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| **Joint Video Experts Team (JVET)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  17th Meeting: Brussels, BE, 7–17 January 2020 | Document: JVET-Q\_Notes\_d1 |

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| *Title:* | **Meeting Report of the 17th Meeting of the Joint Video Experts Team (JVET), Brussels, BE, 7–17 Jan. 2020** | | |
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| *Source:* | Chairs of JVET | | |

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# Summary

The Joint Video Experts Team (JVET) of ITU-T WP3/16 and ISO/IEC JTC 1/ SC 29/ WG 11 held its seventeenth meeting during 7–17 January 2020 at Square – Brussels Convention Center in Brussels, BE. The JVET meeting was held under the chairmanship of Dr Gary Sullivan (Microsoft/USA) and 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 2.13 of this document. 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 a new standard. The name Versatile Video Coding (VVC) was chosen in April 2018 as the informal nickname for the new standard.

The JVET meeting began at approximately 0900 hours on Tuesday 7 January 2020. Meeting sessions were held on all days (including weekend days) until the meeting was closed at approximately XXXX hours on Friday 17 January 2020. On the first day of the meeting, only aspects related to high level syntax were on the agenda. Approximately XXX people attended the JVET meeting, and approximately XXX input documents, 5 CE summary reports, and 16 AHG reports were discussed. The meeting took place in a collocated fashion with a meeting of SG16 – one of the two parent bodies of the JVET. The subject matter of the JVET meeting activities consisted of developing video coding technology with a compression capability that significantly exceeds that of the current HEVC standard, or otherwise gives better support regarding the requirements of future application domains of video coding. As a primary goal, the JVET meeting reviewed the work that was performed in the interim period since the sixteenth JVET meeting in producing a sixth draft of the VVC standard and the sixth version of the associated VVC test model (VTM). Further important goals were reviewing the results of 5 Core Experiments (CE), reviewing other technical input on novel aspects of video coding technology, producing the next versions of the VVC draft text and VTM, and plan next steps for further investigation of candidate technology towards the formal standard development.

The JVET produced 11 output documents from the meeting (update):

* JVET-P2001 Versatile Video Coding specification text (Draft 7), also issued as ISO/IEC DIS 23090-3 Versatile Video Coding
* JVET-P2002 Algorithm description for Versatile Video Coding and Test Model 7 (VTM 7)
* JVET-P2005 Methodology and reporting template for coding tool testing
* JVET-P2007 Supplemental enhancement information messages for coded video bitstreams (Draft 2), also issued as ISO/IEC DIS 23002-7
* JVET-P2008 Conformance testing for versatile video coding (Draft 1)
* JVET-P2011, JVET common test conditions and software reference configurations for HDR/WCG video
* JVET-P2021 through JVET-P2025, Description of Core Experiments 1 through 5

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 Core Experiments (CE) were defined. The next four JVET meetings were planned for 15–24 April 2020 under WG 11 auspices in Alpbach, AT, during 23 June – 01 July 2020 under ITU-T SG16 auspices in Geneva, CH, during 7–16 October 2020 under WG 11 auspices in Rennes, FR, and during 6–15 January 2021 under WG 11 auspices in Capetown, ZA.

The document distribution site <http://phenix.it-sudparis.eu/jvet/> was used for distribution of all documents.

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 16 Visual Coding Experts Group (VCEG) and the ISO/IEC JTC 1/SC 29/WG 11 Moving Picture Experts Group (MPEG). The parent bodies of the JVET are ITU-T WP3/16 and ISO/IEC JTC 1/SC 29/WG 11.

The Joint Video Experts Team (JVET) of ITU-T WP3/16 and ISO/IEC JTC 1/ SC 29/ WG 11 held its sixteenth meeting during 1–11 October 2019 at the ITU premises in Geneva, CH. The JVET meeting was held under the chairmanship of Dr Gary Sullivan (Microsoft/USA) and Dr Jens-Rainer Ohm (RWTH Aachen/Germany).

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 a new standard. The name Versatile Video Coding (VVC) was chosen in April 2018 as the informal nickname for the new standard.

## 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/2020_01_Q_Brussels/>.

## Primary goals

As a primary goal, the JVET meeting reviewed the work that was performed in the interim period since the sixteenth JVET meeting in producing a seventh draft of the VVC standard and the seventh version of the associated VVC test model (VTM). Further important goals were reviewing the results of 5 Core Experiments (CE), reviewing other technical input on novel aspects of video coding technology, producing the next versions of draft text and VTM, and planning next steps for further investigation of candidate technology towards the formal standard development.

## Documents and document handling considerations

### General

The documents of the JVET meeting are listed in Annex A of this report. The documents can be found at <http://phenix.it-sudparis.eu/jvet/>.

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 (other than as contribution registration and upload times) follow the local time at the meeting facility.

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 the VTM software but have no normative effect are marked by the string “Decision (SW):”.
* Decisions that fix a “bug” in the VTM description (an error, oversight, or messiness) or in the software are marked by the string “Decision (BF):”.
* Decisions that are merely editorial without effect on the technical content of the 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.

This meeting report is based primarily on notes taken by the JVET chairs. 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.

### Late and incomplete document considerations

The formal deadline for registering and uploading non-administrative contributions had been announced as Tuesday, 31 December 2019. Any documents uploaded after 1159 hours Paris/Geneva time on Wednesday 1 January 2020 were considered “officially late”, giving 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.

As agreed by the fifteenth meeting as permanent rule, contributions related to CE proposals (including draft text) were to be uploaded 1 week ahead of the above mentioned deadline, such that more thorough study was possible, and in particular the CE summary reports could be provided in time by the regular deadline. Consequently, CE proposal documents which were uploaded after 1159 hours Paris/Geneva time on Wednesday 25 December 2019 were considered “officially late”.

It was suggested to have CE description documents include a description of how the results are planned to be reported – e.g., the form of the tables to be used for the results data. Complexity analysis characterizations were suggested to be a particular issue where this applies.

All contribution documents with registration numbers higher than JVET-Q0523 were registered after the “officially late” deadline (and therefore were also uploaded late). Likewise, CE proposal documents with registration numbers higher than JVET-Q0096 were registered late. However, some documents in the “late” range might include break-out activity reports that were generated during the meeting, and are therefore better considered as report documents rather than as late contributions. Also, all cross-check reports were uploaded late.

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 was 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 was agreed to be a helpful approach to be followed at the meeting.

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

* JVET-Q0XXX (a proposal on …), uploaded XX-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. For example, some of them were proposing combinations or simplifications of other proposals.

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

* JVET-Q0XXX (a document on …), uploaded XX-XX.
* …

All cross-verification reports at this meeting (except for JVET-Q0XXX) were registered late and all were 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 (X) contribution registrations were later cancelled, withdrawn, never provided, were cross-checks of a withdrawn contribution, or were registered in error: JVET-Q0XXX, … .

The following cross verification reports had not been uploaded yet by the end of the meeting, but were provided later: JVET-Q0XXX, … .

“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 typically be counted as a late contribution). At the current meeting, this situation applied to the initial uploads of documents JVET-Q0XXX, … .

Contributions that had significant problems with uploaded versions included the following:

* JVET-Q0XXX (…)
* …

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 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 was some expression of annoyance and remarks on the difficulty of dealing with late contributions and late revisions.

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.

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.). These 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 were 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-P2000, the Versatile Video Coding specification text (Draft 7) JVET-P2001, the Algorithm description for Versatile Video Coding and Test Model 7 (VTM 7) JVET-P2002, the Methodology and reporting template for coding tool testing JVET-P2005, the Supplemental enhancement information messages for coded video bitstreams (Draft 2) JVET-P2007, the Conformance testing for VVC (Draft 1) JVET-P2008, the JVET common test conditions and software reference configurations for HDR/WCG video JVET-P2011, and the Description of Core Experiments 1 through 5 (JVET-P2021 through JVET-P2025), had been completed and were approved. The software implementation of VTM (versions 7.0 and 7.1) was also approved.

The group was initially asked to review the meeting report of the previous meeting for finalization. The meeting report was later approved without modification.

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 Annex B of this report.

The meeting was open to those qualified to participate either in ITU-T WP3/16 or ISO/IEC JTC 1/‌SC 29/‌WG 11 (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.

## Agenda

The agenda for the meeting was as follows:

* Opening remarks and review of meeting logistics and communication practices
* IPR policy reminder and declarations
* Contribution document allocation
* Review of results of the previous meeting
* Reports of *ad hoc* group (AHG) activities
* Reports of core experiments planned at the previous meeting
* Consideration of contributions and communications on project guidance
* Consideration of additional video coding technology contributions
* Consideration of information contributions
* Coordination activities
* Approval of output documents and associated editing periods
* Future planning: Determination of next steps, discussion of working methods, communication practices, establishment of coordinated experiments, establishment of AHGs, meeting planning, other planning issues
* Other business as appropriate for consideration

On the first day of the meeting (January 7), only aspects related to high level syntax (including AHG8, AHG9, AHG12, and AHG14 reports) were on the agenda. In the morning of January 8, the meeting was continued with general status review and administrative matters, and then proceeded with reports of ad *hoc* group activities, reports of core experiments, and other matters.

## 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)
* <http://www.itscj.ipsj.or.jp/sc29/29w7proc.htm> (JTC 1/‌SC 29 Procedures)

It is noted that the ITU TSB director’s AHG on IPR had issued a clarification of the IPR reporting process for ITU-T standards, as follows, per SG 16 TD 327 (GEN/16):

“TSB has reported to the TSB Director’s IPR Ad Hoc Group that they are receiving Patent Statement and Licensing Declaration forms regarding technology submitted in Contributions that may not yet be incorporated in a draft new or revised Recommendation. The IPR Ad Hoc Group observes that, while disclosure of patent information is strongly encouraged as early as possible, the premature submission of Patent Statement and Licensing Declaration forms is not an appropriate tool for such purpose.

In cases where a contributor wishes to disclose patents related to technology in Contributions, this can be done in the Contributions themselves, or informed verbally or otherwise in written form to the technical group (e.g. a Rapporteur’s group), disclosure which should then be duly noted in the meeting report for future reference and record keeping.

It should be noted that the TSB may not be able to meaningfully classify Patent Statement and Licensing Declaration forms for technology in Contributions, since sometimes there are no means to identify the exact work item to which the disclosure applies, or there is no way to ascertain whether the proposal in a Contribution would be adopted into a draft Recommendation.

Therefore, patent holders should submit the Patent Statement and Licensing Declaration form at the time the patent holder believes that the patent is essential to the implementation of a draft or approved Recommendation.”

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 software implementation package uses 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](http://phenix.it-sudparis.eu/mpeg/doc_end_user/current_document.php?id=27881&id_meeting=16) of the 89th meeting of ISO/IEC JTC 1/‌SC 29/‌WG 11. Both ITU and ISO/IEC will be identified in the <OWNER> and <ORGANIZATION> tags in the header. This software is used in the process of designing the VTM software, and for evaluating proposals for technology to be potentially included in the design. 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.

## Communication practices

The documents for the meeting can be found at <http://phenix.it-sudparis.eu/jvet/>.

It was reminded to send a notice to the chairs in cases of changes to document titles, authors etc.

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 was 1221.

For distribution of test sequences, a password-protected ftp site had been set up at RWTH Aachen University, with a mirror site at FhG-HHI. Accredited members of JVET may contact the responsible JVET coordinators to obtain the password information (but the site is not open for use by others).

## Terminology

Some terminology used in this report is explained below:

(check for completeness with JVET-N0013, and draft text)

* **ACT**: Adaptive colour transform.
* **AFF**: Affine.
* **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).
* **ARSS**: Adaptive reference sample smoothing.
* **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.
* **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.
* **CCLM**: Cross-component linear model.
* **CCP**: Cross-component prediction.
* **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.
* **CL-RAS**: Cross-layer random-access skip.
* **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.
* **DCT**: Discrete cosine transform (sometimes used loosely to refer to other transforms with conceptually similar characteristics).
* **DCTIF**: DCT-derived interpolation filter.
* **DF**: Deblocking filter.
* **DMVR**: Decoder-side motion vector refinement.
* **DPS**: Decoding parameter sets.
* **DRC**: Dynamic resolution conversion (synonymous with ARC, and a form of RPR).
* **DT**: Decoding time.
* **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).
* **ECV**: Extended Colour Volume (up to WCG).
* **EL**: Enhancement layer.
* **ET**: Encoding time.
* **FRUC**: Frame rate up conversion (pattern matched motion vector derivation).
* **GRA**: Gradual random access
* **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 constitutes our draft standard design – now also used especially in reference to the (non-normative) encoder algorithms (see WD and TM).
* **HMVP**: History based motion vector prediction.
* **HRD**: Hypothetical reference decoder.
* **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).
* **IPCM**: Intra pulse-code modulation (similar in spirit to IPCM in AVC and HEVC).
* **ISP**: Intra subblock partitioning
* **JCCR**: Joint coding of chroma residuals
* **JEM**: Joint exploration model – the software codebase for future 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.
* **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”)
* **LP** or **LDP**: Low-delay P – the variant of the LD conditions that uses P frames.
* **LUT**: Look-up table.
* **LTRP**: Long-term reference pictures.
* **MC**: Motion compensation.
* **MCP**: Motion compensated prediction.
* **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 (WG 11, the parent body working group 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 (as in AVC and HEVC).
* **NSQT**: Non-square quadtree.
* **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).
* **operation point**: A temporal subset of an OLS.
* **PDPC**: Position dependent (intra) prediction combination.
* **PERP**: Padded equirectangular projection (a 360° projection format).
* **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.
* **BT**: Binary tree.
* **TT**: Ternary tree.
* **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.
* **RASL**: Random-access skipped leading.
* **R-D**: Rate-distortion.
* **RDO**: Rate-distortion optimization.
* **RDOQ**: Rate-distortion optimized quantization.
* **RDPCM**: Residual DPCM
* **ROT**: Rotation operation for low-frequency transform coefficients.
* **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.
* **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.
* **SDT**: Signal-dependent transform.
* **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.
* **SPS**: Sequence parameter set (as in AVC and HEVC).
* **STMVP**: Spatial-temporal motion vector prediction.
* **TBA/TBD/TBP**: To be announced/determined/presented.
* **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.
* **TPM**: Triangular partitioning mode
* **UCBDS**: Unrestricted center-biased diamond search.
* **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).
* **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.
* **VTM**: VVC Test Model.
* **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 WG 11, a.k.a. MPEG).
* **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.

## Opening remarks

Remarks during the opening session of the meeting 0900 Tuesday 7 January (chaired by GJS) were as follows.

