)] [late]

### ECM modifications and software improvements beyond EE2 (33)

#### Intra and CIIP (5)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0089](https://jvet-experts.org/doc_end_user/current_document.php?id=15060) Non-EE2: Improvement on MPM [G. Wang, C. Zhou, Z. Lv (vivo)] [late]

[JVET-AK0202](https://jvet-experts.org/doc_end_user/current_document.php?id=15191) AHG12: On cross-component intra prediction [Y.-J. Chang, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0223](https://jvet-experts.org/doc_end_user/current_document.php?id=15212) Non-EE2: CCP merge mode with adjustment [Y. Wang, K. Zhang, W. Yin, Z. Deng, N. Zhang, L. Zhao, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0234](https://jvet-experts.org/doc_end_user/current_document.php?id=15223) Non-EE2: Subblock-based CCCM [F. Pu, N. C. Thuong, P. Yin, S. McCarthy (Dolby)]

[JVET-AK0262](https://jvet-experts.org/doc_end_user/current_document.php?id=15251) EE2-related: On EIP filter shapes [K. Panusopone, M. He, S. Hong, L. Wang, J. Lainema (Nokia)] [late]

[JVET-AK0288](https://jvet-experts.org/doc_end_user/current_document.php?id=15277) Crosscheck of JVET-AK0262 (EE2-related: On EIP filter shapes) [Y. Yu, L. Xu (OPPO)] [late] [miss]

#### Inter (12)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0090](https://jvet-experts.org/doc_end_user/current_document.php?id=15061) Non-EE2: IntraTMP complexity reduction [Z. Fan, T. Chujoh, T. Ikai (Sharp)]

[JVET-AK0250](https://jvet-experts.org/doc_end_user/current_document.php?id=15239) Crosscheck of JVET-AK0090 (Non-EE2: IntraTMP complexity reduction) [F. Wang (OPPO)] [late] [miss]

[JVET-AK0096](https://jvet-experts.org/doc_end_user/current_document.php?id=15067) Non-EE2: Additional inter merge candidates [N. Zhang, K. Zhang, Z. Deng, L. Zhao, Y. Wang, W. Yin, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0108](https://jvet-experts.org/doc_end_user/current_document.php?id=15079) Non-EE2: CMVP extension for constructed affine merge candidates [C. Li, R.-L. Liao, J. Chen, Y. Ye (Alibaba)]

[JVET-AK0111](https://jvet-experts.org/doc_end_user/current_document.php?id=15082) Non-EE2: On interpolation filter for template matching [Z. Dai, R.-L. Liao, J. Chen, X. Li, Y. Ye (Alibaba)]

[JVET-AK0251](https://jvet-experts.org/doc_end_user/current_document.php?id=15240) Crosscheck of JVET-AK0111 (Non-EE2: On interpolation filter for template matching) ]L. Xu (OPPO)] [late] [miss]

[JVET-AK0137](https://jvet-experts.org/doc_end_user/current_document.php?id=15108) Non-EE2: Improvements on inter AMVP candidate list construction [S. Park, H. Jeong, B. Jeon (SKKU)] [late]

[JVET-AK0270](https://jvet-experts.org/doc_end_user/current_document.php?id=15259) Crosscheck of JVET-AK0137 (Non-EE2: Improvements on inter AMVP candidate list construction) [D. Kim, S.-C. Lim (ETRI)] [late]

[JVET-AK0162](https://jvet-experts.org/doc_end_user/current_document.php?id=15133) AHG12: On affine motion compensation [H. Huang, R. Yu, Z. Zhang, Y. Zhang, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0186](https://jvet-experts.org/doc_end_user/current_document.php?id=15157) Non-EE2: Subblock-based spatial MVP [Z. Deng, K. Zhang, N. Zhang, L. Zhao, Y. Wang, W. Yin, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0192](https://jvet-experts.org/doc_end_user/current_document.php?id=15163) Non-EE2: On Sample-Based BDOF [M. Salehifar, Y. He, K. Zhang, L. Zhao, Y. Wang, N. Zhang, Z. Deng, W. Yin, L. Zhang (Bytedance)]

[JVET-AK0199](https://jvet-experts.org/doc_end_user/current_document.php?id=15186) Non-EE2: MV refinement for TMVP [Z. Zhang, J.-L. Lin, Y. Zhang, H. Huang, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0213](https://jvet-experts.org/doc_end_user/current_document.php?id=15202) AHG12: Extended BDOF usage for MV refinement [R. Yu, H. Huang, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0225](https://jvet-experts.org/doc_end_user/current_document.php?id=15214) Non-EE2: Extension on spatial and temporal merge candidates [J.-L. Lin, P.-H. Lin, Z. Zhang, V. Seregin, M. Karczewicz (Qualcomm)] [late]

[JVET-AK0254](https://jvet-experts.org/doc_end_user/current_document.php?id=15243) Case study of candidates in AMVP candidate list [S. Park, H. Jeong, B. Jeon (SKKU)] [late]

#### GPM (2)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0103](https://jvet-experts.org/doc_end_user/current_document.php?id=15074) Non-EE2: Template matching based jointly reordering for GPM split modes and partition indexes [C. Ma, X. Xiu, X. Wang (Kwai)]

[JVET-AK0133](https://jvet-experts.org/doc_end_user/current_document.php?id=15104) Non-EE2: Improvements on the BV-based prediction in SGPM [J. Huo, Y. Fei, L. Wang, Y. Ma, F. Yang (Xidian Univ.)]

[JVET-AK0253](https://jvet-experts.org/doc_end_user/current_document.php?id=15242) Crosscheck of JVET-AK0133 (Non-EE2: Improvements on the BV-based prediction in SGPM) [X. Li (Alibaba)] [late] [miss]

#### In-Loop Filters (6)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0113](https://jvet-experts.org/doc_end_user/current_document.php?id=15084) AHG12: On CCALF [L. Xu, Y. Yu, H. Yu, N. Song, D. Wang (OPPO)]

[JVET-AK0117](https://jvet-experts.org/doc_end_user/current_document.php?id=15088) Non-EE2: Neural network-based loop filtering for ECM [Y. Du, A. Li, J. Liu, C. Zhu, L. Luo, H. Guo (UESTC), Y. Huo, Y. Liu (Transsion)]

[JVET-AK0132](https://jvet-experts.org/doc_end_user/current_document.php?id=15103) AHG12: Boundary strength adjustment for DBV mode [J. Huo, J. Fan, Y. Fei, J.Liu, Y. Ma, F. Yang (Xidian Univ.)]