* The first day was dedicated to high-level syntax (incl. AHGs 8, 9, 12)
* 0900 start time on the first day; 0800 generally
* Balloting and approval timeline: "H.VVC" | ISO/IEC 23090-3 for VVC and H.SEI | ISO/IEC 23002-7
  + DIS as output of the previous meeting (N18873 and N18877), with ballot period between the January and April meetings
    - Post-meeting editing
  + FDIS and Consent in July
* The meeting logistics, agenda, working practices, policies, and document allocation were reviewed.
  + The meeting host is XXXX
  + Having text and software available is crucial (and not just arriving at the end of the meeting).
  + There were no objections voiced in the opening plenary to the consideration of late contributions.
* The results of the previous meeting and the meeting report were reviewed.
  + See the AHG3 report for the software integration status
  + The relationship between the VVC and SEI texts was noted
    - VUI is in the SEI text, mostly for providing colour interpretation
      * It was noted that VUI is within the SPS, whereas SEI is in the SEI payload syntax structure, although this is not so relevant to the SEI text itself, and is more tied with the bitstream (less likely to be altered or removed).
      * VUI has a clear scope, is more tied to the sequence level
      * Should VUI be in the VVC spec instead of the SEI spec?
      * VUI could contain other info, such as constraint indicators (info that does not affect the decoding process)
      * SEI has a length parameter that enables discarding; VUI does not. SPS extension data follows the VUI. It was remarked that having a size indicator for VUI may be desirable.
    - field\_seq\_flag was put into the SPS to improve
* On placeholders – there were a number of cases where there was some description of a concept but no test results (see section 2.4.2).
* The primary goals of the meeting were to review the results of CEs, identify promising technology directions, and adopt proposed technology into the VVC and associated SEI draft texts and VTM.
* Due to the high number of input contributions, parallelization and breakout work were planned to be used at the meeting.
* Planning of viewing & equipment setup is needed
* Principles of standards development were discussed.
  + It was noted that now is the time for the filing of formal IPR declarations for those who have patent rights that would be necessary for implementation of VVC or the associated SEI standard.

## Scheduling of discussions

Scheduling: Generally meeting time was scheduled during 0800–2100+ hours, with coffee and lunch breaks as convenient. Ongoing scheduling refinements were announced on the group email reflector as needed. Some particular scheduling notes are shown below, although not necessarily 100% accurate or complete:

* Tue. 7 Jan., 1st day
  + 0900–1000 Opening remarks, review of practices, agenda, IPR reminder
  + 1010-1215 Reports of AHGs 8, 9, 12
  + 1400-1800 room 201, 1900-2230 Bozar bldg BoG (J. Boyce)
    - High-level tool control section 6.19.2
    - Feature combinations (section 6.19.1
    - Parameter sets cleanup (section 6.19.4)
  + 1400-1800, 1845-2230, room 100 (GJS)
    - Subpictures (section 6.20.1)
    - Slices and tiles (section 6.20.2)
    - Subpicture ID signalling (section 6.20.1.3)
* Wed. 8 Jan., 2nd day
  + 0900 Status review, remaining AHGs, planning, room 100 (GJS & JRO)
  + Track A (GJS)
    - CE4: Inter prediction with geometric partitioning (7) (section 5.4) (Track A)
    - CE4-related: Inter prediction with geometric partitioning (31) (section 6.4) (Track A)
    - Subpicture-based bitstream merging (section 6.20.1.4)
  + Track B (JRO)
    - CE1: Deblocking filtering (5) (section 5.1) (Track B)
    - CE2: Palette mode coding (5) (section 5.2) (Track B)
    - CE3: Lossless coding (12) (section 5.3) (Track B)
    - CE5: Cross-component adaptive loop filtering (7) (section 5.5) (Track B)
* Thu. 9 Jan., 3rd day
* Fri. 10 Jan., 4th day

## Contribution topic overview

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 may not be completely accurate):

* AHG reports (18) (section 3) (Plenary)
* Project development (section 4) (Plenary)
  + Text and software development (2)
  + Test conditions (0)
  + Performance assessment (3)
  + Coding studies and tools on specific use cases (3)
  + Test Material (0)
  + Conformance (1)
  + Implementation studies (11)
  + Profile/level specification (4)
* Core Experiments (section 5) with subtopics
  + CE1: Deblocking filtering (5) (section 5.1) (Track B)
  + CE2: Palette mode coding (5) (section 5.2) (Track B)
  + CE3: Lossless coding (12) (section 5.3) (Track B)
  + CE4: Inter prediction with geometric partitioning (7) (section 5.4) (Track A)
  + CE5: Cross-component adaptive loop filtering (7) (section 5.5) (Track B)
* Non-CE technology proposals (section 6) with subtopics
  + CE1 related – Deblocking filtering (4) (section 6.1) (Track B)
  + CE2 related – Palette mode coding (13) (section 6.2) (Track B)
  + CE3 related – Lossless coding (26) (section 6.3) (Track B)
  + CE4 related – Inter prediction with geometric partitioning (31) (section 6.4) (Track A)
  + CE5 related – Cross-component adaptive loop filtering (24) (section 6.5) (Track B)
  + Inter prediction and MV coding (29) (section 6.6) (Track B|A)
  + Intra prediction and mode coding (20) (section 6.7) (Track B)
  + Loop filtering (8) (section 6.8) (Track B)
  + Reference picture resampling (4) (section 6.9) (Track B)
  + Quantization control (13) (section 6.10) (Track B)
  + Transforms and transform signalling (24) (section 6.11) (Track B)
  + Residual coding (11) (section 6.12) (Track B)
  + Entropy coding (3) (section 6.13) (Track B)
  + Partitioning (5) (section 6.14) (Track B)
  + Chroma formats and chroma related coding tools (22) (section 6.15) (Track B)
  + Lossless and near lossless coding (1) (section 6.16) (Track B)
  + Screen content tools (2) (section 6.17) (Track B)
  + 360 degree video (3) (section 6.18) (Track A)
  + AHG9: General high-level syntax (133) (section 6.19) (Track A)
  + AHG12: High-level parallelism and coded picture regions (53) (section 6.20) (Track A)
  + AHG8: Layered coding and resolution adaptation (19) (section 6.21) (Track A)
* Complexity analysis (3) (section 7) (Track B)
* Encoder optimization (2) (section 8) (Track B)
* Metrics and evaluation criteria (0) (section 9) (Track B)
* Withdrawn (13) (section 10) (Track none)
* Joint meetings, plenary discussions, BoG reports, Summary of actions (section 11)
* Project planning (section 12)
* Establishment of AHGs (section 13)
* Output documents (section 14)
* Future meeting plans and concluding remarks (section 15)

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

Track A (241) was generally chaired by GJS and Track B (246) by JRO.

# AHG reports (16)

These reports were discussed XXday X Jan. 0900–XXXX (chaired by GJS and JRO), except otherwise noted.

[JVET-Q0001](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9361) JVET AHG report: Project management (AHG1) [J.-R. Ohm, G. J. Sullivan]

[JVET-Q0002](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9362) JVET AHG report: Draft text and test model algorithm description editing (AHG2) [B. Bross, J. Chen, J. Boyce, S. Kim, S. Liu, Y.-K. Wang, Y. Ye]

[JVET-Q0003](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9363) JVET AHG report: Test model software development (AHG3) [F. Bossen, X. Li, K. Sühring]

[JVET-Q0004](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9364) JVET AHG report: Test material and visual assessment (AHG4) [V. Baroncini, T. Suzuki, M. Wien, R. Chernyak, A. Norkin]

[JVET-Q0005](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9365) JVET AHG report: Conformance testing (AHG5) [J. Boyce, W. Wan, E. Alshina, I. Moccagatta, K. Kawamura, S. McCarthy, K. Sühring]

[JVET-Q0006](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9366) JVET AHG report: 360° video coding tools, software and test conditions (AHG6) [J. Boyce, Y. He, K. Choi, J.-L. Lin, Y. Ye]

[JVET-Q0007](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9367) JVET AHG report: Coding of HDR/WCG material (AHG7) [A. Segall, E. François, W. Husak, S. Iwamura, D. Rusanovskyy]

[JVET-Q0008](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9368) JVET AHG report: Layered coding and resolution adaptivity (AHG8) [S. Wenger, A. Segall, M. M. Hannuksela, Hendry, S. McCarthy, Y.-C. Sun, P. Topiwala, M. Zhou]

This AHG report was discussed Tuesday 7 October 2020 at 1010 (chaired by GJS).

The document summarizes activities of AHG on Layered coding and resolution adaptivity between the 16th and the 17th JVET meetings. Two email messages were exchanged on the reflector, covering the DPB size in case of layered coding. While there was no extended discussion, the conclusion reached can be summarized as follows: In VVC version 1, the constraint on DPB size should be specified to be independent of the number of layers, without specifying an explicit limit on the maximum number of layers. Proposal contribution JVET-Q0112 to this meeting is aligned with this suggestion.

A total of 35 relevant documents were received in preparation of the Brussels meeting.

The AHG recommended:

* To review all related contributions
* To continue to study VVC layered coding and resolution adaptivity

[JVET-Q0009](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9369) JVET AHG report: High-level syntax (AHG9) [R. Sjöberg, J. Boyce, B. Choi, S. Deshpande, M. M. Hannuksela, R. Skupin, A. Tourapis, Y.-K. Wang, W. Wan]

This AHG report was discussed Tuesday 7 October 2020 at 1020 (chaired by GJS).

This AHG report summarizes the activities of the AHG on High-level syntax (HLS) between the 16th JVET meeting in Geneva, CH (1–11 October 2019) and the 17th JVET meeting in Brussels, BE (7–17 January 2020).

It is reported that the estimated number of input contributions related to high-level syntax has increased from 137 at the 16th JVET meeting to 188 at this 17th meeting.

It is noted that the first day of the 17th meeting in Brussels was announced on the reflector on November 6 to be devoted to high-level syntax related topics.

An e-mail reflector discussion on HLS planning took place. The discussion was summarized by the AHG as the following lists of suggested actions:

Suggested actions to handle HLS input contributions at this meeting:

* Encourage joint contributions to reduce the number of documents
* Allocate more meeting time for HLS compared to low-level work
* Let software availability impact the presentation times of HLS proposals

Suggested actions for future meetings:

* Require that software is provided with HLS contributions, preferably also require cross-checks
* Prioritize missing HLS adoptions for VTM-8 integration
* Allocate much earlier time slots for the HLS-related implementation work
* Define test conditions for HLS aspects (e.g. scalability, RPR, subpictures) to ensure that the software works as expected

It was commented that we need greater clarity on who is responsible for providing software for contributions that merge proposals from different organizations.

It was also commented that when we have some part of the design that has not yet been adequately implemented in the software, the focus should be on getting that problem fixed rather than making additional refinements of the non-implemented feature.

[JVET-Q0010](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9370) JVET AHG report: Encoding algorithm optimization (AHG10) [A. Duenas, A. Tourapis, S. Ikonin, A. Norkin, R. Sjöberg, J. Le Tanou, J.-M. Thiesse]

[JVET-Q0011](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9371) JVET AHG report: Screen content coding (AHG11) [S. Liu, J. Boyce, A. Filippov, Y.-C. Sun, J. Xu, H. Yang]

[JVET-Q0012](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9372) JVET AHG report: High-level parallelism and coded picture regions (AHG12) [S. Deshpande, B. Choi, M. M. Hannuksela, R. Sjöberg, R. Skupin, W. Wan, Y.-K. Wang]

This AHG report was discussed Tuesday 7 October 2020 at 1110 (chaired by GJS).

The document summarizes activities of AHG on High-level parallelism and coded picture regions between the 16th and the 17th JVET meetings.

In the JVET email reflector, a kick-off message was sent. There were no other emails on the reflector specifically focusing on AHG12.

Input documents (total 70) related to AHG12 are listed in the AHG report, categorized as follows:

* Slice, tile information signalling (14)
* Sub-pictures/ independent coded regions (39)
* Entry point (2)
* Miscellaneous (11)
* Summaries (4)

[JVET-Q0013](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9373) JVET AHG report: Tool reporting procedure and testing (AHG13) [W.-J. Chien, J. Boyce, W. Chen, Y.-W. Chen, R. Chernyak, K. Choi, R. Hashimoto, Y.-W. Huang, H. Jang, R.-L. Liao, S. Liu]

[JVET-Q0014](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9374) JVET AHG report: Lossless and near-lossless coding (AHG14) [T. Nguyen, T.-C. Ma, M. Ikeda, H. Jang, X. Zhao]

[JVET-Q0015](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9375) JVET AHG report: Quantization control (AHG15) [R. Chernyak, E. François, C. Helmrich, S. McCarthy, A. Segall]

[JVET-Q0016](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9376) JVET AHG report: Implementation studies (AHG16) [M. Zhou, J. An, E. Chai, K. Choi, S. Sethuraman, T. Hsieh, X. Xiu]Formularende

# Project development

Contributions in this category were discussed XXday X Jan. XXXX–XXXX (chaired by XXX)

## Text and software development and general guidance (2)

[JVET-Q0041](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8866) AHG2: Editorial input on VVC draft text [Y.-K. Wang (Bytedance), B. Bross (HHI), V. Drugeon (Panasonic), J. Chen (Futurewei)]

[JVET-Q0273](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9098) AHG9: Editorial changes related to picture header [M. Pettersson, R. Sjöberg, M. Damghanian (Ericsson)]

## Test conditions (0)

## Performance assessment (3)

### Tool level analysis (AHG13) (3)

[JVET-Q0050](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8875) AHG13: Decoding Time and Energy Assessment of VTM-7.0 [M. Kränzler, C. J. Herglotz, A. Kaup]

[JVET-Q0053](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8878) AHG13: Analysis of the Energy Demand and Time Complexity of Several Coding Tools in VTM-7.0 [M. Kränzler, C. J. Herglotz, A. Kaup]

[JVET-Q0320](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9145) AHG13: Performance of VVC field coding [H.-W. Sun, H.-B. Teo, C.-S. Lim (Panasonic)]

### Overall VVC performance (0)

## Coding studies and tools on specific use cases (3)

[JVET-Q0438](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9264) Monochrome processing [A. Browne, K. Sharman, S. Keating (Sony)]

[JVET-Q0424](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9249) Mandatory film grain [R. Sjöberg, D. Saffar, M. Pettersson, M. Damghanian (Ericsson)]

[JVET-Q0533](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9379) Film Grain Synthesis Support [A. Norkin (Netflix)] [late]

## Test material (0)

## Conformance (1)

[JVET-Q0479](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9306) Updates to conformance testing for versatile video coding [I. Moccagatte, J. Boyce (Intel)]

## Implementation studies (AHG16) (11)

[JVET-Q0102](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8927) AHG16: A study of bin to bit ratio for VTM7.0 [M. Zhou (Broadcom)]

[JVET-Q0185](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9010) AHG16: On merge estimation region for VVC [Y.-L. Hsiao, C.-C. Chen, C.-W. Hsu, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek), H. Huang, W.-J. Chien, T. Hsieh, V. Seregin, C.-C. Chen, K. Reuzé, M. Karczewicz (Qualcomm)]

[JVET-Q0211](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9036) [AHG16] VVC software decoder and performance analysis [S. Gudumasu, S. Bandyopadhyay, A. Srivastava, Y. He, Y. He (InterDigital)]

[JVET-Q0297](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9122) AHG16: Merge estimation region [H. Huang, W.-J. Chien, T. Hsieh, V. Seregin, C.-C. Chen, K. Reuze, M. Karczewicz (Qualcomm)]

[JVET-Q0356](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9181) AHG16: Parallel Merge Estimation for VVC [S. Esenlik, H. Gao, B. Wang, A. M. Kotra, E. Alshina (Huawei), Y.-L. Hsiao, C.-C. Chen, C.-W. Hsu, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (Mediatek)]

[JVET-Q0583](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9429) Crosscheck of JVET-Q0356 (AHG16: Parallel Merge Estimation for VVC) [B. Bross (HHI)] [late]

[JVET-Q0386](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9211) AHG16: Feature-rich implementation of VVC real-time decoding and playback on ARM based mobile clients [J. Arumugam, S. Kotecha, S. Ramamurthy (Ittiam)]

[JVET-Q0430](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9255) AHG16: Syntax based MTS zero out [F. Le Léannec, K. Naser, F. Galpin, P. Delagrange (InterDigital)]

[JVET-Q0495](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9323) AHG16: Simplified clip ranges for NL-ALF [Y.-W. Chen, X. Xiu, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai Inc.)]