[JVET-AK0252](https://jvet-experts.org/doc_end_user/current_document.php?id=15241) Crosscheck of JVET-AK0132 (AHG12: Boundary strength adjustment for DBV mode) [X. Li (Alibaba)] [late] [miss]

[JVET-AK0200](https://jvet-experts.org/doc_end_user/current_document.php?id=15187) Non-EE2: CCSAO with reused CTU control and extended edge classifier [C.-W. Kuo, X. Xiu, X. Wang (Kwai)]

[JVET-AK0224](https://jvet-experts.org/doc_end_user/current_document.php?id=15213) Non-EE2: Cross-Chroma Adaptive Loop-Filter [W. Yin, K. Zhang, H. Liu, Y. Wang, Z. Deng, N. Zhang, L. Zhao, M. Salehifar, L. Zhang (Bytedance)]

[JVET-AK0237](https://jvet-experts.org/doc_end_user/current_document.php?id=15226) Non-EE2: CCALF with dual-chroma inputs [C. Ma, X. Xiu, C.-W. Kuo, X. Wang (Kwai)]

#### Entropy coding, transforms, quantization, and transform coefficient coding (5)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0135](https://jvet-experts.org/doc_end_user/current_document.php?id=15106) AhG12: CABAC contexts retraining [F. Galpin (InterDigital)] [late]

[JVET-AK0174](https://jvet-experts.org/doc_end_user/current_document.php?id=15145) Non-EE2: Optimization of probability estimation in CABAC [D. Karwowski, D. Mieloch, M. Lorkiewicz (PUT)]

[JVET-AK0214](https://jvet-experts.org/doc_end_user/current_document.php?id=15203) Non-EE2: IntraNN NSPT set [G. Verba, M. Coban, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0215](https://jvet-experts.org/doc_end_user/current_document.php?id=15204) Non-EE2: MTS with reduced memory [B. Ray, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-AK0279](https://jvet-experts.org/doc_end_user/current_document.php?id=15268) Non-EE2: On coefficient level binarization in Transform Skip [M. Abdoli, R. G. Youvalari, F. Plowman, A. Tissier (Xiaomi)] [late]

#### Other (3)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0171](https://jvet-experts.org/doc_end_user/current_document.php?id=15142) Non-EE2: Picture-level mirroring and rotation [D. Mieloch, M. Lorkiewicz, J. Stankowski (PUT)]

[JVET-AK0173](https://jvet-experts.org/doc_end_user/current_document.php?id=15144) Non-EE2: Adaptive picture-level vertical mirroring [D. Mieloch, M. Lorkiewicz, A. Dziembowski, J. Stankowski, D. Karwowski (PUT)]

[JVET-AK0219](https://jvet-experts.org/doc_end_user/current_document.php?id=15208) Non-EE2: Chroma partition prediction in separate tree condition [P.-H. Lin, J.-L. Lin, V. Seregin, M. Karczewicz (Qualcomm)]

### CTC for EE2/ECM and general ECM improvements (0)

This section is kept as a template for future use.

See also discussion under 4.7 and 4.15.

# High-level syntax (HLS) and related proposals (XX)

## AHG9: Aspects on SEI messages in VSEIv4 and related (34)

### General comments (1)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0160](https://jvet-experts.org/doc_end_user/current_document.php?id=15131) AHG9: On VVC interface of object mask information and annotated regions SEI messages [J. Chen, B. Chen, Y. Ye (Alibaba), M. M. Hannuksela (Nokia)]

### SEI processing order and processing order nesting SEI message aspects (5)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0055](https://jvet-experts.org/doc_end_user/current_document.php?id=15026) AHG9: Semantics of the SPO SEI message [Y.-K. Wang, J. Xu, L. Zhang (Bytedance), K. Yang, Y. Li, Y. Xu (SJTU)]

[JVET-AK0112](https://jvet-experts.org/doc_end_user/current_document.php?id=15083) AHG9: On the SPO SEI message [Y. Gao, P. Wu, Y. Bai, S. Xie, M. Jia, W. Niu, C. Huang (ZTE)]

[JVET-AK0156](https://jvet-experts.org/doc_end_user/current_document.php?id=15127) AHG9: On SEI processing order SEI message [C. H. Demarty, E. François, F. Aumont, O. Le Meur (InterDigital)]

[JVET-AK0165](https://jvet-experts.org/doc_end_user/current_document.php?id=15136) AHG9: On SPO sub-chain signaling [T. M. Borges, Y. Sanchez, R. Skupin, C. Hellge, T. Schierl (Fraunhofer HHI)]

[JVET-AK0205](https://jvet-experts.org/doc_end_user/current_document.php?id=15194) AHG9: On SEI messages in spoPropertySeiList [H. Tan, J. Lee, J. Nam, C. Kim, J. Lim, S. Kim (LGE)]

### NNPF modifications (9)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0053](https://jvet-experts.org/doc_end_user/current_document.php?id=15024) AHG9: NNPF interface text in VVC [Y.-K. Wang, J. Xu, L. Zhang (Bytedance), K. Yang, Y. Li, Y. Xu (SJTU)]

[JVET-AK0054](https://jvet-experts.org/doc_end_user/current_document.php?id=15025) AHG9: Semantics of the NNPFC and NNPFA SEI messages [Y.-K. Wang, J. Xu, L. Zhang (Bytedance), K. Yang, Y. Li, Y. Xu (SJTU)]

[JVET-AK0070](https://jvet-experts.org/doc_end_user/current_document.php?id=15041) AHG9: On seed parameter for NNPF [T. Chujoh, Z. Fan, R. Ishimoto, T. Ikai (Sharp), L. Jin, H. Watanabe (Waseda Univ.)]

[JVET-AK0072](https://jvet-experts.org/doc_end_user/current_document.php?id=15043) AHG9: Comments on NNPF SEI messages [M. M. Hannuksela, F. Cricri (Nokia)]

[JVET-AK0073](https://jvet-experts.org/doc_end_user/current_document.php?id=15044) AHG9: Enabling multiple instances of NNPF extrapolated pictures [M. M. Hannuksela, F. Cricri (Nokia)]

[JVET-AK0074](https://jvet-experts.org/doc_end_user/current_document.php?id=15045) AHG9: Handling output variability of an NNPF [M. M. Hannuksela, F. Cricri (Nokia)]

[JVET-AK0152](https://jvet-experts.org/doc_end_user/current_document.php?id=15123) AHG9: On Spatial Extrapolation for NNPF [S. Deshpande (Sharp), M. M. Hannuksela (Nokia)]

[JVET-AK0167](https://jvet-experts.org/doc_end_user/current_document.php?id=15138) AHG9: On Enabling the usage of auxiliary layers for NNPF [T. M. Borges, Y. Sanchez, R. Skupin, C. Hellge, T. Schierl (Fraunhofer HHI)]

[JVET-AK0188](https://jvet-experts.org/doc_end_user/current_document.php?id=15159) AHG9: On NNPF filtering control strength value adjustment [J. Xu, Y.-K. Wang (Bytedance)]

### Generative face video SEI messages (8)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0080](https://jvet-experts.org/doc_end_user/current_document.php?id=15051) AHG9: Comments on the GFV and GFVE SEI messages [M. M. Hannuksela (Nokia), J. Chen, B. Chen, Y. Ye (Alibaba)]

[JVET-AK0124](https://jvet-experts.org/doc_end_user/current_document.php?id=15095) AHG9: On timing information and order of pictures in GFV SEI message [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0127](https://jvet-experts.org/doc_end_user/current_document.php?id=15098) AHG9: On miscellaneous aspects of GFV and DSCI SEI messages [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0128](https://jvet-experts.org/doc_end_user/current_document.php?id=15099) AHG9: Editorial updates for GFV SEI message [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0154](https://jvet-experts.org/doc_end_user/current_document.php?id=15125) AHG9: Comments on Generative Face Video SEI [A. C. Sidiya, S. Deshpande (Sharp)]

[JVET-AK0164](https://jvet-experts.org/doc_end_user/current_document.php?id=15135) AHG9: Supplementation of value range definition and editorial bugs fixes on the GFVE pupil position SEI messages [F. Ma, A. Trioux, F. Yang (Xidian Univ.), B. Li, F. Xing, Z. Wang (Hisense)]

[JVET-AK0238](https://jvet-experts.org/doc_end_user/current_document.php?id=15227) AHG9: Semantics fixes for generative face video (GFV) SEI message [J. Chen, B. Chen, Y. Ye (Alibaba)] [late]