[JVET-Q0496](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9324) AHG16: On motion shift derivation of SbTMVP [Y.-W. Chen, X. Xiu, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai Inc.)]

[JVET-Q0500](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9328) AHG16: On derivation of CCLM predictors [Y.-W. Chen, X. Xiu, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai Inc.)]

[JVET-Q0513](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9342) AHG16: Clipping residual samples for JCCR [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

## Profile/level specification (4)

[JVET-Q0065](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8890) Level restrictions on maximum tile width for line buffer reduction [M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0111](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8936) A proposal of an 8-bit profile [Li Zhang, Y.-K. Wang, J. Wang (Bytedance)]

[JVET-Q0112](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8937) On level definitions [Y.-K. Wang (Bytedance), Y. He (InterDigital), P. Wu (ZTE)]

See also the AHG8 report, which describes relevant email reflector discussion.

[JVET-Q0485](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9312) Profile and Level Definitions [W. Wan, T. Hellman, M. Zhou, B. Heng, P. Chen (Broadcom)]

# Core Experiments

## CE1: Deblocking filtering (5)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0021](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9333) CE1: Summary Report on Deblocking Filtering [K. Andersson, A. Norkin]

[JVET-Q0054](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8879) CE1: CE1-1.1 to CE1-1.3: Fixes for long luma deblocking filter decision [K. Andersson, J. Enhorn (Ericsson)]

[JVET-Q0063](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8888) CE1-3.1: Deblocking for blocks with different BCW weights [C.-M. Tsai, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek), A. M. Kotra, S. Esenlik, B. Wang, H. Gao, E. Alshina (Huawei), X. Meng, S. Wang, S. Ma (PKU), X. Zheng (DJI)]

[JVET-Q0084](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8909) CE1-2: Deblocking for TPM (Triangular Partition Mode) [X.W. Meng, S.S. Wang, S.W. Ma (PKU), S. Iwamura, S. Nemoto, A. Ichigaya(NHK), X.Zheng (DJI)]

[JVET-Q0094](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8919) CE1-4: Disable deblocking for affine sub-PU edges when PROF is applied [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

[JVET-Q0096](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8921) CE1-3.2: Boundary strength derivation for blocks with BCW [S. Iwamura, S. Nemoto, A. Ichigaya (NHK), K. Andersson, R. Yu, J. Enjorn (Ericsson)]

## CE2: Palette mode coding (5)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0022](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9259) CE2: Summary Report on Palette Mode Coding [X. Xu, Y.-H. Chao, Y.-C. Sun, J. Xu]

[JVET-Q0064](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8889) CE2-3.1: Simplification of palette predictor update for small CUs [Y.-H. Chao, T. Hsieh, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0066](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8891) CE2-1.2: Fixed-length binarization of palette escape value [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.)]

[JVET-Q0067](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8892) CE2-1.3: Truncated binarization of palette escape value [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.), S. Yoo, J. Zhao, J. Nam, J. Choi, S. H. Kim, J. H. Lim (LGE)]

[JVET-Q0075](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8900) CE2-1.1: QP dependent fixed-length binarization for escape coding [W. Zhu, J. Xu, L. Zhang (Bytedance)]

[JVET-Q0076](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8901) CE2-2.1: Resetting palette predictor at CTU row [W. Zhu, L. Zhang, J. Xu (Bytedance), H. Jang, J. Nam, S. Kim, J. Lim (LGE)]

## CE3: Lossless coding (12)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0023](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9302) CE3: Summary Report on Lossless Coding [T. Nguyen, T.-C. Ma, A. Nalci]

[JVET-Q0068](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8893) CE3-1.3: Using RRC for lossless coding without state transition [T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai Inc.), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek), A. Nalci, H. E. Egilmez, M. Coban, M. Karczewicz (Qualcomm), M. G. Sarwer, R. Liao, J. Luo, Y. Ye (Alibaba)]

[JVET-Q0069](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8894) CE3-1.4: On residual scanning order for lossless coding [T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai Inc.)]

[JVET-Q0070](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8895) CE3-2.5: Residual coding selection signaling for lossless coding [T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai Inc.), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek), A. Nalci, H. E. Egilmez, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0071](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8896) CE3-2.10: Luma BDPCM for lossless coding with RRC and residual rotation [T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai Inc.), A. Nalci, H. E. Egilmez, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0072](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8897) CE3-2.11: Luma and Chroma BDPCM for lossless coding with RRC and residual rotation [[T.-C. Ma](mailto:tsung-chuanma@kwai.com), [H.-J. Jhu](mailto:jhuhong-jheng@kwai.com), [X. Xiu](mailto:xiaoyuxiu@kwai.com), [Y.-W. Chen](mailto:yiwenchen@kwai.com), [X. Wang (Kwai Inc.)](mailto:xianglinwang@kwai.com), A. Nalci, H. E. Egilmez, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0080](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8905) CE3-1.5: Rice parameter derivation of transform skip residual coding [M. G. Sarwer, R. -L. Liao, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0081](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8906) CE3-2.6: Luma BDPCM and IBC with TSRC for lossless coding [J. Choi, H. Jang, S. Yoo, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0082](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8907) CE3-2.7: Luma and chroma BDPCM and IBC with TSRC for lossless coding [J. Choi, H. Jang, S. Yoo, J. Heo, J. Lim, S. Kim (LGE), A. Nalci, H. Wang, M. Coban, M. Karczewicz (Qualcomm), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0086](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8911) CE3-2.1 and CE3-2.2: Luma/Chroma BDPCM for Lossless Coding with Transform Skip Residual Coding [A. Nalci, H. Wang, M. Coban, M. Karczewicz (Qualcomm), J. Choi, H. Jang, S. Yoo, J. Heo, J. Lim, S. Kim (LGE), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0088](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8913) CE3-2.3: Luma BDPCM for Lossless Coding with Regular Residual Coding [A. Nalci, H. Wang, M. Coban, M. Karczewicz (Qualcomm), T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek), M. G. Sarwer, R. Liao, Y. Ye, J. Luo (Alibaba), T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai), H. Jang, J. Choi, S. Kim, J. Lim (LGE)]

[JVET-Q0089](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8914) CE3-2.4: Luma and Chroma BDPCM for Lossless Coding with Regular Residual Coding [A. Nalci, H. Wang, M. Coban, M. Karczewicz (Qualcomm), T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony), Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek), T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang (Kwai)]

[JVET-Q0092](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8917) CE3: Modified Rice Parameter Derivation for Residual Coding (CE3-1.1, CE3-1.2, CE3-2.8 and CE3-2.9) [H. Wang, M. Karczewicz, A. Nalci, Y.-H. Chao, M. Coban (Qualcomm)]

## CE4: Inter prediction with geometric partitioning (7)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0024](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9353) CE4: Summary report on inter prediction with geometric partitioning [C.-C. Chen, R.-L. Liao, X. Xiu, H. Yang]

[JVET-Q0059](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8884) CE4-1: Geometric Inter Prediction with 64 Modes [H. Gao, S. Esenlik, E. Alshina, A. M. Kotra, B. Wang (Huawei), R.-L. Liao, J. Chen, Y. Ye, J. Luo (Alibaba), K. Reuzé, C.-C. Chen, H. Huang, W.-J. Chien, V. Seregin (Qualcomm), M. Bläser, J. Sauer (RWTH Aachen)]

[JVET-Q0060](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8885) CE4-4: Geometric Inter Prediction with Adaptive Blending for SCC [H. Gao, S. Esenlik, E. Alshina, A. M. Kotra, B. Wang (Huawei), M. Bläser, J. Sauer (RWTH Aachen)]

[JVET-Q0062](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8887) CE4-3: Constrain SBT for GEO mode [H. Huang, T. Hsieh, V. Seregin, K. Reuze, C.-C. Chen, H.E. Egilmez, W.-J. Chien, M. Karczewicz (Qualcomm), L. Xu, X. Cao, Y. Sun, F. Chen, L. Wang (Hikvision)]

[JVET-Q0077](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8902) CE4-2: Block size restriction of GEO [Z. Deng, L. Zhang, H. Liu, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0078](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8903) CE4-6: Combination of geometric partitioning and CIIP [S. Blasi, G. Kulupana (BBC)]

[JVET-Q0602](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9448) Crosscheck of JVET-Q0078 (CE4-6: Combination of geometric partitioning and CIIP) [K. Panusopone (Nokia)]

[JVET-Q0079](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8904) CE4 Common Base: Geometric inter prediction [H. Gao, S. Esenlik, E. Alshina, A. M. Kotra, B. Wang (Huawei), K. Reuze, C.-C. Chen, H. Huang, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm), R.-L. Liao, J. Chen, Y. Ye, J. Luo (Alibaba), M. Bläser, J. Sauer (RWTH Aachen)]

[JVET-Q0091](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8916) CE4-5: Single mode partition for 4xN and Nx4 CU [K. Panusopone, S. Hong, L. Wang (Nokia)]

## CE5: Cross-component adaptive loop filtering (7)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0025](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9317) CE5: Summary Report on Cross Component Adaptive Loop Filtering [C.-Y. Chen, A. Segall]Formularende

[JVET-Q0058](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8883) CE5 Common Base: Cross Component Adaptive Loop Filter [K. Misra, F. Bossen, P. Cowan, A. Segall (Sharp Labs of America), N. Hu, J. Dong, V. Seregin, M. Karczewicz (Qualcomm), P. Onno, C. Gisquet, G. Laroche (Canon), J. Li, C.S. Lim, C.-W. Kuo (Panasonic), J. Nam, J. Choi, J. Lim, S. Kim (LGE), O. Chubach, C.-Y. Lai, C.-Y. Chen, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0073](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8898) CE5-2.1, CE5-3.1: Multiplication removal for cross component adaptive loop filter and 5x5 filter shape [N. Hu, J. Dong, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0085](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8910) CE5-1.1: CCALF with 5x4 filter shape and 8 filter coefficients [A. M. Kotra, S. Esenlik, B. Wang, H. Gao, E. Alshina (Huawei)]

[JVET-Q0093](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8918) CE5-1.3: CCALF with 6 filter coefficients [Y. Zhao, A.M. Kotra, H. Yang (Huawei)]

[JVET-Q0095](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8920) CE5-2.2: Multiplication removal for CCALF with coefficient range in [-8, 8] [G. Li, X. Li, X. Zhao, L. Zhao, Y. Du, S. Liu (Tencent), N. Hu, J. Dong, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0097](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8922) CE5-1.2: Cross-component ALF simplification with 6-tap filter [J. Li, C. S. Lim (Panasonic)] [late]

[JVET-Q0229](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9054) CE5: Report of CE5-1.4 and CE5-3.2 on Joint chroma cross-component adaptive loop filtering [Y. He, F. Le Léannec, E. François (InterDigital)] [late]

# Non-CE Technology proposals

## CE1 related – Deblocking filtering (4)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0141](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8966) Non-CE1/Non-CE3: Deblocking filter control for lossless blocks [K. Unno, K. Kawamura, S. Naito (KDDI)]

[JVET-Q0321](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9146) Non-CE1: Deblocking filter decision simplification [H.-B. Teo, C. Wang, C.-S. Lim, H.-W. Sun (Panasonic)]

[JVET-Q0322](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9147) CE1-related: Long luma deblocking filter decision modification [H.-B. Teo, C. Wang, C.-S. Lim (Panasonic)]

[JVET-Q0325](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9150) CE1-related: Deblocking modification for GEO [X. W. Meng (PKU), X. Zheng (DJI), S. S. Wang, S. W. Ma (PKU)]

[JVET-Q0478](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9305) Non-CE1: QP fix for deblocking [W. Zhu, L. Zhang, J. Xu (Bytedance)]

## CE2 related – Palette mode coding (13)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0291](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9116) CE2-related: On maximum palette size of VVC [M. G. Sarwer, Y. Ye, J. Luo, R. -L. Liao (Alibaba)]

[JVET-Q0435](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9261) CE8-related: Modification of palette coding syntax structure [W. Lim, G. Bang (ETRI)] [late]

[JVET-Q0445](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9271) AHG9/Non-CE2: On predictor palette initialization [J. Luo, Y. Ye, R. Liao, M. Sarwer, J. Chen (Alibaba)]

[JVET-Q0477](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9304) Non-CE2: Modified coding order of syntax elements in palette mode [W. Zhu, L. Zhang, J. Xu, H-C. Chuang (Bytedance)]

[JVET-Q0491](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9319) CE2-related: Palette escape binarization [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.)]

[JVET-Q0492](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9320) Non-CE2: Palette encoding with high QPs [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.)]

[JVET-Q0493](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9321) Non-CE2: Palette encoder improvements for lossless coding [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.)]

[JVET-Q0587](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9433) Crosscheck of JVET-Q0493 (Non-CE2: Palette encoder improvements for lossless coding) [R.-L. Liao (Alibaba)]

[JVET-Q0501](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9329) Non-CE2: On palette predictor initialization in WPP [Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0502](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9330) Non-CE2: Encoder only approach for CTU row palette predictor initialization [Y.-H. Chao, W.-J. Chien, C.-H. Hung, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0503](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9331) CE2-related: Encoder improvement for palette mode [Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm), R.-L. Liao, M. Sarwer, J. Chen, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0596](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9442) Crosscheck of JVET-Q0503 (CE2-related: Encoder improvement for palette mode) [H.-J. Jhu (Kwai Inc.)]