[JVET-AK0239](https://jvet-experts.org/doc_end_user/current_document.php?id=15228) AHG9: On generative face video enhancement (GFVE) SEI message [J. Chen, B. Chen, Y. Ye (Alibaba)] [late]

### Digitally signed content SEI messages (8)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0109](https://jvet-experts.org/doc_end_user/current_document.php?id=15080) AHG9: On signaling and constraint for RefDigest in digitally signed content SEI messages [C. Kim, H. Tan, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0110](https://jvet-experts.org/doc_end_user/current_document.php?id=15081) AHG9: On reference message digest for verification in digitally signed content SEI messages [C. Kim, H. Tan, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0125](https://jvet-experts.org/doc_end_user/current_document.php?id=15096) AHG9: On presence and persistency of digitally signed content SEI messages [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0126](https://jvet-experts.org/doc_end_user/current_document.php?id=15097) AHG9: On signaling the mapping between verification substreams and layer and temporal sublayer for DSCI SEI message [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0127](https://jvet-experts.org/doc_end_user/current_document.php?id=15098) AHG9: On miscellaneous aspects of GFV and DSCI SEI messages [J. Lee, H. Tan, C. Kim, J. Nam, J. Lim, S. Kim (LGE)]

[JVET-AK0194](https://jvet-experts.org/doc_end_user/current_document.php?id=15165) AHG9: Digitally Signed Content SEI messages for AVC and HEVC [K. Sühring, T. Hinz, Y. Sanchez, J. Pfaff, H. Schwarz, D. Marpe, T. Wiegand (Fraunhofer HHI)]

[JVET-AK0206](https://jvet-experts.org/doc_end_user/current_document.php?id=15195) AHG9: On digitally signed content SEI messages [S. McCarthy, C. Fersch, I. Sodagar (Dolby)]

[JVET-AK0287](https://jvet-experts.org/doc_end_user/current_document.php?id=15276) AHG9: Multilayer digitally signed content authentication SEI messages [J. Boyce, M. M. Hannuksela (Nokia)] [late]

### Other (3)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0075](https://jvet-experts.org/doc_end_user/current_document.php?id=15046) AHG9: Additional information on object-based optimization for the encoder optimization information SEI message [M. Pedzisz, M. M. Hannuksela, F. Cricri (Nokia)]

[JVET-AK0155](https://jvet-experts.org/doc_end_user/current_document.php?id=15126) AHG9: On Encoder optimization information SEI message [C. H. Demarty, E. François, F. Aumont, O. Le Meur (InterDigital)]

[JVET-AK0168](https://jvet-experts.org/doc_end_user/current_document.php?id=15139) AHG9: On SPTI SEI message: Robustness and source constant framerate [Y. Sanchez, T. M. Borges, R. Skupin, C. Hellge, T. Schierl (Fraunhofer HHI)]

## AHG9: Aspects on SEI messages in TuC and related (23)

### Constituent rectangles SEI (4)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0115](https://jvet-experts.org/doc_end_user/current_document.php?id=15086) AHG9: On supporting 4:4:4 color format in constituent rectangles and enhanced colour format information SEI messages [C. Kim, H. Tan, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0209](https://jvet-experts.org/doc_end_user/current_document.php?id=15198) AHG9: On constituent rectangles SEI message [H. Tan, C. Kim, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0210](https://jvet-experts.org/doc_end_user/current_document.php?id=15199) AHG9: On constituent rectangle grouping for 4:4:4 color format support in constituent rectangle SEI message [H. Tan, J. Nam, C. Kim, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0278](https://jvet-experts.org/doc_end_user/current_document.php?id=15267) AHG9: Constituent Rectangles / Enhanced Colour Format Information SEI extension to support 4:2:2 source content coded in bitstream with 4:2:0 chroma format [S. Keating, M. Ikeda (Sony)] [late] [miss]

### Display overlay SEI (6)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0099](https://jvet-experts.org/doc_end_user/current_document.php?id=15070) AHG9: On bit depth alignment between target and coded pictures in DOI SEI [T. Biatek, J. Boyce, M. M. Hannuksela (Nokia)]

[JVET-AK0100](https://jvet-experts.org/doc_end_user/current_document.php?id=15071) AHG9: DOI SEI support for target picture with alpha channel [T. Biatek, J. Boyce, M. M. Hannuksela (Nokia)]

[JVET-AK0157](https://jvet-experts.org/doc_end_user/current_document.php?id=15128) AHG9: On the number of DOI SEI message in an AU [J. Nam, H. Tan, J. Lee, C. Kim, J. Lim, S. Kim (LGE)]

[JVET-AK0158](https://jvet-experts.org/doc_end_user/current_document.php?id=15129) AHG9: On reconstruction of target display picture in DOI SEI message [J. Nam, H. Tan, J. Lee, C. Kim, J. Lim, S. Kim (LGE)]

[JVET-AK0190](https://jvet-experts.org/doc_end_user/current_document.php?id=15161) AHG9: On the display overlays information SEI message [J. Xu, Y.-K. Wang (Bytedance)]

[JVET-AK0265](https://jvet-experts.org/doc_end_user/current_document.php?id=15254) AHG9: Display overlay sets for DOI SEI [J. Boyce, T. Biatek, M. M. Hannuksela (Nokia)] [late]

### Quality metrics SEI (3)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0159](https://jvet-experts.org/doc_end_user/current_document.php?id=15130) AHG9: On miscellaneous aspects of quality metrics SEI message [J. Nam, H. Tan, J. Lee, C. Kim, J. Lim, S. Kim (LGE)]

[JVET-AK0207](https://jvet-experts.org/doc_end_user/current_document.php?id=15196) AHG9: On signalling of average quality in quality metrics SEI message [H. Tan, J. Nam, J. Lee, C. Kim, J. Lim, S. Kim (LGE)]

[JVET-AK0208](https://jvet-experts.org/doc_end_user/current_document.php?id=15197) AHG9: On the inclusion of quality metric SEI message in SEI processing order SEI message [H. Tan, C. Kim, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

### Other (10)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0140](https://jvet-experts.org/doc_end_user/current_document.php?id=15111) AHG9/AHG8: Showcase for Packed regions information SEI [J. Boyce, H. Zhang, M. M. Hannuksela (Nokia)]

[JVET-AK0189](https://jvet-experts.org/doc_end_user/current_document.php?id=15160) AHG9: On the bitdepth range information SEI message [J. Xu, Y.-K. Wang (Bytedance)]

[JVET-AK0114](https://jvet-experts.org/doc_end_user/current_document.php?id=15085) AHG9: Updates and suggestion on AI usage restrictions SEI message [C. Kim, H. Tan, J. Nam, J. Lee, J. Lim, S. Kim (LGE)]

[JVET-AK0179](https://jvet-experts.org/doc_end_user/current_document.php?id=15150) AHG9: On Lens Optical Correction SEI message [J. Samuelsson-Allendes, S. Deshpande (Sharp)]

[JVET-AK0204](https://jvet-experts.org/doc_end_user/current_document.php?id=15193) AHG9: Proposed Lens Optical Correction SEI message for version 5 of VSEI [S. Wenger, G. Teniou, A. T. Hinds (Tencent)]

[JVET-AK0153](https://jvet-experts.org/doc_end_user/current_document.php?id=15124) AHG9: On Photosensitive Content Information Signaling [S. Deshpande (Sharp)]

[JVET-AK0058](https://jvet-experts.org/doc_end_user/current_document.php?id=15029) [AHG9/AHG13] Comments on Film grain regions characteristics SEI message [S. Xie, P. Wu, Y. Gao, Y. Bai, C. Huang (ZTE)]

[JVET-AK0211](https://jvet-experts.org/doc_end_user/current_document.php?id=15200) AHG9/AHG13: Proposed Film Grain Region SEI message for version 5 of VSEI [S. Wenger, G. Teniou, A. T. Hinds (Tencent)]

[JVET-AK0281](https://jvet-experts.org/doc_end_user/current_document.php?id=15270) AHG9: On AI usage restrictions SEI message [M. M. Hannuksela, F. Cricri (Nokia)] [late]

[JVET-AK0286](https://jvet-experts.org/doc_end_user/current_document.php?id=15275) AHG9: Simplified enhanced colour format information SEI [J. Boyce, M. M. Hannuksela (Nokia)] [late]

## AHG9: Other SEI topics (6)

Contributions in this area were discussed at XXXX–XXXX on XXday XX Jan. 2025 (chaired by XXX).