[JVET-Q0504](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9332) CE2-related: Palette mode for non 4:4:4 color format [R.-L. Liao, M. Sarwer, J. Chen, Y. Ye, J. Luo (Alibaba), Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0509](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9338) CE2-1.1-related: Encoder optimization with adjusted palette clustering steps [M. Wang, J. Li, L. Zhang, J. Xu, K. Zhang, H. Liu, S. Wang (Bytedance)]

[JVET-Q0519](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9348) Non-CE2: On signaling of maximum palette size and maximum palette predictor size [X. Xiu, H.-J. Jhu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai)]

## CE3 related – Lossless coding (26)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0056](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8881) CE3-related: Level prediction for transform skip samples [J. Lainema (Nokia)]

[JVET-Q0107](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8932) CE3-related: Flag-free Lossless Coding in VVC [A. Nalci, M. Karczewicz, H. Wang, H. E. Egilmez, M. Coban (Qualcomm)]

[JVET-Q0108](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8933) CE3-related: On signaling overhead for low-level lossless flags in CE3-2.5 [M. Karczewicz, A. Nalci, H. Wang, H. E. Egilmez, M. Coban (Qualcomm)]

[JVET-Q0109](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8934) CE3-related: On Last Position Signaling for Lossless Coding [M. Karczewicz, A. Nalci, H. Wang, H. E. Egilmez, M. Coban (Qualcomm)]

[JVET-Q0137](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8962) CE3-related: Rice Parameter Derivation with Unified Lookup Table [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0139](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8964) CE3-related: Lookup Table Free Rice Parameter Derivation [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0143](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8968) Non-CE3: Issue of Level mapping in transform skip residual [Y. Kato, K. Abe, T. Toma (Panasonic)]

[JVET-Q0144](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8969) Non-CE3: Contexts in Chroma transform skip residual coding [Y. Kato, K. Abe, T. Toma (Panasonic)]

[JVET-Q0145](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8970) CE3-related: Unified rice parameter derivation of transfrom skip residual [Y. Kato, K. Abe, T. Toma (Panasonic)]

[JVET-Q0548](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9394) Crosscheck of JVET-Q0145 (CE3-related: Unified rice parameter derivation of transform skip residual) [J. Lainema (Nokia)] [late]

[JVET-Q0186](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9011) CE3-related: TB-level residual coding selection for lossless coding [Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0187](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9012) CE3-related: Rice parameter derivation in residual coding [Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0263](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9088) CE3-related: Bit-exact simplification of Rice parameter selection for regular residual coding [C. Auyeung, X. Li, X. Zhao, S. Liu (Tencent)]

[JVET-Q0545](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9391) Crosscheck of JVET-P0263 (CE3-related: Bit-exact simplification of Rice parameter selection for regular residual coding) [Z.-Y. Lin (MediaTek)] [late]

[JVET-Q0264](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9089) CE3-related: Computation reduction in the derivation of Rice parameter for abs\_remainder[ ] in regular residual coding [C. Auyeung, X. Li, X. Zhao, S. Liu (Tencent)]

[JVET-Q0553](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9399) Crosscheck of JVET-Q0264: CE3-related: Computation reduction in the derivation of Rice parameter for abs\_remainder[ ] in regular residual coding [T. Nguyen (HHI)] [late]

[JVET-Q0269](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9094) CE3-related: On transform skip residual coding [M. G. Sarwer, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0294](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9119) CE3-related: CTU level local lossless coding of VVC [M. G. Sarwer, Y. Ye, J. Luo, J. Chen (Alibaba)]

[JVET-Q0323](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9148) Non-CE3: Encoder optimization for chroma BDPCM [C.-C. Kuo, S.-P. Wang, C.-C. Lin, C.-L. Lin (ITRI)]

[JVET-Q0603](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9449) Crosscheck of JVET-Q0323 (Non-CE3: Encoder optimization for chroma BDPCM) [M.-S. Chiang (MediaTek)]

[JVET-Q0347](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9172) CE3 related: Fixed rice parameters in transform residual coding [Y. Chen, F. Le Léannec, F. Galpin, T. Poirier (InterDigital)]

[JVET-Q0366](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9191) Non-CE3: Simplification of interpolation filtering for intra prediction [G. Rath, F. Galpin, F. Urban (InterDigital)]

[JVET-Q0439](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9265) CE3 Related: Modified Rice Parameter derivation [S. Keating, K. Sharman (Sony)]

[JVET-Q0460](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9286) Non-CE3: Inter BDPCM for lossless video coding [G. Kulupana, S. Blasi (BBC)]

[JVET-Q0462](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9288) CE3-related: Modified transform skip residual coding for lossless coding [T. Nguyen, B. Bross, H. Schwarz, D. Marpe, T. Wiegand (HHI)]

[JVET-Q0463](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9289) CE3-related: Inter BDPCM with RRC for lossless video coding [G. Kulupana, S. Blasi (BBC)]

[JVET-Q0489](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9316) CE3-related: Modified TS residual coding [M. Karczewicz, H. Wang, M. Coban, A. Nalci (Qualcomm), C. Auyeung, X. Li, X. Zhao, S. Liu (Tencent)]

[JVET-Q0551](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9397) Crosscheck of JVET-Q0489: CE3-related: Modified TS residual coding [T. Nguyen (HHI)] [late]

[JVET-Q0490](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9318) CE3-related: Simplification of rice parameter derivation [H. Wang, M. Karczewicz, M. Coban (Qualcomm)]

[JVET-Q0599](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9445) Crosscheck of JVET-Q0490 (CE3-related: Simplification of rice parameter derivation) [H.-J. Jhu (Kwai Inc.)]

[JVET-Q0498](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9326) Non-CE3: TB based Rice parameter selection for transform skip residual coding [Y.-W. Chen, T.-C. Ma, X. Xiu, H.-J. Jhu, X. Wang (Kwai Inc.)] [placehold] [late]

[JVET-Q0588](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9434) Crosscheck of JVET-Q0498 (Non-CE3: TB based Rice parameter selection for transform skip residual coding) [R.-L. Liao (Alibaba)]

[JVET-Q0561](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9407) CE3-related: Transquant Bypass Mode for Lossless Coding [A. Nalci, M. Karczewicz, H. Wang, H. E. Egilmez, M. Coban (Qualcomm)] [late]

## CE4 related – Inter prediction with geometric partitioning (31)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0061](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8886) CE4-related: Combined Test of CE4-1, CE4-2 and CE4-3 [H. Gao, S. Esenlik, E. Alshina, A. M. Kotra, B. Wang (Huawei), K. Reuzé, C.-C. Chen, H. Huang, W.-J. Chien, V. Seregin (Qualcomm), R.-L. Liao, J. Chen, Y. Ye, J. Luo (Alibaba), L. Xu, F. Chen, L. Wang (Hikvision), Z. Deng, L. Zhang, H. Liu, K. Zhang, Y. Wang (Bytedance), M Bläser, J. Sauer (RWTH Aachen)]

[JVET-Q0123](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8948) CE4-related: Modifications of GEO [J. Li (Panasonic)]

[JVET-Q0127](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8952) Non-CE4: On merge list generation for geometric partitioning [Y. Kidani, K. Kawamura, K. Unno, S. Naito (KDDI)]

[JVET-Q0131](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8956) Non-CE4: GEO with mode reduction [T. Hashimoto, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0132](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8957) Non-CE4: Separate syntax for GEO angle and distance [T. Zhou, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0160](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8985) CE4-related: CE4-1 spec text with suggested fixes [M. Zhou (Broadcom)]

[JVET-Q0168](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8993) CE4-related: On GEO clean-ups [Y. Morigami, M. Ikeda, T. Suzuki (Sony)]

[JVET-Q0188](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9013) CE4-related: Simplification on geometric partitioning mode by replacing motion index calculation with subsampled weight information [Y.-L. Hsiao, C.-C. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0554](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9400) Crosscheck of JVET-Q0188: CE4-related: Simplification on geometric partitioning mode by replacing motion index calculation with subsampled weight information [H. Gao (Huawei)] [late]

[JVET-Q0189](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9014) CE4-related: Reducing GEO modes [O. Chubach, Y.-L. Hsiao, C.-Y. Chen, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0268](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9093) CE4-related: GEO with 32 modes [K. Reuzé, H. Huang, W.-J. Chien, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0307](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9132) CE4-related: Block-dimension based GEO mode selection [Z. Deng, L. Zhang, H. Liu, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0577](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9423) Crosscheck of JVET-Q0307 (CE4-related: Block-dimension based GEO mode selection) [L. Xu, H. Dou, Y.-J. Chiu (Intel)] [late]

[JVET-Q0309](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9134) CE4-related: Further constraints on block shapes for GEO [Z. Deng, L. Zhang, H. Liu, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0528](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9358) Crosscheck of JVET-Q0309 (CE4-related: Further constraints on block shapes for GEO) [J. Li (Panasonic)] [late] [miss]

[JVET-Q0312](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9137) CE4-related: On simplification for GEO weight derivation [Y. Sun, F. Chen, L. Wang (Hikvision)]

[JVET-Q0338](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9163) CE4-related: Harmonized conditions for CIIP and GEO [N. Park, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0575](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9421) Crosscheck of JVET-Q0338 (CE4-related: Harmonized conditions for CIIP and GEO) [N. Zhang (Bytedance)] [late]

[JVET-Q0339](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9164) CE4-related: Adjustment of the distance on the GEO mode [N. Park, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0348](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9173) CE4-related: Displacement Restriction on Geometric Inter Prediction [Y.-C. Yang, C.-Y. Teng (Foxconn)]

[JVET-Q0598](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9444) Crosscheck of JVET-Q0348 (CE4-related: Displacement Restriction on Geometric Inter Prediction) [H.-J. Jhu (Kwai Inc.)]

[JVET-Q0364](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9189) CE4.4-related: Combination of GEO and Weighted-Prediction [P. Bordes, T. Poirier, F. Le Léannec (InterDigital)]

[JVET-Q0541](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9387) Crosscheck of JVET-Q0364 (CE4.4-related: Combination of GEO or TPM with Weighted-Prediction) [T. Chujoh (Sharp)] [late]

[JVET-Q0365](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9190) CE4-Related: On-the-fly Weighting Index to Sample Blending Weight Conversion without Table Look-Up in GEO [L.-F. Chen, X. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0564](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9410) Crosscheck of JVET-Q0365: CE4-Related: On-the-fly Weighting Index to Sample Blending Weight Conversion without Table Look-Up in GEO [H. Gao (Huawei)] [late]

[JVET-Q0388](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9213) CE4-related: GEO memory reduction in weighting masks by fixed shifting [D. Liu, C. Hollmann, R. Yu, J. Ström (Ericsson)]

[JVET-Q0422](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9247) CE4 related: cleanup for signaling maximum number of triangle merge candidates [L. Li, X. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0429](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9254) CE4-related: Geometric partitioning signaling [T. Poirier, F. Le Léannec, F. Urban, A. Robert (InterDigital)]

[JVET-Q0437](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9263) Non-CE4: Disabling MTS for Geo [K. Naser, F. Le Leannec, T. Poirier, F. Galpin (InterDigital)]

[JVET-Q0440](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9266) Non-CE4: Disabling TrSkip for Geo [K. Naser, F. Le Léannec, T. Poirier (InterDigital)]

[JVET-Q0456](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9282) Non-CE4: reduced LUT for GEO blending weights generation [Y.-Z. Ma, Q.-H. Ran, R.-P. Qiu, M.-L. Zhang, J.-Y. Huo, F.-Z. Yang (Xidian Univ.), S. Wan (NPU)]

[JVET-Q0458](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9284) CE4-Related: On-the-fly Weighting Index to Sample Blending Weight Conversion without Table Look-Up on Top of Combine Test in Q0061 [L.-F. Chen, X. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0565](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9411) Crosscheck of JVET-Q0458: CE4-Related: On-the-fly Weighting Index to Sample Blending Weight Conversion without Table Look-Up on Top of Combined Test in Q0061 [H. Gao (Huawei)] [late]

[JVET-Q0459](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9285) CE4-Related: Look-Up Table Free Weighting Index to Sample Blending Weight Calculation By Using Piecewise Constant Function in GEO [L.-F. Chen, X. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0466](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9292) CE4-Related: On-the-fly Weighting Calculation in GEO [L.-F. Chen, X. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0507](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9336) CE4-related: Quality scalable GEO [J. Li, C. S. Lim (Panasonic)]

[JVET-Q0508](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9337) CE4-related: Combined test of JVET-Q0123 and JVET-Q0268 [?? (Panasonic)] [late] [miss]

[JVET-Q0526](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9356) CE4-related: GEO support for 4xN and Nx4 CU [K. Panusopone, S. Hong, L. Wang (Nokia)] [late]

[JVET-Q0563](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9409) Crosscheck of JVET-Q0526: CE4-related: GEO support for 4xN and Nx4 CU [H. Gao (Huawei)] [late]

[JVET-Q0601](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9447) Non-CE4: Extension of JVET-P0325 [A. Robert, T. Poirier, F. Le Léannec (InterDigital)]

## CE5 related – Cross-component adaptive loop filtering (24)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0074](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8899) CE5-related: Performance of CE5 anchor with 8-bit dynamic range for CC-ALF coefficients [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0124](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8949) CE5-related: JC-CCALF with Power of 2 Weight Values [C.-W. Kuo (Panasonic)]

[JVET-Q0125](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8950) CE5-related: JC-CCALF with Alternative Filter Weight [C.-W. Kuo (Panasonic)]

[JVET-Q0585](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9431) CE5-related: cross-check report of JVET-Q0125 on JC-CCALF with Alternative Filter Weight [?? (InterDigital)] [late]

[JVET-Q0165](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8990) CE5-related: On the CC-ALF filtering process [Z. Zhang, J. Ström, K. Andersson (Ericsson)]

[JVET-Q0544](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9390) Crosscheck of JVET-P0165 Test 1 (CE5-related: On the CC-ALF filtering process) [O. Chubach (MediaTek)] [late]

[JVET-Q0167](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8992) Non-CE5: Multiplication simplification for ALF and CC-ALF [J. Ström, Z. Zhang, K. Andersson (Ericsson)]

[JVET-Q0190](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9015) CE5-related: On CC-ALF modifications related to coefficients and signalling [O. Chubach, C.-Y. Chen, C.-Y. Lai, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0251](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9076) CE5-related: Unified cross component adaptive loop filter [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0253](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9078) CE5-related: High level syntax modifications for CCALF [A. M. Kotra, S. Esenlik, B. Wang, H. Gao, E. Alshina (Huawei)]

[JVET-Q0296](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9121) Non-CE5: Adaptive precision for CCALF coefficients [L.-H. Xu, J. Yao, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0301](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9126) CE5-related: CCALF filter for 4:2:2 and 4:4:4 color format [J. Choi, J. Nam, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0304](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9129) Non-CE5: Non-Linear Cross Component Adaptive Loop Filter [J. Yao, L.-H. Xu, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0310](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9135) Non-CE5: Suggested text for CC-ALF padding process with raster scan slices [Y. Wang, H. Liu, L. Zhang, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0311](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9136) Non-CE5: On CC-ALF padding for ALF virtual boundaries [Y. Wang, H. Liu, L. Zhang, K. Zhang, Z. Deng, Y. Wang (Bytedance)]

[JVET-Q0537](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9383) Crosscheck of JVET-Q0311 (Non-CE5: On CC-ALF padding for ALF virtual boundaries) [T. Ikai (Sharp)] [late]

[JVET-Q0382](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9207) CE5-related: On high level syntax of CC-ALF [F. Chen, L. Xu, L. Wang (Hikvision)]

[JVET-Q0467](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9293) CE5-related: Simplified CCALF [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

[JVET-Q0494](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9322) CE5-related: Joint clip operation for CCALF and chroma ALF [T.-C. Ma, X. Xiu, Y.-W. Chen, H.-J. Jhu, X. Wang (Kwai Inc.)]