[JVET-AK0107](https://jvet-experts.org/doc_end_user/current_document.php?id=15078) AHG9: Modality Information SEI for HEVC [J. Gao, H.-B. Teo, C.-S. Lim, K. Abe, V. Drugeon (Panasonic)]

[JVET-AK0136](https://jvet-experts.org/doc_end_user/current_document.php?id=15107) AHG9: Target Colour Volume SEI message [C. H. Demarty, E. François, F. Aumont, O. Le Meur (InterDigital)]

[JVET-AK0147](https://jvet-experts.org/doc_end_user/current_document.php?id=15118) AHG9: On NNPF for Tone Mapping with Colour Volume Information [C.-H. Demarty, E. François, F. Aumont, O. Le Meur (InterDigital)]

[JVET-AK0142](https://jvet-experts.org/doc_end_user/current_document.php?id=15113) AHG9: Display rectangles SEI [J. Boyce, T. Biatek, M. M. Hannuksela (Nokia)]

[JVET-AK0191](https://jvet-experts.org/doc_end_user/current_document.php?id=15162) AHG9: Examples of danmaku applications [J. Xu, Y.-K. Wang, L. Zhang (Bytedance)]

[JVET-AK0203](https://jvet-experts.org/doc_end_user/current_document.php?id=15192) AHG9: On signalling segmentation and object tracking information [E. Thomas, E. Potetsianakis, E. Alexiou, M.-L. Champel (Xiaomi)]

## Non-SEI HLS aspects (0)

Kept as template for future use.

# Plenary meetings, joint meetings, BoG reports, and liaison communications

## General

The following topics in JVET plenary XXday X Jan. XXXX–XXXX:

* Scheduling for remaining week (further detail on scheduling is recorded in section 2.12).
* Joint meetings involving JVET were scheduled as follows:
* …

Further detail about joint sessions with other groups is provided in the subsection 7.3.

Break-out group reports are discussed in section 7.4.

General plenary wrap-up discussions are recorded under sections 8, 9, and 10.

## Information sharing meetings

(kept for future use in meetings under SC 29 auspices)

Information sharing sessions with other WGs and AGs of the MPEG community were held on Monday 15 July 0900–1200, Wednesday 17 July 0900–1000, and Friday 19 July 1400–1600.

The status and plans for the work in the MPEG WGs and AGs was reviewed at these information sharing sessions.

## Joint meetings

### Joint session XXXX-XXXX XXday X Jan. on XXXX: MPEG WG X / XXXX, MPEG AG 5 / Quality Assessment, MPEG WG 5 / JVET and VCEG (ITU-T Q6/21)

(These notes were recorded by XXX)

Chaired by XXX (XXX Convenor/Rapporteur), … .

## BoGs (X)

The following break-out groups were established at this meeting to conduct discussion and develop recommendations on particular subjects.

## Liaison communications (X) (update)

[m70439](https://dms.mpeg.expert/doc_end_user/current_document.php?id=96222&id_meeting=200) Liaison statement from SC 29/WG 1 to WG 5 on JPEG AI [WG 1 via SC 29 Secretariat]

The liaison response WG 5 N 324 was reviewed in JVET on Thursday 7 Nov. at 1445-1500. The draft reply was also presented in the MPEG AG 3 Communication meeting Thursday 7 Nov. at 1500-1800.

# Project planning

## Software timeline (update)

ECM 15.0 software (including all adoptions) was planned to be available 3 weeks after the meeting (29 November).

The NNVC 11.0 codebase software was planned to be available 3 weeks after the meeting (29 November).

Extensions on top of VTM23.5 software will be released as appropriate (e.g., integration and updates of SEI messages incuded in JVET-AJ2006 by the current meeting).

Updates on top of HM18.0 and HTM16.3 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 (update)

An EE on neural network-based video coding was established, as recorded in output document JVET-AJ2023.

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-AJ2024.

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](mailto:jvet@lists.rwth-aachen.de)).

Review of AHG plans was conducted during the plenary on XXday X Jan. 2025 at XXXX–XXXX.