[JVET-Q0531](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9377) Crosscheck of JVET-P0494 (CE5-related: Joint clip operation for CCALF and chroma ALF) [O. Chubach (MediaTek)] [late]

[JVET-Q0171](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8996) AHG9: On CC-ALF modifications related to HLS [O. Chubach, C.-Y. Chen, C.-Y. Lai, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0250](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9075) CE5-related: Removing number of filters for CC-ALF in slice and picture header [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0326](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9151) CE5-related: On CC-ALF slice and picture header syntax [X. W. Meng (PKU), X. Zheng (DJI), S. S. Wang, S. W. Ma (PKU)]

[JVET-Q0580](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9426) Crosscheck report of JVET-Q0326 [X. Xu (Tencent)] [late]

[JVET-Q0520](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9349) AHG9: Cleanups on signaling for CC-ALF, BDPCM, ACT and Palette [Y. Wang, L. Zhang, K. Zhang, W. Zhu (Bytedance)]

Items 1 and 2 of this contribution belong to this category.

[JVET-Q0559](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9405) CE5-related: CCALF coefficient derivation using combined neighbors [K. Panusopone, S. Hong, L. Wang, J. Lainema (Nokia)] [late]

## Inter prediction and MV coding (29)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0105](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8930) nonCE4: BCW SIF Derivation for Pairwise Candidate [A. Robert, T. Poirier, F. Le Léannec (InterDigital)]

[JVET-Q0558](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9404) Crosscheck of JVET-Q0105 "BCW SIF Derivation for Pairwise Candidate" [G. Li (Tencent)] [late]

[JVET-Q0128](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8953) On clarification of applicable conditions of DMVR and BDOF [T. Chujoh, T. Hashimoto, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0589](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9435) Crosscheck of JVET-Q0128 (On clarification of applicable conditions of DMVR and BDOF) [P. Bordes (InterDigital)]

[JVET-Q0129](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8954) On editorial improvements for specification of explicit weighted prediction [T. Chujoh, T. Hashimoto, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0130](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8955) On improvement of collocated\_ref\_idx [T. Chujoh, T. Hashimoto, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0242](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9067) Cleanup for TPM, CIIP, and GEO in the colour format of 4:0:0 [L. Pham Van, G. Van der Auwera, A. K. Ramasubramonian, H. Huang, W.-J. Chien, M. Karczewicz (Qualcomm)]

[JVET-Q0266](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9091) On TPM and GEO merge modes in presence of weighted prediction [A. Filippov, H. Chen, V. Rufitskiy, H. Yang, E. Alshina (Huawei)]

[JVET-Q0306](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9131) Non-CE4: Removal of MVD scaling process for 4x8/8x4 blocks in MMVD [N. Zhang, H. Liu, L. Zhang, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0313](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9138) Non-CE4: Constraints on block size for ATMVP [Y. Sun, F. Chen, L. Wang (Hikvision)]

[JVET-Q0532](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9378) Crosscheck of JVET-Q0313 (Non-CE4: Constraints on block size for ATMVP) [H. Chen (Huawei)] [late]

[JVET-Q0315](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9140) Non-CE4: Triangular prediction mode with motion vector difference [K. Zhang, L. Zhang, H. Liu, Z. Deng, Y. Wang (Bytedance)]

[JVET-Q0324](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9149) Simplification of MV derivation for affine chroma [S. H. Wang (PKU), X. Zheng (DJI), S. S. Wang, S. W. Ma (PKU)]

[JVET-Q0327](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9152) On IBC/ATMVP candidate list construction [X. W. Meng, S. H. Wang (PKU), X. Zheng (DJI), S. S. Wang, S. W. Ma (PKU)]

[JVET-Q0337](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9162) Non-CE4: On weight values of the chroma-component for TPM mode [N. Park, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0540](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9386) Crosscheck of JVET-Q0337 (Non-CE4: On weight values of the chroma-component for TPM mode) [T. Chujoh (Sharp)] [late]

[JVET-Q0340](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9165) Non-CE4: Cleanup of the MMVD offset derivation [N. Park, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0341](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9166) Non-CE4: Range of the motion vector [N. Park, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0535](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9381) Crosscheck of JVET-Q0341 (Non-CE4: Range of the motion vector) [J. Li (Panasonic)] [late]

[JVET-Q0349](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9174) Combination of TPM and Weighted-Prediction [P. Bordes, T. Poirier, F. LeLeannec (InterDigital)]

[JVET-Q0538](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9384) Crosscheck of JVET-Q0349 (Combination of TPM and Weighted-Prediction) [T. Chujoh (Sharp)] [late]

[JVET-Q0350](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9175) Non-CE: Enable CIIP for 4x8/8x4 block without SCIPU violation [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

[JVET-Q0600](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9446) Crosscheck of JVET-Q0350 (Non-CE: Enable CIIP for 4x8/8x4 block without SCIPU violation) [K. Panusopone (Nokia)]

[JVET-Q0354](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9179) Non-CE: Clean-up regarding syntaxes for prediction mode decision [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

[JVET-Q0362](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9187) Non-normative aspects for cleanup of DMVR specification and software [S. Esenlik, B. Wang, A. M. Kotra, H. Gao, E. Alshina (Huawei), J. Arumugam, S. Kotecha, S. Ramamurthy (Ittiam)]

[JVET-Q0368](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9193) On context model for mvp\_flag and ref\_idx [H. Chen, H. Yang (Huawei)]

[JVET-Q0370](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9195) On context model for merge indices [H. Chen, H. Yang (Huawei)]

[JVET-Q0534](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9380) Crosscheck of JVET-Q0370 (On context model for merge indices) [Y. Sun, F. Chen, L. Wang (Hikvision)] [late]

[JVET-Q0372](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9197) A fix for the shorter tap interpolation filter for 4x4 block [Z. Wang, J. Luo, Y. Ye (Alibaba)] [late]

[JVET-Q0389](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9214) Non-CE4: SbTMVP harmonization [D. Liu, C. Hollmann, R. Yu (Ericsson)]

[JVET-Q0562](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9408) Crosscheck of JVET-Q0389 (Non-CE4: SbTMVP harmonization) [Y. Sun, F. Chen, L. Wang (Hikvision)] [late]

[JVET-Q0390](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9215) Non-CE4: SbTMVP simplification [D. Liu, C. Hollmann, R. Yu (Ericsson)]

[JVET-Q0431](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9256) Interaction between Affine and SBT [F. Le Léannec, K. Naser, T. Poirier, P. Bordes (InterDigital)]

[JVET-Q0455](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9281) On CU-level BDOF enable condition [S. Wan, Y. Xue (NPU), J.-Y. Huo, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0483](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9310) On avoiding out of range motion vectors [F. Bossen, A. Segall (Sharp)]

[JVET-Q0522](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9351) Non-CE4: Early termination of DMVR and study of its pixel coverage [C.-C. Chen, H. Huang, W.-J. Chien, M. Karczewicz (Qualcomm)]

[JVET-Q0524](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9354) Non-CE4: DC balancing in DMVR [A. Aminlou, M. Homayouni (Nokia)] [late]

[JVET-Q0525](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9355) Non-CE4: Support large rotation and flipping in affine and PROF [A. Aminlou, D. Naik (Nokia)] [late]

## Intra prediction and mode coding (20)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0110](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8935) On Intra Prediction Mode and Chroma BDPCM [A. Nalci, L. Pham Van, H. Egilmez, G. Van der Auwera, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0597](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9443) Crosscheck of JVET-Q0110 (On Intra Prediction Mode and Chroma BDPCM) [H.-J. Jhu (Kwai Inc.)]

[JVET-Q0161](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8986) On constant shift and offset in MIP [K. Kondo, M. Ikeda, T. Suzuki (Sony)]

[JVET-Q0542](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9388) Crosscheck of JVET-Q0161 (On constant shift and offset of MIP) [J. Pfaff (HHI)] [late]

[JVET-Q0192](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9017) Chroma wide angle intra prediction mode mapping for 4:2:2 format [C.-M. Tsai, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0194](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9019) Cleanup for checking CTU row boundary location in CCLM [C.-M. Tsai, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0274](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9099) MIP with fixed-length mode coding and memory reduction [T. Biatek, L. Pham Van, A. K. Ramasubramonian, G. Van der Auwera, M. Karczewicz (Qualcomm)]

[JVET-Q0275](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9100) Suggested bugfixes for CCLM filtering in the VVC specification draft [A. Filippov, V. Rufitskiy, E. Alshina (Huawei)]

[JVET-Q0292](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9117) Cleanup of intra reference sample filter selection [J. Heo, J. Choi, J. Nam, H. Jang, J. Lim, S. Kim (LGE)]

[JVET-Q0293](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9118) Removal of chroma Nx2 blocks in PDPC [J. Heo, H. Jang, J. Choi, J. Lim, S. Kim (LGE)]

[JVET-Q0302](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9127) Simplified contexts in intra prediction [J. Choi, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0371](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9196) Unification of intra reference sample generation [D.-Y. Kim (Chips&Media), S.-C. Lim, J. Lee, J. Kang (ETRI)]

[JVET-Q0385](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9210) Simplification of intra prediction in CIIP mode [R. Ghaznavi-Youvalari, J. Lainema, K. Panusopone (Nokia)]

[JVET-Q0547](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9393) Crosscheck of JVET-Q0385 (Simplification of intra prediction in CIIP mode) [B. Ray (Qualcomm)] [late]

[JVET-Q0391](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9216) Unified PDPC for angular intra modes [B. Ray, G. Van der Auwera, M. Karczewicz (Qualcomm)]

[JVET-Q0543](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9389) Crosscheck of JVET-Q0391 (Unified PDPC for angular intra modes) [J. Pfaff (HHI)] [late]

[JVET-Q0392](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9217) On the coding of cclm\_mode\_flag [B. Ray, G. Van der Auwera, A. K. Ramasubramonian, M. Karczewicz (Qualcomm)]

[JVET-Q0555](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9401) Crosscheck of JVET-Q0392 (On the coding of cclm\_mode\_flag) [R. Ghaznavi-Youvalari (Nokia)] [late]

[JVET-Q0446](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9272) MIP with constant shifts and offsets [J. Pfaff, B. Stallenberger, M. Schäfer, P. Merkle, P. Helle, T. Hinz, H. Schwarz, D. Marpe, T. Wiegand (HHI), K. Kondo, M. Ikeda (Sony), J. Huo, H. Wang, Y. Ma, F. Yang (Xidian University), S. Wan (NPU), Y. Yu (OPPO)]

[JVET-Q0450](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9276) On fixed sW and fO in MIP [J.-Y. Huo, H.-X. Wang, Y. Sun, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), S. Wan (NPU), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0451](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9277) On mipSizeId modification for 8x8 blocks [J.-Y. Huo, H.-X. Wang, X.-W. Li, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), S. Wan (NPU), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0452](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9278) Modification of up-sampling in MIP [J.-Y. Huo, X.-W. Li, Q.-H. Ran, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), S. Wan (NPU), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0457](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9283) MIP input value calculation unification [S. Wan (NPU), H.-X. Wang, J.-Y. Huo, D.-N. Wang, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0464](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9290) On modifications of intra prediction process [A. Filippov, V. Rufitskiy, B. Wang, S. Esenlik, A.M. Kotra, H. Gao, E. Alshina (Huawei)]

[JVET-Q0556](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9402) Aligning intra-prediction of TS blocks with BDPCM [Saverio Blasi, Gosala Kulupana (BBC)] [late]

## Loop filtering (9)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

See also:

* Section 6.19.2:
  + Q0121 on deblocking control parameters
  + Q0175 on parameters override mechanism in slice header for in-loop filters
  + Q0248 on constraints for ALF APS
  + Q0254 on override for ALF related syntax elements in slice header
  + Q0352 on subpicture boundaries
  + Q0572 on ALF signalling
* Section 6.20.3:
  + Q0120 on control of loop filtering across subpicture/tile/slice boundaries
  + Q0317 which affects filtering control for subpictures
  + Q0352 on subpicture boundaries
  + Q0475 on subpicture signalling

[JVET-Q0150](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8975) Fix for ALF virtual boundary processing [K. Andersson, J. Ström, Z. Zhang, J. Enhorn (Ericsson)]

[JVET-Q0191](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9016) Deblocking filter process with considering dependent quantization [C.-M. Tsai, C.-W. Hsu, C.-Y. Lai, Z.-Y. Lin, O. Chubach, T.-D. Chuang, C.-C. Chen, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0249](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9074) Clipping flag clean-up for chroma adaptive loop filters [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0319](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9144) Non-CE5: On SEI for ALF [H.-B. Teo, H.-W. Sun, C.-S. Lim (Panasonic)]

[JVET-Q0378](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9203) Non-CE5: On the number of ALF Chroma filters [P. Onno, G. Laroche, N. Ouedraogo (Canon)]

[JVET-Q0427](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9252) AHG11: Picture/slice level deblocking control flag for IBC [X. Xu, G. Li, X. Li, S. Liu (Tencent)]

[JVET-Q0434](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9260) PRE-Sample Adaptive Offset Filter [W. Lim, C. Helmrich, J. Erfurt, H. Schwarz, D. Marpe, T. Wiegand (HHI)]

[JVET-Q0441](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9267) SAO Modification for 12-bit [A. Browne, K. Sharman, S. Keating (Sony)]

[JVET-Q0470](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9296) Conditional signalling of SAO [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

## Reference picture resampling (13)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

Probably more contributions currently allocated to HLS/scalability belong here

[JVET-Q0257](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9082) How to do 16:1 reference picture resampling in VVC [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0199](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9024) AHG8: Support of ROI (Region-Of-Interest) RPR [T. Lu, F. Pu, [P. Yin](mailto:pyin@dolby.com), S. McCarthy, W. Husak, T. Chen (Dolby)]

[JVET-Q0567](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9413) Crosscheck of JVET-Q0199 AHG8: Support of ROI (Region-Of-Interest) RPR [J. Luo (Alibaba)] [late]

[JVET-Q0178](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9003) AHG9: Bitstream conformance requirement related to RPR scaling ratio [T.-D. Chuang, O. Chubach, C.-Y. Chen, C.-W. Hsu, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0179](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9004) AHG9: Bitstream conformance requirement related to RPR scaling ratio for worst case MC memory bandwidth reduction [T.-D. Chuang, O. Chubach, C.-Y. Chen, C.-W. Hsu, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0262](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9087) AHG9: On reference picture resampling enabled flag [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0290](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9115) AHG9/AHG12: Modifications related to subpicture signalling and RPR [S.-T. Hsiang, C.-Y. Chen, T.-D. Chuang, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 1 of this contribution belongs to this category.