|  |  |  |
| --- | --- | --- |
| **Title and Email Reflector** | **Chairs** | **Mtg** |
| **Project Management (AHG1)**  ([jvet@lists.rwth-aachen.de](mailto: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](mailto:jvet@lists.rwth-aachen.de))   * Produce and finalize draft text outputs of the meeting (JVET-AJ2005 and JVET-AJ2006). * Collect reports of errata for the VVC, VSEI, HEVC, AVC, CICP, and the published related technical reports and produce the JVET-AJ1004 errata output collection. * 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. | 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 |
| **Test model software development (AHG3)**  ([jvet@lists.rwth-aachen.de](mailto: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 (for both VTM and HM), 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](mailto:jvet@lists.rwth-aachen.de))   * Consider plans for additional verification testing of VVC capability, particularly target conducting tests for VVC multi-layer features, and update the test plan accordingly. * 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. * Coordinate with AHG17 on investigating sequences outside of CTC, and making arrangements for viewing at the next meeting. * Prepare availability of viewing equipment and facilities arrangements for future meetings. | 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) | N |
| **Conformance testing (AHG5)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study the draft of additional conformance bitstreams for VVC multilayer configurations JVET-AI2028, and investigate the need for future improvements of conformance testing specifications. * Study the draft conformance bitstreams for new HEVC multiview profiles in JVET-AI1008, and further develop related conformance bitstreams. * 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, T. Ikai, S. Iwamura, H.-J. Jhu, K. Kawamura, P. de Lagrange, S. Paluri, K. Sühring, Y. Yu (vice‑chairs) | N |
| **ECM software development (AHG6)**  ([jvet@lists.rwth-aachen.de](mailto: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-15.0 software version (and potential updates), corresponding VTM anchor, 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](mailto: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. * Coordinate with AHG17 to 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. * Develop methodology of more reliable runtime measurement | X. Li (chair), L.-F. Chen, Z. Deng, J. Gan, E. François, R. Ishimoto, H.-J. Jhu, X. Li, J. Pardo, H. Wang (vice‑chairs) | Y (tel., 2 weeks notice) |
| **Optimization of encoders and receiving systems for machine analysis of coded video content (AHG8)**  ([jvet@lists.rwth-aachen.de](mailto: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-AI2031. * 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. * Coordinate experiments on optimization of encoders and receiving systems for machine analysis of coded video content, including combinations of proposed technologies. * Maintain the software implementation examples and develop tool combination examples 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 JVET-AJ2030 on optimization of encoders and receiving systems for machine analysis of coded video content. * Study the potential of using SEI messages for the purpose of machine analysis in coordination with AHG9. * Investigate the impact of using different machine task models in the evaluation of the compression performance of tools optimized for machine analysis tasks. * Coordinate with WG 4 VCM AHG on aspects such as unified common test conditions, evaluation metrics, test and training materials, usage of SEI messages, and on studying characteristics and requirements of machine analysis tasks, etc. Provide WG 4 VCM with AHG software and scripts to experiment non-normative tools and tool combination examples, and provide bitstreams generated by running a dense set of QP points for each sequence. | S. Liu, J. Ström, S. Wang, M. Zhou (AHG chairs) | Y (tel., 2 weeks notice, joint with WG 4 AHG) |
| **SEI message studies (AHG9)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study the SEI messages in VSEI, VVC, HEVC and AVC. * Study JVET-AJ2006 and identify any issues and propose solutions as appropriate. * Study JVET-AJ2032 and propose improvements. * 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. * 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, both for HM and VTM. | S. McCarthy, Y.-K. Wang (co-chairs), J. Boyce, T. Chujoh, S. Deshpande, C. Fogg, M. M. Hannuksela, P. de Lagrange, G. J. Sullivan, H. Tan, A. Tourapis, S. Wenger (vice-chairs) | N |
| **Encoding algorithm optimization (AHG10)**  ([jvet@lists.rwth-aachen.de](mailto: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, and coordinate with AHG4 on improving encoders and test settings for multi-layer verification testing. * Study optimized encoding and suitable test settings for noisy materials, such as sequences containing film grain. * 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) | Y (tel., 2 weeks notice) |
| **Neural network-based video coding (AHG11)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * 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. * Update the test conditions for NN-based video coding in JVET-AJ2016, including list, location and md5sums for training set. 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. * Discuss and propose improved metrics to perform complexity analysis of NN architectures, in particular also considering the impact of sparse models. * Finalize and discuss the EE on neural network-based video coding. * Promote the call for training materials, distribute it, and actively communicate with content owners. * Coordinate with other groups, including SC 29/AG 5 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 and studying the impact of training set extension. | 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), first on Nov. 28, second on Dec. 20 |
| **Enhanced compression beyond VVC capability (AHG12)**  ([jvet@lists.rwth-aachen.de](mailto: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 ECM15 algorithm description JVET-AJ2025. * 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-AI2017. * Analyse the results of exploration experiments described in JVET-AJ2024 in coordination with the EE coordinators. * Coordinate with AHG11 to study the interaction with neural network-based coding tools. | M. Karczewicz, Y. Ye, L. Zhang (co-chairs), B. Bross, R. Chernyak, X. Li, K. Naser, Y. Yu (vice-chairs) | N |
| **Film grain technologies (AHG13)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study the benefits and characteristics of film grain technologies, including autoregressive and frequency-filtering technologies. * Discuss and propose refinements to the draft of the TR 2nd ed. JVET-AJ2020. * Study alternative film grain models and their associated documentation. * Discuss and enumerate updates, improvements, and additions for the second edition of the technical report. * 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. * Coordinate development of film grain technology software and configuration files. * Coordinate with AG 5 on improving the plan for subjective quality testing of the FGC SEI message JVET-AJ2022, and conduct preparations for such testing. * Coordinate with AHG3 for software support of the FGC SEI message. | 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) |
| **NNVC software development (AHG14)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Coordinate development of the NNVC software and associated configuration files. * Prepare and deliver NNVC-11.0 software version (and potential updates), and provide reference configuration encodings according to the NNVC common test conditions as described in JVET-AJ2016. Study the impact of the addition of new dataset on the already integrated models. * Investigate and bridge coding performance of NNVC VTM anchor compared to the latest VTM version and/or VTM anchor in ECM software. * 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) and Very Low Operation Point (HOP/LOP/VLOP) 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-AJ2019) 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), R. Chang, Y. Li, Y. Li, M. Santamaria, J. N. Shingala, Z. Xie (vice chairs) | Y (tel., 2 weeks notice), first on Nov. 28, second on Dec. 20 |
| **Gaming content compression (AHG15)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Identify gaming content application scenarios and their requirements for codec operation. * 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. * Produce VTM and ECM anchor encodings according to CTC JVET-AJ2027, and provide results at the next meeting. * Develop and maintain software elements for supporting use cases of camera parameters and depth maps in gaming applications, including mechanisms for transporting them in the video bitstream. * Evaluate JVET test models (such as ECM, VTM, NNVC, etc.) under the proposed test conditions. * Investigate possibilities to enhance compression capability for gaming content. * Study conversion of depth maps into integer representation that could be input to compression. * Solicit contributions from industry on typical bitrate/quality/resolution used for gaming content compression. | S. Puri, J. Sauer (co-chairs), R. Chernyak, A. Duenas, L. Wang (vice chairs) | Y (tel., 2 weeks notice) |
| **Generative face video compression (AHG16)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Maintain GFVC software tools, associated configuration files, and software usage documentation. * Study the extension of GFVC software capability to handle video content with higher resolutions. * Identify and study additional test content, including content with higher resolutions, suitable for use in GFVC performance evaluation. * Study GFVC performance under test conditions defined in JVET-AJ2035, as well as performance on additional test content, and wider bitrate ranges. * Coordinate with AHG9 on further development of the GFV and GFVE SEI messages in JVET-AJ2006. | Y. Ye (chair), H.-B. Teo, Z. Lyu, S. McCarthy, S. Wang (vice chairs) | N |
| **Testing of video coding technology beyond CTC (AHG17)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Identify test sequences extending the represented range of applications (i.e. beyond those defined in common test conditions documents JVET-AB2010, JVET-AC2011 and JVET-AI2017) and investigate their suitability for use in visual quality assessments. * Prepare encoded bitstreams from the identified test sequences using VTM23.5 and ECM14.1 * Make preparations for viewing at the 37th JVET meeting in coordination with AHG4 and AG 5. * Develop the output document JVET-AJ2026, starting from the BoG report JVET-AJ0378. * Investigate potential need of arranging a face-to-face AHG meeting (with remote participation for group discussions) between the 37th and 38th JVET meetings. | M. Wien (chair), Y. Ye, V. Baroncini, E. Alshina (vice chairs) | Y (tel., 2 weeks notice, first on Nov. 20, second on Dec. 18) |

It was confirmed that the rules which can be found in document ISO/IEC JTC 1/‌SC 29/‌AG 2 [N 046](https://www.mpegstandards.org/wp-content/uploads/2022/01/ISO-IECJTC1-SC29-AG2_N0046_AhG.pdf) “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 XXX) 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 XXX, as noted in section 9.

[JVET-AJ1000](https://jvet-experts.org/doc_end_user/current_document.php?id=14988) Meeting Report of the 37th JVET Meeting [J.-R. Ohm] [WG 5 N XXX] (2025-02-19)

Initial versions of the meeting notes (d0 … dX) were made available on a daily basis during the meeting.

Remains valid – not updated: [JVET-AC1001](https://jvet-experts.org/doc_end_user/current_document.php?id=12566) Guidelines for HM-based software development [K. Sühring, F. Bossen, X. Li (software coordinators)]

Remains valid – not updated: [JVET-Y1002](https://jvet-experts.org/doc_end_user/current_document.php?id=11463) High Efficiency Video Coding (HEVC) Test Model 16 (HM 16) Encoder Description Update 16 [C. Rosewarne (primary editor), K. Sharman, R. Sjöberg, G. J. Sullivan (co-editors)] [WG 5 [N 103](https://dms.mpeg.expert/doc_end_user/current_document.php?id=82085&id_meeting=189)]

Remains valid – not updated: [JVET-AH1003](https://jvet-experts.org/doc_end_user/current_document.php?id=14259) Coding-independent code points for video signal type identification (Draft 3) [G. J. Sullivan, A. Tourapis] (2024-06-28)

Primary editor: G. J. Sullivan.