[JVET-Q0318](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9143) AHG9: Constraints on RPR [K. Zhang, L. Zhang, Y.-K. Wang, H. Liu, J. Xu, Z. Deng (Bytedance)]

[JVET-Q0331](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9156) AhG8: Constraints on the picture scaling ratios [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

Item 1 of this contribution belongs to this category.

[JVET-Q0449](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9275) On smoothing filter with RPR in VVC [B. Bross, M. Winken, Y. Sanchez, R. Skupin, H. Schwarz, D. Marpe, T. Wiegand (HHI)]

[JVET-Q0486](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9313) AHG8: Constraints on Scaling Window Offset Parameters [T. Hellman, W. Wan, P. Chen, B. Heng, M. Zhou (Broadcom)]

[JVET-Q0487](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9314) AHG8: RPR Scaling Window Issues [W. Wan, T. Hellman, B. Heng, P. Chen (Broadcom)]

[JVET-Q0517](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9346) On RPR down-sampling filters for affine mode [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

[JVET-Q0568](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9414) Crosscheck of JVET-Q0517 On RPR down-sampling filters for affine mode [J. Luo (Alibaba)] [late]

[JVET-Q0518](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9347) Mismatch between text specification and reference software on RPR chroma down-sampling for affine mode [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

## Quantization control (14)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

See also Q0484.

[JVET-Q0126](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8951) Initializations and propagation of Chroma QP Offset [K. Kawamura, S. Naito (KDDI)]

[JVET-Q0142](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8967) Clipping of minimum QP prime value [K. Unno, K. Kawamura, S. Naito (KDDI)]

[JVET-Q0148](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8973) AHG15: Additional coefficients for low frequency region of 64x64 scaling matrix [K. Abe, T. Toma (Panasonic)]

[JVET-Q0536](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9382) Crosscheck of JVET-Q0148 (AHG15: Additional coefficients for low frequency region of 64x64 scaling matrix) [T. Hashimoto, T. Ikai (Sharp)] [late]

[JVET-Q0227](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9052) Dependent Quantization with Qp offset adaptation [P. de Lagrange, F. Hiron, F. Le Léannec, E. François (InterDigital)]

[JVET-Q0267](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9092) On Propagation of Chroma CU QP Offsets [B. Heng, M. Zhou, W. Wan (Broadcom)]

[JVET-Q0421](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9246) AHG15: Clean up for signaling quantization matrix [L. Li, H. Zhang, X. Li, S. Liu (Tencent)]

[JVET-Q0425](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9250) AHG15: QP offsets for adaptive colour transform [R. Sjöberg, M. Pettersson, M. Damghanian, D. Saffar (Ericsson)]

[JVET-Q0472](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9298) AHG15: Quantization matrix signalling [P. de Lagrange, F. Le Léannec, E. François, K. Naser (InterDigital)]

[JVET-Q0474](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9300) AHG15: defining QP at TU level P. de Lagrange, F. Le Léannec, F. Urban, K. Naser (InterDigital)]

[JVET-Q0476](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9303) On chroma QP offsets for zero-CBF leading chroma coding blocks [A. K. Ramasubramonian, B. Ray, G. Van der Auwera, M. Karczewicz (Qualcomm)]

[JVET-Q0505](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9334) AHG15: Improvement for Quantization Matrix Signaling [H. Zhang, X. Li, G. Li, L. Li, S. Liu (Tencent)]

[JVET-Q0570](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9416) AHG15: reset chroma QP offsets when starting a CTU [P. de Lagrange (InterDigital)] [late]

[JVET-Q0576](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9422) AHG15: history of local chroma QP offsets [P. de Lagrange (InterDigital)] [late]

## Transforms and transform signalling (25)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0055](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8880) On MTS index signalling [J. Lainema (Nokia)]

[JVET-Q0566](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9412) Crosscheck of JVET-Q0055 (On MTS index signalling) [S. De-Luxán-Hernández (HHI)] [late]

[JVET-Q0057](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8882) Coefficient group based restriction on MTS signaling [M. Coban, M. Karczewicz, H.E. Egilmez, V. Seregin (Qualcomm)]

[JVET-Q0549](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9395) Crosscheck of JVET-Q0057 (Coefficient group based restriction on MTS signaling) [J. Lainema (Nokia)] [late]

[JVET-Q0090](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8915) On constraint on DC only flag in LFNST [Y. Fujimoto, T. Tsukuba, M. Ikeda, T. Suzuki (Sony)]

[JVET-Q0099](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8924) On Interaction of LFNST and Transform Skip [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0100](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8925) On Maximum Block Size for Chroma Transform Skip [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0101](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8926) On Transform Skip in JointCbCr mode [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0103](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8928) LFNST Signaling for Chroma based on Chroma Transform Skip Flags [H. E. Egilmez, A. Nalci, M. Coban, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0104](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8929) On worst-case complexity of LFNST [H. E. Egilmez, A. Nalci, M. Coban, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0539](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9385) Crosscheck of JVET-Q0104 (On worst-case complexity of LFNST) [T. Zhou, T. Ikai (Sharp)] [late]

[JVET-Q0106](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8931) Combination of LFNST with transform skip [B. Heng, T. Hellman, M. Zhou, W. Wan (Broadcom)]

[JVET-Q0530](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9360) Crosscheck of JVET-Q0106: AHG16: Combination of LFNST with transform skip [W. Zhu (Bytedance)] [late]

[JVET-Q0133](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8958) Fix on LFNST condition [T. Hashimoto, T. Chujoh, E. Sasaki, T. Ikai (Sharp)]

[JVET-Q0136](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8961) Alignment of MTS index signalling condition with MTS zero-out [M. Koo, M. Salehifar, J. Lim, S. Kim (LGE)]

[JVET-Q0138](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8963) Separate transform skip checking of Luma and Chroma for LFNST index signalling [M. Koo, M. Salehifar, J. Lim, S. Kim (LGE)]

[JVET-Q0183](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9008) AHG9: High-level syntax related to transform skip mode [S.-T. Hsiang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0193](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9018) LFNST signalling cleanup with TS checking [M.-S. Chiang, C.-W. Hsu, C.-M. Tsai, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0195](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9020) Maximum TS size considering chroma sampling ratio [M.-S. Chiang, C.-W. Hsu, C.-M. Tsai, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0196](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9021) MTS redundancy removal [M.-S. Chiang, C.-W. Hsu, C.-M. Tsai, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0550](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9396) Crosscheck of JVET-Q0196 (MTS redundancy removal) [J. Lainema (Nokia)] [late]

[JVET-Q0303](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9128) LFNST signaling simplification [J. Yao, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0578](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9424) Crosscheck of JVET-Q0303 (LFNST signaling simplification) [S. De-Luxán-Hernández (HHI)] [late]

[JVET-Q0314](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9139) Non-CE: Retrained LFNST Matrices [K. Fan, L. Zhang, K. Zhang, Y. Wang (Bytedance)]

[JVET-Q0328](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9153) On LFNST signalling and transform skip [C. Rosewarne, J. Gan (Canon)]

[JVET-Q0380](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9205) LFNST restriction based on MIP [S. Shrestha, A. Kumar, B. Lee (Chosun Univ.), Y. Lee, J. Park (Humax)]

[JVET-Q0381](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9206) Block size restriction in MTS kernel for ISP and LFNST [S. Shrestha, A. Kumar, B. Lee (Chosun Univ.), Y. Lee, J. Park (Humax)]

[JVET-Q0442](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9268) Non-CE: Transform Selection for MIP in Implicit MTS [K. Naser, F. Le Léannec, T. Poirier, F. Galpin (InterDigital)]

[JVET-Q0499](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9327) On LFNST signaling with Transform-skip mode [T.-C. Ma, X. Xiu, Y.-W. Chen, H.-J. Jhu, X. Wang (Kwai Inc.)]

[JVET-Q0516](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9345) MTS signaling based on last significant coefficient position [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

[JVET-Q0557](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9403) Crosscheck of JVET-Q0516: MTS signaling based on last significant coefficient position [H. Gao (Huawei)] [late]

[JVET-Q0529](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9359) On LFNST index and MTS index signalling [Z.-Y. Lin, M.-S. Chiang, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)] [late]

## Residual coding (11)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0146](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8971) Simplified bypass coding of transform regular residual [Y. Kato, K. Abe, T. Toma (Panasonic)]

[JVET-Q0243](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9068) Additional support of dependent quantization with 8 states [H. Schwarz, S. Schmidt, P. Haase, T. Nguyen, D. Marpe, T. Wiegand (Fraunhofer HHI)]

[JVET-Q0295](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9120) On residual coding for MTS [C. Rosewarne, J. Gan (Canon)]

[JVET-Q0298](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9123) Reports on level mapping off versus level mapping on [J. Choi, S. Yoo, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0546](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9392) Crosscheck of JVET-P0298 (Reports on level mapping off versus level mapping on) [Z.-Y. Lin (MediaTek)] [late]

[JVET-Q0299](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9124) Residual coding simplification [J. Choi, S. Yoo, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0300](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9125) Unification of bypass coding between TSRC and RRC [J. Choi, S. Yoo, J. Heo, J. Lim, S. Kim (LGE)]

[JVET-Q0552](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9398) Crosscheck of JVET-Q0300: Unification of bypass coding between TSRC and RRC [T. Nguyen (HHI)] [late]

[JVET-Q0363](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9188) On transform skip residual coding [J. Gan, C. Rosewarne (Canon)]

[JVET-Q0448](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9274) MTS dependent coefficient subblock scanning for zero-out [S. De-Luxán-Hernández, T. Nguyen, B. Bross, H. Schwarz, D. Marpe, T. Wiegand (HHI)]

[JVET-Q0453](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9279) Modification of LFNST for MIP coded block [J.-Y. Huo, W.-H. Qiao, X.-W. Li, Y.-Z. Ma, F.-Z. Yang (Xidian Univ.), S. Wan (NPU), Y.-F. Yu, Y. Liu (OPPO)]

[JVET-Q0582](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9428) Harmonization of JVET-Q0451 and JVET-Q0453 for MIP & LFNST design [J.-Y. Huo (Xidian Univ.), S. Wan (NPU), X.-W. Li, H.-X. Wang, F.-Z. Yang, Y.-Z. Ma (Xidian Univ.), Y.-F. Yu, Y. Liu (OPPO)] [late]

[JVET-Q0497](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9325) Simplification of Rice parameter derivation for RRC [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang (Kwai Inc.)]

## Entropy coding (3)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0149](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8974) AHG14: Report of CABAC skip mode results on VTM-7.0 [K. Abe, T. Toma, [V. Drugeon (Panasonic)](mailto:virginie.drugeon@eu.panasonic.com)]

[JVET-Q0436](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9262) CABAC zero word threshold [A. Browne, K. Sharman, S. Keating (Sony)]

[JVET-Q0461](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9287) QP-independent and slice type-independent initialization of context models for the high throughput CABAC mode of JVET-P0300 [H. Kirchhoffer, B. Bross, T. Nguyen, D. Marpe, H. Schwarz, T. Wiegand (HHI)]

## Partitioning (7)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0174](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8999) AHG9: Fix on high-level syntax related to coding tree constraints [S.-T. Hsiang, C.-Y. Lai, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0226](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9051) AHG9: High-level syntax for signalling maximum TT size [S.-T. Hsiang, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0330](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9155) On block partitioning at picture boundary [R.-L. Liao, J. Chen, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0432](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9257) On TT or BT split modes disabling [F. Le Léannec, T. Poirier, F. Urban (InterDigital)]

[JVET-Q0468](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9294) Constraint on minimum CU size [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

[JVET-Q0469](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9295) On minimum chroma QT size derivation [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

[JVET-Q0471](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9297) On chroma QT split [G. Li, X. Li, X. Xu, S. Liu (Tencent)]

## Chroma formats and chroma related coding tools (22)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0098](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8923) On QP Adjustment for Adaptive Color Transform [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki (Sony)]

[JVET-Q0140](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8965) On chroma processing simplification [A. Filippov, V. Rufitskiy, E. Alshina (Huawei)]

[JVET-Q0162](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8987) A memory issue on adaptive color transform [K. Kondo, M. Ikeda, T. Suzuki (Sony)]

[JVET-Q0166](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8991) On the adaptive color transform [H. Huang, A. K. Ramasubramonian, C.-C. Chen, V. Seregin, T. Hsieh, Y.-H. Chao, W.-J. Chien, G. Van der Auwera, M. Karczewicz (Qualcomm)]

[JVET-Q0241](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9066) On QP adjustment in adaptive color transform [J. Jung, D. Kim, G. Ko, J.-H. Son, J. Kwak (WILUS)]

[JVET-Q0305](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9130) Disallowing JCCR mode for ACT coded CUs [H. Dou, L. Xu, Y.-J. Chiu (Intel)]

[JVET-Q0569](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9415) Crosscheck of JVET-Q0305: Disallowing JCCR mode for ACT coded CUs [W. Zhu (Bytedance)] [late]

[JVET-Q0351](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9176) Non-CE: Report on experimental result for fixing BDPCM Chroma mismatch [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

[JVET-Q0353](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9178) Non-CE: Harmonization adaptive color transform with BDPCM chroma [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

[JVET-Q0361](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9186) Cleanup of chroma BDPCM constraint [W.-T. Cai, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0367](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9192) Cleanup on the adaptive color transform [W.-T. Cai, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0369](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9194) Restricting MIP for ACT coded CUs [W.-T. Cai, J.-Q. Zhu, K. Kazui (Fujitsu)]

[JVET-Q0408](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9233) On the combination of JCCR and TS [B. Ray, G. Van der Auwera, M. Karczewicz (Qualcomm)]