[JVET-AJ1004](https://jvet-experts.org/doc_end_user/current_document.php?id=14989) Errata report items for VVC, VSEI, HEVC, AVC, and Video CICP [Y.-K. Wang, B. Bross, I. Moccagatta, C. Rosewarne, G. J. Sullivan] (2024-12-31, near next meeting)

Primary editor: Y.-K. Wang.

This includes changes from new bug tickets.

Remains valid – not updated: [JVET-AH1005](https://jvet-experts.org/doc_end_user/current_document.php?id=14261) Technology under consideration for future editions of CICP [E. Thomas, A. Tourapis] [WG 5 N 289)] (2024-06-28)

From JVET-AH0154 and JVET-AH0217.

[JVET-AJ1006](https://jvet-experts.org/doc_end_user/current_document.php?id=14990) HEVC extensions and corrections (draft 1) [Y.-K. Wang, B. Bross, S. Deshpande, G. J. Sullivan, A. Tourapis ] (2024-12-20)

Request for amendment WG 5 N 320 was reviewed Friday 8 Nov. 1030.

Primary editor: Y.-K. Wang.

Remains valid – not updated: [JCTVC-V1007](https://mpeg.expert/jct/files/JCTVC-V1007-v1.zip) SHVC Test Model 11 (SHM 11) Introduction and Encoder Description [G. Barroux, J. Boyce, J. Chen, M. M. Hannuksela, Y. Ye] [WG 11 N 15778]

Remains valid: [JVET-AI1008](https://jvet-experts.org/doc_end_user/current_document.php?id=14609) Conformance testing for HEVC multiview extended and monochrome profiles [I. Moccagatta, S. Paluri, A. Tourapis, Y.-K. Wang]

Remains valid – not updated: [JVET-AC1009](https://jvet-experts.org/doc_end_user/current_document.php?id=12569) Common test conditions for SHVC [K. Sühring]

Remains valid – not updated [JCTVC-O1010](https://mpeg.expert/jct/files/JCTVC-O1010-v1.zip) Guidelines for Conformance Testing Bitstream Preparation [T. Suzuki, W. Wan]

[JVET-AJ1011](https://jvet-experts.org/doc_end_user/current_document.php?id=14991) White paper on HEVC [B. Bross, J.-R. Ohm, G. J. Sullivan, Y.-K. Wang] [AG 3 N 174] (2024-12-06)

JVET-[AJ1012](https://jvet-experts.org/doc_end_user/current_document.php?id=14992) Overview of IT systems used in JVET [J.-R. Ohm, I. Moccagatta, K. Sühring, M. Wien] (2024-12-31)

Requires update for new test sequence download server, and new JCT-VC/-3V sites

Remains valid – not updated: [JCT3V-G1003](https://mpeg.expert/jct3v/files/JCT3V-G1003-v2.zip) 3D-AVC Test Model 9 [D. Rusanovskyy, F. C. Chen, L. Zhang, T. Suzuki] [WG 11 N 14239]

Remains valid – not updated: [JCT3V-K1003](https://mpeg.expert/jct3v/files/JCT3V-K1003-v1.zip) Test Model 11 of 3D-HEVC and MV-HEVC [Y. Chen, G. Tech, K. Wegner, S. Yea] [WG 11 N 15141]

Remains valid – not updated: [JVET-AE1013](https://jvet-experts.org/doc_end_user/current_document.php?id=13268) Common test conditions of 3DV experiments [K. Sühring, M. Wien]

Remains valid – not updated [JCTVC-V1014](https://mpeg.expert/jct/files/JCTVC-V1014-v1.zip) Screen Content Coding Test Model 7 Encoder Description (SCM 7) [R. Joshi, J. Xu, R. Cohen, S. Liu, Y. Ye] [WG 11 N 16049]

Remains valid – not updated: [JVET-AC1015](https://jvet-experts.org/doc_end_user/current_document.php?id=12571) Common test conditions for SCM-based screen content coding [K. Sühring]

Remains valid – not updated: [JVET-AH1016](https://jvet-experts.org/doc_end_user/current_document.php?id=14264) AVC with extensions and corrections (draft 3) [B. Bross, T. Ikai, G. J. Sullivan, A. Tourapis, Y.-K. Wang] (2024-06-28)

Primary editor: B. Bross.

No output: JVET-Axx1017 through JVET-Axx1099

Remains valid – not updated [JVET-AA1100](https://jvet-experts.org/doc_end_user/current_document.php?id=11944) Common Test Conditions for HM Video Coding Experiments [K. Sühring, K. Sharman]

This specifies only the CTC for non-4:2:0 colour formats. The corresponding document for VVC is JVET-T2013, with no unification yet.

No output: JVET-Axx2001

Remains valid – not updated: [JVET-AH2002](https://jvet-experts.org/doc_end_user/current_document.php?id=14265) Algorithm description for Versatile Video Coding and Test Model 22 (VTM 22) [Y. Ye, A. Browne, S. Kim] [WG 5 N 284] (2024-07-05)

Primary editor: Y. Ye.

New elements from notes elsewhere in this report:

* …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

It was suggested that editorial improvements submitted as input to the next meeting would be welcome.

[JVET-AJ2003](https://jvet-experts.org/doc_end_user/current_document.php?id=14993) Guidelines for VTM-based software development [F. Bossen, X. Li, K. Sühring] (2024-11-22)

Update from JVET-AJ0187

Remains valid – not updated: [JVET-T2004](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=10542) Algorithm descriptions of projection format conversion and video quality metrics in 360Lib (Version 12) [Y. Ye, J. Boyce]

[JVET-AJ2005](https://jvet-experts.org/doc_end_user/current_document.php?id=14994) Additions and corrections for VVC version 4 (Draft 10) [G. J. Sullivan, B. Bross, M. M. Hannuksela, Y.-K. Wang] [WG 5 preliminary DAM N 330)] (2024-12-06)

Also issue Draft DoC WG 5 N 329 (with editing period 2024-12-06)

Agreed changes are alignment of code points with JVET-AJ2006, text improvements, text for digitally signed content SEI messages as per JVET-AJ0151v3. Not yet to be sent for DAM ballot.

Primary editor: G. J. Sullivan.

[JVET-AJ2006](https://jvet-experts.org/doc_end_user/current_document.php?id=14995) Additional SEI messages for VSEI version 4 (Draft 4) [J. Boyce, J. Chen, S. Deshpande, M. M. Hannuksela, S. McCarthy, G. J. Sullivan, H. Tan, Y.-K. Wang] [WG 5 preliminary DAM N 319)] (2024-12-06)

Also issue Draft DoC WG 5 N 321 (with editing period 2024-12-06)

New elements from notes elsewhere in this report:

* General editorial improvements
  + …
* SEI Processing Order SEI
  + …
* Neural Network Post Filter
  + …
* Encoder optimization information SEI
  + …
* Text description information SEI
  + …
* Source picture timing SEI
  + …
* Generative Face video SEI
  + …
* Digitally signed content SEIs
  + …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

Primary editor: J. Boyce.

[JVET-AJ2007](https://jvet-experts.org/doc_end_user/current_document.php?id=14996) Guidelines for NNVC software development [F. Galpin, S. Eadie, L. Wang, Z. Xie, Y. Li] (2024-11-22)

To be updated from JVET-AJ0193.

Remains valid – not updated: [JVET-X2008](https://jvet-experts.org/doc_end_user/current_document.php?id=11228) Conformance testing for versatile video coding (Draft 7) [J. Boyce, F. Bossen, K. Kawamura, I. Moccagatta, W. Wan]

Number might be re-used in future.

[JVET-AJ2009](https://jvet-experts.org/doc_end_user/current_document.php?id=14997) Reference software for versatile video coding 2nd edition (Draft 2) [F. Bossen, K. Sühring, X. Li] [WG 5 DIS N 322)] (2024-12-06)

DoCR on CD WG 5 N 321 was reviewed Friday 8 Nov. 1020.

Primary editor: F. Bossen.

Remains valid – not updated [JVET-AB2010](https://jvet-experts.org/doc_end_user/current_document.php?id=12216) VTM and HM common test conditions and software reference configurations for SDR 4:2:0 10 bit video [F. Bossen, X. Li, V. Seregin, K. Sharman, K. Sühring]

Remains valid – not updated: [JVET-AC2011](https://jvet-experts.org/doc_end_user/current_document.php?id=12575) VTM and HM common test conditions and evaluation procedures for HDR/WCG video [A. Segall, E. François, W. Husak, S. Iwamura, D. Rusanovskyy]

Remains valid – not updated: [JVET-U2012](https://jvet-experts.org/doc_end_user/current_document.php?id=10681) JVET common test conditions and evaluation procedures for 360° video [Y. He, J. Boyce, K. Choi, J.-L. Lin]

Remains valid – not updated: [JVET-T2013](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=10546) VTM common test conditions and software reference configurations for non-4:2:0 colour formats [Y.-H. Chao, Y.-C. Sun, J. Xu, X. Xu]

Remains valid – not updated: [JVET-Q2014](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9683) JVET common test conditions and software reference configurations for lossless, near lossless, and mixed lossy/lossless coding [T.-C. Ma, A. Nalci, T. Nguyen]

Remains valid – not updated: [JVET-Q2015](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9684) JVET functionality confirmation test conditions for reference picture resampling [J. Luo, V. Seregin]

[JVET-AJ2016](https://jvet-experts.org/doc_end_user/current_document.php?id=14998) Common test conditions and evaluation procedures for neural network-based video coding technology [E. Alshina, F. Galpin, R.-L. Liao, S. Liu, A. Segall] (2024-11-22)

Developed from JVET-AJ0362

Also include the new requirement that an analysis as conducted in JVET-AJ0361 shall be submitted with proposals.

Remains valid – not updated: [JVET-AI2017](https://jvet-experts.org/doc_end_user/current_document.php?id=14615) Common test conditions and evaluation procedures for enhanced compression tool testing [M. Karczewicz, Y. Ye] (2024-08-30)

Remains valid – not updated: [JVET-AA2018](https://jvet-experts.org/doc_end_user/current_document.php?id=11949) Common test conditions for high bit depth and high bit rate video coding [A. Browne, T. Ikai, D. Rusanovskyy, X. Xiu, Y. Yu]

[JVET-AJ2019](https://jvet-experts.org/doc_end_user/current_document.php?id=14999) Description of algorithms version 9 and software version 11 in neural network-based video coding (NNVC) [F. Galpin, Y. Li, D. Rusanovskyy, J. Ström, L. Wang] (2024-12-13)

New elements in text and software from notes elsewhere in this report:

* …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

[JVET-AJ2020](https://jvet-experts.org/doc_end_user/current_document.php?id=15000) Film grain synthesis technology for video applications ed. 2 (Draft 1) [D. Grois, Y. He, W. Husak, P. de Lagrange, A. Norkin, M. Radosavljević, A. Tourapis] (2024-12-31)

Start with corrections on first edition, and first thoughts on other content to be added (see JVET-AJ0013)

[JVET-AJ2021](https://jvet-experts.org/doc_end_user/current_document.php?id=15001) Verification test plan for VVC multilayer coding (update 5) [O. Chubach, P. de Lagrange, M. Wien] (2024-12-31)

See discussion under JVET-AJ0366.

[JVET-AJ2022](https://jvet-experts.org/doc_end_user/current_document.php?id=15002) Plan for subjective quality testing of the FGC SEI message (update 4) [P. de Lagrange, W. Husak, M. Radosavljević, M. Wien] (2024-12-31)

Remove items except for future tests in category 3.

[JVET-AJ2023](https://jvet-experts.org/doc_end_user/current_document.php?id=14986) Exploration experiment on neural network-based video coding (EE1) [E. Alshina, F. Galpin, Y. Li, D. Rusanovskyy, M. Santamaria, J. Ström, R. Chang, Z. Xie (EE coordinators)] (2024-11-29)

An initial draft of this document was reviewed and approved at 0940-1000 on Friday 8 Nov.

This round of EE1 tests includes:

* **…**

[JVET-AJ2024](https://jvet-experts.org/doc_end_user/current_document.php?id=14987) Exploration experiment on enhanced compression beyond VVC capability (EE2) [V. Seregin, J. Chen, R. Chernyak, K. Naser, J. Ström, F. Wang, M. Winken, X. Xiu, K. Zhang (EE coordinators)] (2024-12-06)

An initial draft of this document was reviewed and approved at 1000-1015 on Friday 8 Nov.

This round of EE2 tests will include:

* **…**

[JVET-AJ2025](https://jvet-experts.org/doc_end_user/current_document.php?id=15003) Algorithm description of Enhanced Compression Model 15 (ECM 15) [M. Coban, R.-L. Liao, K. Naser, J. Ström, L. Zhang] (2024-12-31)

New elements from notes elsewhere in this report:

* Intra prediction:
  + …
* Inter prediction:
  + …
* Transforms and coefficient coding:
  + …
* In-loop filtering:
  + …
* Software/CTC:
  + …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

[**JVET-AJ2026**](https://jvet-experts.org/doc_end_user/current_document.php?id=15004) **Testing of video coding technology beyond conditions of exploration experiments [M. Wien, Y. Ye, V. Baroncini, E. Alshina] (2024-11-29)**

Developed from BoG JVET-AJ0378, to be finalzed in AHG telco

[JVET-AJ2027](https://jvet-experts.org/doc_end_user/current_document.php?id=15005) Common test conditions for gaming applications [J. Sauer, R. Chernyak, S. Puri, S. Thiebaud] (2024-11-22)

Developed from JVET-AJ0136.