[JVET-Q0423](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9248) Interaction between ACT and BDPCM chroma [L. Li, X. Li, S. Liu (Tencent)]

[JVET-Q0473](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9299) AHG15: Demultiplexing joint CbCr before dequantization [P. de Lagrange, F. Le Léannec, E. François, P. Bordes (InterDigital)]

[JVET-Q0506](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9335) Interaction between ACT and cross-component coding tools [H. Zhang, X. Li, L. Li, G. Li, S. Liu (Tencent)]

[JVET-Q0510](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9339) ACT color conversion for both lossless and lossy coding [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai), J. Zhao, Hendry, S. Paluri, S.-H. Kim (LGE), W. Zhu, J. Xu, L. Zhang (Bytedance)]

[JVET-Q0511](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9340) On ACT QP clipping [J. Zhao, Hendry, S.-H. Kim (LGE), X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai), W. Zhu, J. Xu, L. Zhang (Bytedance)]

[JVET-Q0512](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9341) Enabling transform skip and BDPCM for chroma in ACT [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

[JVET-Q0514](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9343) Encoder improvements on JCCR with chroma transform skip [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

[JVET-Q0581](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9427) Crosscheck report of JVET-Q0514 (AHG11: Encoder improvements for chroma transform skip mode) [X. Xu (Tencent)] [late]

[JVET-Q0515](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9344) Disabling chroma transform skip mode for ISP [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai)]

[JVET-Q0521](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9350) Alignment of BDPCM for ACT [W. Zhu, L. Zhang, J. Xu (Bytedance), X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang (Kwai), H. Jang, J. Nam, S.-H. Kim, J. Lim (LGE)]

[JVET-Q0584](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9430) Crosscheck of JVET-Q0521 (Alignment of BDPCM for ACT) [H. Dou, L. Xu, Y.-J. Chiu (Intel)] [late]

[JVET-Q0523](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9352) Redistribution of chroma information for improved HDR color representation [M. Azimi (U of Cambridge), M. T. Pourazad (TELUS), P. Nasiopoulos (UBC)]

## Lossless and near lossless coding (1)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0387](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9212) AHG14: Throughput and coding efficiency report of JVET-P0300 on VTM-7.0 [H. Kirchhoffer, B. Bross, T. Nguyen, D. Marpe, H. Schwarz, T. Wiegand (HHI)]

## Miscellaneous coding tools (4)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0571](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9417) IBC-Mirror mode for screen content coding [J. Cao, Z. Qiu, J. Wang, F. Liang (??), Y. Yu, Y. Liu (OPPO)] [late] [miss]

[JVET-Q0573](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9419) Intra-Affine mode for screen content coding [J. Cao, H. Wang, J. Wang, F. Liang (??), Y. Yu (OPPO)] [late] [miss]

## 360 degree video (0)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

## AHG9: General high-level syntax (135)

### Combinations of features (21)

#### Combination of RPR and subpictures (7)

[JVET-Q0594](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9440) AHG9: A summary of proposals on combination of RPR and subpictures [Y.-K. Wang (Bytedance)]

[JVET-Q0043](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8868) AHG9: Constraint about usage of reference picture resampling and subpictures [T. Nishi, K. Abe, V. Drugeon (Panasonic)]

[JVET-Q0232](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9057) AHG8/AHG12 Subpicture-based reference picture resampling signalling [M. Hirabayashi, M. Katsumata, T. Suzuki (Sony)]

[JVET-Q0236](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9061) AHG8/AHG12: Subpicture-specific RPR [M. M. Hannuksela, A. Aminlou, R. Ghaznavi-Youvalari, K. Kammachi-Sreedhar (Nokia)]

[JVET-Q0290](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9115) AHG9/AHG12: Modifications related to subpicture signalling and RPR [S.-T. Hsiang, C.-Y. Chen, T.-D. Chuang, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 2 of this contribution belongs to this category.

[JVET-Q0331](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9156) AhG8: Constraints on the picture scaling ratios [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

Item 2 of this contribution belongs to this category.

[JVET-Q0333](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9158) AhG12: On the subpicture scaling ratios [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0334](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9159) AhG8/AhG12: On the reference picture resampling for the subpictures [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

#### Combination of RPR and reference wraparound (7)

[JVET-Q0595](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9441) AHG9: A summary of proposals on combination of RPR and reference wraparound [Y.-K. Wang (Bytedance)]

[JVET-Q0134](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8959) AHG8: Disabling reference wraparound for reference picture resampling [B. Heng, P. Chen, T. Hellman, W. Wan, M. Zhou (Broadcom)]

[JVET-Q0184](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9009) AHG9: On signalling of wrap-around motion compensation [C.-Y. Chiu, C.-C. Chen, C.-W. Hsu, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0238](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9063) AHG8/AHG9: On reference picture wraparound [M. M. Hannuksela (Nokia)]

[JVET-Q0316](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9141) AHG9: On signaling of the wraparound offset [K. Zhang, L. Zhang, Y.-K. Wang, H. Liu, J. Xu, Z. Deng (Bytedance)]

[JVET-Q0287](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9112) AHG9: On wrap-around motion compensation [B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0335](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9160) AhG9: On the wraparound offsets [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

Items 1 and 2 of this contribution belong to this category.

[JVET-Q0416](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9241) AHG8/AHG9: On horizontal wrap-around motion compensation [J. Chen, Y. Ye, R.-L Liao, J. Luo (Alibaba)]

Item 2 of this contribution belongs to this category.

#### Combination of subpictures and reference wraparound (4)

[JVET-Q0212](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9037) [AHG9/AHG12] On sub-picture wrap around signaling [Y. He, A. Hamza (InterDigital), B. Choi, S. Wenger (Tencent)]

[JVET-Q0335](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9160) AhG9: On the wraparound offsets [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

Item 3 of this contribution belongs to this category.

[JVET-Q0344](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9169) AHG6/AHG9: Signalling wrap-around for subpictures [Y.-H. Lee, J.-L. Lin, Y.-J. Chen, C.-C. Ju (MediaTek)]

[JVET-Q0403](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9228) AHG12: On subpicture specific MV wraparound [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

#### Combination of subpictures and scalability (3)

[JVET-Q0279](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9104) AHG8/AHG9: On alignment across layers [B. Choi, S. Wenger, S. Liu (Tencent)]

Item 4 of this contribution belongs to this category.

[JVET-Q0402](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9227) AHG12: On subpicture and scalability [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

[JVET-Q0405](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9230) AHG12: On subpicture and OLS [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

### High level tool control (11)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

Note: Probably more contributions belong here which are allocated to AHGs 8/9/12.

Add mention in relevant other agenda categories.

[JVET-Q0121](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8946) AHG9: On deblocking control parameters [J. Xu, Y.-K. Wang, L. Zhang, W. Zhu, K. Zhang, H. Liu (Bytedance)]

[JVET-Q0175](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9000) AHG9: On parameters override mechanism in slice header for in-loop filters [C.-M. Tsai, C.-W. Hsu, C.-Y. Lai, O. Chubach, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0248](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9073) AHG9: On constraints for ALF APS [N. Hu, V. Seregin, M. Karczewicz (Qualcomm)]

[JVET-Q0254](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9079) [AHG9]: Override mechanism for ALF related syntax elements in slice header [A. M. Kotra, S. Esenlik, B. Wang, H. Gao, E. Alshina (Huawei)]

[JVET-Q0352](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9177) AHG9/AHG12: On subpicture boundary [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

Items 2 and 3 of this contribution belongs to this category.

[JVET-Q0336](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9161) AhG9: Cleanup in high level syntax [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

[Move to 6.19.5] Which features are affected by this?

[JVET-Q0346](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9171) AHG9: On slice header control for LMCS and scaling lists [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0360](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9185) AHG9: Slice level control of coding tools for DMVR, BDOF and PROF [S. Esenlik, A. M. Kotra, H. Gao, B. Wang, A. Filippov, V. Rufitskiy, E. Alshina (Huawei)]

[JVET-Q0444](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9270) Non-CE: Clean-up of High-Level Syntax Related to AMVR [K. Naser, M. Kerdranvat, T. Poirier, A. Robert, F. Galpin, F. Le Léannec (InterDigital)]

[JVET-Q0484](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9311) AHG9: HLS control of chroma QP offset [W. Wan, B. Heng, P. Chen, T. Hellman, M. Zhou (Broadcom)]

[JVET-Q0572](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9418) AHG9: On ALF Signalling [K. Misra, S. Deshpande, A. Segall (Sharp)] [late]

### Misc. general HLS topics (7)

[JVET-Q0113](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8938) AHG9/AHG8/AHG12: Some general HLS syntax clean-ups [Y.-K. Wang (Bytedance)]

Item 1 of this contribution belongs to this category.

[JVET-Q0278](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9103) AHG9/AHG8: On random access related flags [B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0114](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8939) AHG9: A few more general constraints flags [Y.-K. Wang (Bytedance)]

[JVET-Q0256](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9081) AHG9: Temporal sublayer level indication and conformance [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0276](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9101) AHG9: On EOB NAL unit out of band [S. Wenger, B. Choi (Tencent)]

[JVET-Q0282](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9107) AHG9: On temporal sub-layer switching [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

[JVET-Q0398](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9223) AHG9: Sub-layer wise dependency in multi-layer [Y. Sanchez, R. Skupin, K. Sühring, T. Schierl (HHI)]

### Parameter sets cleanups (20)

[JVET-Q0593](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9439) AHG9: A summary of proposals on parameter sets cleanups [Y.-K. Wang (Bytedance)]

[JVET-Q0045](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8870) AHG9: On DPS identifier [V. Drugeon (Panasonic)]

[JVET-Q0117](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8942) AHG9: Cleanups on parameter sets [Y.-K. Wang, J. Xu (Bytedance)]

[JVET-Q0280](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9105) AHG8/AHG9: On video parameter set ID [B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0355](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9180) AHG8/AHG9: Cleanup on multi-layer coding [X. Ma, H. Yang (Huawei)]

Item 3 of this contribution belongs to this category.

[JVET-Q0357](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9182) AHG9: On clarification of DPS [X. Ma, H. Yang (Huawei)]

[JVET-Q0147](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8972) AHG9: On JCCR signaling [K. Abe, T. Toma (Panasonic)]

[JVET-Q0152](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8977) AHG9/AHG12: Miscellaneous HLS topics [M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz (Qualcomm)]

Item 2 of this contribution belongs to this category.

[JVET-Q0155](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8980) AHG9: On separate colour plane coding [V. Seregin, B. Ray, A. K. Ramasubramonian, Y.-J. Chang, M. Coban, G. Van der Auwera, M. Karczewicz (Qualcomm)]

Item 2 of this contribution belongs to this category.

[JVET-Q0265](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9090) Modifications to VVC Draft 7 [C. Auyeung, X. Li, X. Zhao, S. Liu (Tencent)]

[JVET-Q0329](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9154) AHG9: Syntax cleanup of chroma coding tools in 444 color format [R.-L. Liao, J. Chen, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0520](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9349) AHG9: Cleanups on signalling for CC-ALF, BDPCM, ACT and Palette [Y. Wang, L. Zhang, K. Zhang, W. Zhu (Bytedance)]

Item 3 of this contribution belongs to this category.

[JVET-Q0173](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8998) AHG9: On signalling the DPB parameters with delta values [C.-Y. Lai, C.-M. Tsai, T.-D. Chuang, O. Chubach, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0176](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9001) AHG9: Overhead reduction for picture header [S.-T. Hsiang, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 2 of this contribution belongs to this category.

[JVET-Q0210](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9035) [AHG9]: Miscellaneous HLS clean-ups [Hendry, S. Paluri (LGE)]

Items 8 and 9 of this contribution belong to this category.

[JVET-Q0285](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9110) AHG9: On adaptation parameter set ID [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

Item 2 of this contribution belongs to this category.

[JVET-Q0374](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9199) AHG9: Cleanups on redundant signalling in HLS [D. Kim, G. Ko, J. Jung, J. Son, J. Kwak (WILUS)]

[JVET-Q0399](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9224) AHG8: On conformance window and scaling window [Y. Sanchez, R. Skupin, K. Sühring, T. Schierl (HHI)]

[JVET-Q0416](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9241) AHG8/AHG9: On horizontal wrap-around motion compensation [J. Chen, Y. Ye, R.-L Liao, J. Luo (Alibaba)]

Item 1 of this contribution belongs to this category.

[JVET-Q0420](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9245) AHG12: Signaling of chroma presence in PPS and APS [L. Li, X. Li, C. Auyeung, B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0481](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9308) AHG9: Ordering of partition constraints syntax elements in the sequence parameter set and picture header [W. Wan, B. Heng (Broadcom)]

The SPS aspect of this contribution belongs to this category.

### Constant slice header parameters signalling (4)

[JVET-Q0153](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8978) AHG9: On picture header [M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz (Qualcomm)]

Item 3 of this contribution belongs to this category.

[JVET-Q0240](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9065) AHG9: Additional constant slice header parameters [M. M. Hannuksela (Nokia)]

[JVET-Q0419](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9244) AHG 9: On picture header [L. Li, B. Choi, X. Xu, X. Li, S. Wenger, S. Liu (Tencent)]

Item 3 of this contribution belongs to this category.

[JVET-Q0482](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9309) AHG9: Signalling of constant parameter values [W. Wan, P. Chen, [B. Heng](mailto:brian.heng@broadcom.com), [T. Hellman](mailto:tim.hellman@broadcom.com), [M. Zhou (Broadcom)](mailto:minhua.zhou@broadcom.com)]

### Picture header, slice header, and AUD (26)

[JVET-Q0115](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8940) AHG9: On AU and picture start detection [Y.-K. Wang (Bytedance)]

[JVET-Q0177](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9002) AHG9: On picture identification and PH repetition [L. Chen, C.-Y. Chen, C.-Y. Lai, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0116](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8941) AHG9: PH and SH syntax clean-ups [Z. Deng, L. Zhang, Y.-K. Wang (Bytedance)]

[JVET-Q0153](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8978) AHG9: On picture header [M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz (Qualcomm)]

Items 1 and 2 of this contribution belong to this category.

[JVET-Q0154](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8979) AHG9: On picture header IRAP/GDR signalling [M. Coban, V. Seregin, A. K. Ramasubramonian, Y.-J. Chang, M. Karczewicz (Qualcomm)]

[JVET-Q0155](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8980) AHG9: On separate colour plane coding [V. Seregin, B. Ray, A. K. Ramasubramonian, Y.-J. Chang, M. Coban, G. Van der Auwera, M. Karczewicz (Qualcomm)]

Item 1 of this contribution belongs to this category.

[JVET-Q0176](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9001) AHG9: Overhead reduction for picture header [S.-T. Hsiang, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 1 of this contribution belongs to this category.