Remains valid – not updated: [JVET-AI2028](https://jvet-experts.org/doc_end_user/current_document.php?id=14621) Additional conformance bitstreams for VVC multilayer configurations [S. Iwamura, P. de Lagrange, I. Moccagatta] (2024-08-02)

Remains valid – not updated: [JVET-AH2029](https://jvet-experts.org/doc_end_user/current_document.php?id=14274) Visual quality comparison of ECM/VTM encoding [V. Baroncini, J.-R. Ohm, M. Wien] [AG 5 N 118] (2024-07-05)

[JVET-AJ2030](https://jvet-experts.org/doc_end_user/current_document.php?id=15006) Optimization of encoders and receiving systems for machine analysis of coded video content (Draft 7) [S. Liu, J. Chen, J. Ström] [WG 5 CDTR 23888-3, N 323)] (2024-12-31)

Primary editor: S. Liu. New elements from notes elsewhere in this report:

* …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

Remains valid – not updated: [JVET-AI2031](https://jvet-experts.org/doc_end_user/current_document.php?id=14623) Common test conditions for optimization of encoders and receiving systems for machine analysis of coded video content [S. Liu, C. Hollmann] (2024-08-16)

[JVET-AJ2032](https://jvet-experts.org/doc_end_user/current_document.php?id=15007) Technologies under consideration for future extensions of VSEI (version 6) [S. McCarthy, J. Boyce, J. Chen, S. Deshpande, M. M. Hannuksela, H. Tan, Y.-K. Wang] (2024-12-06)

New elements from notes elsewhere in this report:

* General editorial improvements
  + …
* Constituent rectangles SEI
  + …
* Display overlays SEI
  + …
* Image Format Metadata SEI
  + …
* Packed regions information SEI
  + …
* Bitdepth range information SEI
  + …
* AI usage restrictions SEI
  + …
* Lens optical correction SEI
  + …
* Quality metrics SEI
  + …
* Photosenstive content information SEI
  + …
* Graphics rendering information SEI
  + …
* Neural Network Post Filter
  + …
* Derived chroma formats
  + …

It was agreed during approval of this document that the following removals are also to be implemented to the TuC:

* …

It is noted that the list above may not be complete; if some adoption is missing that is recorded somewhere else in the meeting notes it shall also be considered included.

It was agreed that MPI is not further changed, and will be removed upon completion of a corresponding MIV profile.

Remains valid – not updated: [JVET-AF2033](https://jvet-experts.org/doc_end_user/current_document.php?id=13593) Report of verification test on VVC multi-layer coding: Content layering [S. Iwamura, P. de Lagrange, M. Wien] [AG 5 N 105)] (2023-12-22)

Remains valid – not updated: [JVET-AI2034](https://jvet-experts.org/doc_end_user/current_document.php?id=14624) Call for new HDR materials for future video coding development [E. François, W. Husak, S. Iwamura, D. Rusanovskyy, A. Segall, M. Wien] [WG 5 N 312)] (2024-07-26)

Developed from JVET-AI0266

[JVET-AJ2035](https://jvet-experts.org/doc_end_user/current_document.php?id=15008) Test conditions and evaluation procedures for generative face video coding [S. McCarthy, B. Chen] (2024-11-29)

Add higher resolution sequences as proposed in JVET-AJ0209.

Remains valid – not updated: [JVET-AG2036](https://jvet-experts.org/doc_end_user/current_document.php?id=13921) Call for training materials for neural network-based video coding tool development [E. Alshina, F. Galpin, S. Liu, M. Wien] [WG 5 N 266)] (2024-02-09)

The draft of WG 5 recommendations was reviewed and approved in JVET at 1055-1125 on Friday 19 July.

[JVET-AJ2037](https://jvet-experts.org/doc_end_user/current_document.php?id=15009) Report on subjective quality testing of the FGC SEI message (AG 5 N 140) [P. de Lagrange, W. Husak, M. Wien] [AG 5 N 140)] (2024-12-31)

The draft of WG 5 recommendations was reviewed and approved in JVET at 1230-1255 on Friday 8 November.

# Future meeting plans, expressions of thanks, a.o.b., and closing of the meeting

Future meeting plans were established according to the following guidelines (assuming face-to-face meetings):

* Meeting under ITU-T SG21 auspices when it meets (ordinarily starting meetings on the Tuesday or Wednesday of the first week and closing it on the Wednesday of the second week of the SG21 meeting – a total of 8-9 meeting days), and
* Otherwise meeting under ISO/IEC JTC 1/‌SC 29 auspices when its MPEG WGs meet (ordinarily starting meetings on the Thursday or Friday prior to the main week of such meetings and closing it on the same day as other MPEG WGs – a total of 8–9 meeting days).

In cases where an exceptionally high workload is expected for a meeting, an earlier starting date may be defined. In cases of online meetings, no sessions should be held on weekend days, such that meetings would typically start two days earlier.

Some specific future meeting plans (to be confirmed) were established as follows:

* During Wed. 26 March – Fri. 4 April 2025, 38th meeting under ISO/IEC JTC 1/‌SC 29 auspices, to be conducted as teleconference meeting,
* During Thu. 26 June – Fri. 4 July 2025, 39th meeting under ISO/IEC JTC 1/‌SC 29 auspices in Daejeon, – KR,
* During 2 – 10 October 2025, 40th meeting under ITU-T SG21 auspices in Geneva, CH,
* During 14 – 23 January 2026, 41st meeting under ISO/IEC JTC 1/‌SC 29 auspices, to be conducted as teleconference meeting,
* During 24 April – 1 May 2026, 42nd meeting under ISO/IEC JTC 1/‌SC 29 auspices in Santa Eulària, ES,
* During July 2026, 43rd meeting under ITU-T SG21 auspices, date and location t.b.d.
* During October 2026, 44th meeting under ISO/IEC JTC 1/‌SC 29 auspices, date and location t.b.d.
* During January 2027, 45th meeting under ISO/IEC JTC 1/‌SC 29 auspices, date and location t.b.d.

A face-to-face meeting of AHG17 (with best-effort online access to discussions) may be conducted during March 10-14, 2025 in Aachen, Germany (estimated duration of 3 days), with the purpose of identifying non-CTC test cases for subjective investigation. This is to be decided by the 37th JVET meeting.

The agreed document deadline for the 38th JVET meeting was planned to be XXday X March 2025.

(update thanks)

TCL was thanked for offering new HDR test material, and Bytedance was thanked for offering test material showing user generated content.

TCL and Vestel were thanked for providing 4K displays, Fraunhofer HHI was thanked for providing play-out equipment used in the experts viewing in Kemer. Adam Wieckowski was thanked for helping with the test setup. The experts who volunteered to participate in the viewing were also thanked.

Marius Preda was thanked for maintaining the document site jvet-experts.org, and for re-installing access to the documents of JCT-VC and JCT-3V. Institut Mines-Télécom was thanked for hosting the sites.

Fraunhofer HHI and RWTH Aachen University were thanked for hosting the new JVET content sites.

Ali Begen was thanked for planning, preparing and hosting the 36th JVET meeting in Kemer. Mustafa Bay, Alev Yavuz, Basak Erel and Merve Dağlı of Dekon Congress and Tourism, and the staff of Mirage Park Resort Hotel were thanked for the excellent support during the meeting. Further thanks were expressed to the silver sponsors Ofinno, Perculus and Unified Streaming, bronze sponsors Dolby, Ericsson, Nokia, and Qualcomm, and supporters Kuru Kahveci Mehmet Efendi, Ozyegin University, TCL and Vestel.

The 37th JVET meeting was closed at approximately XXX hours CET on Wednesday 22 January 2025.

# Annex A to JVET report: List of documents

(Dates and times in the table below are in Paris/Geneva time (1 hr. ahead of UTC).

# Annex B1 to JVET report: List of meeting participants attending in person

The participants who were personally present at the meeting site of the thirty-seventh meeting of the JVET, according to a sign-in sheet circulated in the JVET meeting rooms (approximately XXX people in total), were as follows:

1. …

# Annex B2 to JVET report: List of meeting participants attending remotely

The remote participants of the thirty-sieventh meeting of the JVET, according to the participation records from the Zoom teleconferencing tool used for the meeting sessions (approximately XXX people in total, not including those who had attended the meeting in person at least part-time (see annex B1), and not including those who attended only the joint sessions with other groups), were as follows:

1. …

# Annex C to JVET report: Recommendations of the 18th meeting of ISO/IEC JTC 1/SC 29/WG 5 MPEG Joint Video Experts Team with ITU-T SG 21

**ISO/IEC JTC 1/SC 29/WG 5 N XXX**