[JVET-Q0198](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9023) AHG9: On picture header dependency [L. Chen, C.-Y. Chen, C.-Y. Lai, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0182](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9007) AHG9: Allowing slice-level scaling list and LMCS [C.-Y. Lai, T.-D. Chuang, O. Chubach, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0200](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9025) [AHG9]: On picture level and slice level tool parameters [Hendry, S. Kim, S. Lee (LGE)]

[JVET-Q0207](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9032) [AHG9]: On signalling of TMVP enabled flag and collocated reference picture [Hendry, S. Kim, J. Nam, J. Lim (LGE)]

[JVET-Q0208](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9033) [AHG9]: On TMVP collocated reference picture [Hendry (LGE)]

[JVET-Q0245](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9070) [AHG9]: On signalling slice type information in the picture header [S. Paluri, Hendry, J. Zhao, S.H. Kim (LGE)]

[JVET-Q0247](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9072) [AHG9]: Signalling the prediction weight table in the picture header [S. Paluri, Hendry, J. Zhao, S. H. Kim (LGE)]

[JVET-Q0255](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9080) AHG9: Coded Picture NAL unit [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0259](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9084) AHG9: On picture header [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0270](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9095) AHG9: On Picture Header Modifications [M. Pettersson, R. Sjöberg, M. Damghanian (Ericsson)]

[JVET-Q0358](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9183) AHG9: Constraints on ALF APS [X. Ma, H. Yang (Huawei)]

[JVET-Q0376](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9201) AhG9: Picture header refinement [G. Laroche, N. Ouedraogo, P. Onno (Canon)]

[JVET-Q0379](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9204) AhG9: On the position of APS IDs in Picture Header [G. Laroche, N. Ouedraogo, P. Onno (Canon)]

[JVET-Q0400](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9225) AHG9: On extra picture header bits in VVC [K. Sühring, R. Skupin, Y. Sanchez, T. Schierl (HHI)]

[JVET-Q0414](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9239) AHG9: A fix for GDR signaling [J. Chen, R.-L Liao, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0419](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9244) AHG 9: On picture header [L. Li, B. Choi, X. Xu, X. Li, S. Wenger, S. Liu (Tencent)]

Items 1 and 2 of this contribution belong to this category.

[JVET-Q0426](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9251) AHG9: Picture header enabled flag [R. Sjöberg, M. Pettersson, M. Damghanian, D. Saffar (Ericsson)]

[JVET-Q0428](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9253) AHG 9: Picture header syntax clean-ups [X. Xu, B. Choi, L. Li, X. Li, S. Wenger, S. Liu (Tencent)]

[JVET-Q0481](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9308) AHG9: Ordering of partition constraints syntax elements in the sequence parameter set and picture header [W. Wan, B. Heng (Broadcom)]

The PH aspect of this contribution belongs to this category.

### Mixed NA unit types within a coded picture (7)

[JVET-Q0163](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8988) AHG9: On mixed NAL unit types in a video picture [P. Wu (ZTE)]

[JVET-Q0206](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9031) AHG9: On picture with mixed NAL unit types [Hendry (LGE)]

[JVET-Q0239](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9064) AHG9: On mixed NAL unit types in a coded picture [M. M. Hannuksela (Nokia)]

[JVET-Q0261](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9086) AHG9: On mixed NAL unit types [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0284](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9109) AHG9: On mixed NAL unit type [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

[JVET-Q0289](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9114) AHG9/AHG12: Comments on miscellaneous HLS text [L. Chen, C.-W. Hsu, C.-C. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 2 of this contribution belongs to this category.

[JVET-Q0396](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9221) AHG9: On mixing NAL unit types in a coded picture [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

### Reference picture list (RPL) signalling (2)

[JVET-Q0197](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9022) AHG9: Miscellaneous fixes for HLS in Specification [B. Wang, S. Esenlik, A. M. Kotra, H. Gao, E. Alshina (Huawei)]

[JVET-Q0217](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9042) AHG9: On Reference Picture List Information Signalling [S. Deshpande (Sharp)]

### Virtual boundary signalling (5)

[JVET-Q0181](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9006) AHG9: On signalling of virtual boundary [C.-Y. Chiu, C.-C. Chen, C.-W. Hsu, L. Chen, C.-Y. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0210](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9035) [AHG9]: Miscellaneous HLS clean-ups [Hendry, S. Paluri (LGE)]

Items 6 and 7 of this contribution belong to this category.

[JVET-Q0246](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9071) [AHG9]: On virtual boundary signalling [S. Paluri, Hendry (LGE)]

[JVET-Q0258](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9083) AHG9: On virtual boundary signalling [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0417](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9242) AHG8/AHG9: On SPS level virtual boundary [J. Chen, Y. Ye, R.-L. Liao, J. Luo (Alibaba)]

### Gradual decoding refresh (2)

[JVET-Q0527](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9357) AHG9: Gradual Decoding Refresh for VVC [L. Wang, S. Hong, K. Panusopone (Nokia)] [late]

[JVET-Q0560](http://phenix.int-evry.fr/jvet/doc_end_user/current_document.php?id=9406) AHG9: Gradual Decoding Refresh without Forcing Intra Area [L. Wang, S. Hong, K. Panusopone (Nokia)] [late]

### Hypothetical reference decoder (HRD) (10)

[JVET-Q0048](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8873) AHG9: On order of HRD related SEI messages [V. Drugeon (Panasonic)]

[JVET-Q0216](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9041) AHG9: On Picture Timing Information Signalling [S. Deshpande (Sharp)]

[JVET-Q0219](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9044) AHG9: On Alternative Timing Information Signalling [S. Deshpande (Sharp)]

[JVET-Q0221](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9046) AHG9: On Decoding Unit Parameters Signalling [S. Deshpande (Sharp)]

[JVET-Q0283](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9108) AHG9: On subbitstream extraction [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

[JVET-Q0393](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9218) AHG9: On DU based HRD with temporal scalability [Y. Sanchez, R. Skupin, K. Sühring, T. Schierl (HHI)]

[JVET-Q0394](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9219) AHG9: On OLS extraction and scalable nesting SEI message [Y. Sanchez, R. Skupin, K. Sühring, T. Schierl (HHI)]

[JVET-Q0397](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9222) AHG12: On subpicture extraction [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

[JVET-Q0404](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9229) AHG12: On CBR subpicture extraction [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

[JVET-Q0407](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9232) AHG9: On alternative HRD timing and temporal sub-layers [Y. Sanchez, R. Skupin, K. Sühring, T. Schierl (HHI)]

### VUI and SEI (13)

[JVET-Q0042](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8867) AHG9: On Video Usability Information [V. Drugeon (Panasonic)]

[JVET-Q0159](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8984) AHG8: Indication for output picture size [V. Seregin, A. K. Ramasubramonian, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0260](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9085) AHG9: Intended display resolution [J. Samuelsson, S. Deshpande, A. Segall (Sharp)]

[JVET-Q0288](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9113) AHG9: On picture output [B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0214](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9039) [AHG 9/AHG12] Subpicture reposition indication SEI message [Y. He, A. Hamza (InterDigital)]

[JVET-Q0234](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9059) AHG12 SEI message signalling of display region in picture for merged picture [M. Hirabayashi, M. Katsumata, T. Suzuki (Sony)]

[JVET-Q0272](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9097) AHG9: Compact Region-Wise Packing SEI message [M. Pettersson, R. Sjöberg, M. Damghanian (Ericsson)]

[JVET-Q0281](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9106) AHG12: Independently coded regions output window SEI message [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

[JVET-Q0343](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9168) AHG6/AHG9: Signalling guard band type for generalized cubemap projection [Y.-H. Lee, J.-L. Lin, Y.-J. Chen, C.-C. Ju (MediaTek)]

[JVET-Q0345](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9170) AHG6/AHG9: Signalling EAP via the ERP SEI message [Y.-H. Lee, J.-L. Lin, Y.-J. Chen, C.-C. Ju (MediaTek)]

[JVET-Q0395](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9220) AHG12: On subpicture level information SEI message [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

[JVET-Q0443](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9269) Independent Subpictures [K. Sharman, S. Keating, A. Browne (Sony)]

Item 2 (the SEI message aspect) of this contribution belongs to this category.

[JVET-Q0488](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9315) AHG9: Bounding redundant SEI messages [W. Wan, B. Heng (Broadcom)]

## AHG12: high-level parallelism and coded picture regions (54)

### Subpictures (30)

#### General and misc. subpicture aspects (10)

[JVET-Q0592](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9438) AHG12: A summary of proposals on general and misc. subpicture aspects [Y.-K. Wang (Bytedance)]

This contribution was discussed Tuesday 7 January 2020 at 1400 (chaired by GJS).

This contribution provides a summary of all proposals on general and misc. subpicture aspects submitted to this JVET meeting. It is suggested that this summary is used for the reviewing of these proposals, such that the discussions can be in a more structured and efficient manner.

The summary was used to structure the notes and discussion.

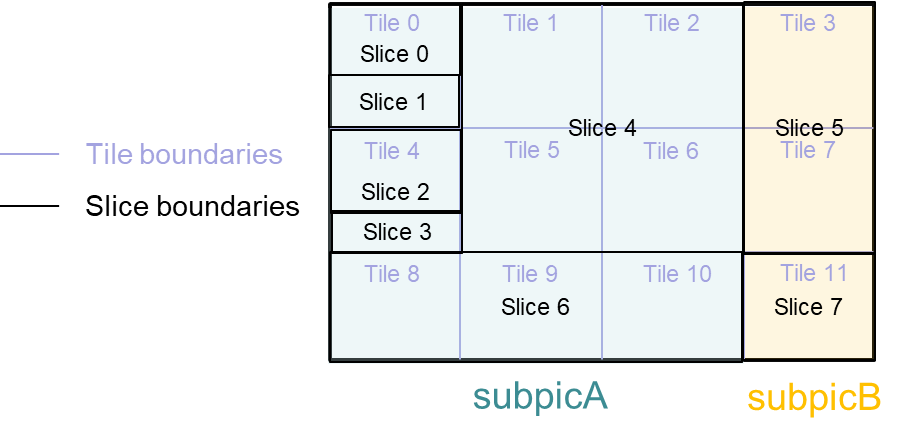
[JVET-Q0044](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8869) AHG9/AHG12: Simplification of slice index with subpictures [T. Nishi, V. Drugeon (Panasonic)]

This contribution was discussed Tuesday 7 January 2020 at 1405 (chaired by GJS).

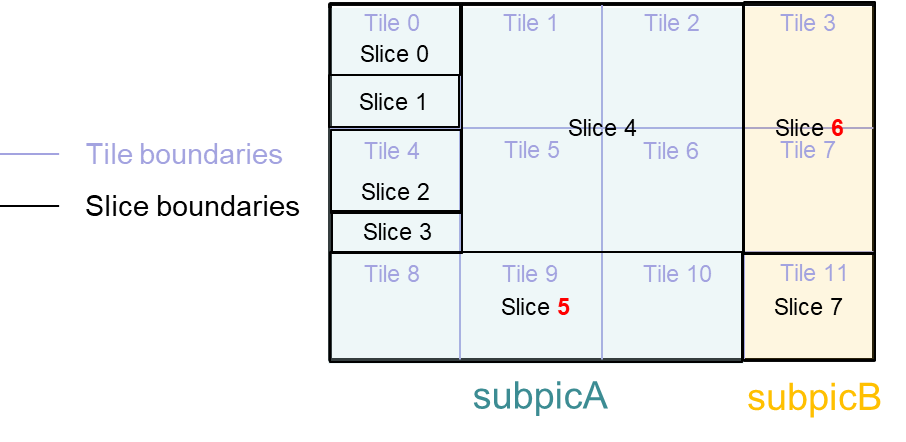
It is suggested to simplify the indexing of slices by aligning the picture level slice index to the subpicture level slice index, thereby removing the need to map the subpicture level slice index to the picture level slice index.

That means, disallow the picture-level slice index values allocated as shown in the first figure below. For the same picture partitioning (into subpictures, slices and tiles), use the picture-level slice index values as in the second figure below.

In other words, picture-level slice index values for slices within a subpicture are required to be continuous. In other words, for any two slices sliceA and sliceB belonging to different subpictures subpicA and subpicB, respectively, when the subpicture index of subpicA is less than that of subpicB, the picture-level slice index value of sliceA shall be less than that sliceB.



**Picture divided in 12 tiles, 8 slices and 2 subpictures**



**Picture divided in 12 tiles, 8 slices and 2 subpictures with slices indexed according to their decoding order**

It was commented that it is only an editorial matter what slice numbers are assigned to the slices in the text, and that the proposal does simplify the concept in the text by removing a LUT concept.

The proponent indicated that they intended for the text to also align the slice index values with the slice order, i.e., that the slice index values within each subpicture are consecutive. Decision: Adopted in principle (text to be provided and checked in a revisit).

[JVET-Q0113](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8938) AHG9/AHG8/AHG12: Some general HLS syntax clean-ups [Y.-K. Wang (Bytedance)]

Item 2 of this contribution belongs to this category.

This contribution was discussed Tuesday 7 January 2020 at 1430 (chaired by GJS).

1. Text changes for the blank clause for specifying the order of VCL NAL units and association to coded pictures and related. Besides some editorial changes for reorganization of the clauses and addition of a clause on order of PUs and their association to AUs, the proposed text changes include the following aspects:
   1. The terms picture-level slice index and subpicture-level slice index are defined, as the order of the slices within a picture and subpicture, respectively, being signalled in the PPS when rect\_slice\_flag is equal to 1. Note that the term slice index and picture-level slice index are currently used but not defined.
   2. When rect\_slice\_flag is equal to 1, the decoding order of VCL NAL units within a subpicture is specified to be in increasing order of their subpicture-level slice index values, i.e., the slice\_address values. See the notes for JVET-Q0044 for this aspect.
   3. It is required that the values of subpicture IDs are increasing in increasing order of the subpicture indices. It was commented that this constraint would harm some BEAM functionality. The draft already contains a uniqueness constraint, that the combination of slice\_subpic\_id and slice\_address shall be unique among the slices of a picture. No action was thus needed for this.
   4. When slice\_subpic\_id is not present, the value of slice\_subpic\_id is inferred to be equal to 0. The proponent indicated that, following the discussion of item c, this change is not needed.

Decision (expression of existing intent): The general editorial contribution was appreciated. The specification of the decoding order of the VCL NAL units in the picture should use the subpicture index and slice address rather than the subpicture ID and slice address.

This contribution was discussed Tuesday 7 January 2020 at 1450 (chaired by GJS).

1. The contribution proposes to change the coding of sps\_num\_subpics\_minus1 from u(8) to ue(v), and the value of sps\_num\_subpics\_minus1 is restricted to be in the range of 0 to Ceil( pic\_width\_max\_in\_luma\_samples ÷ CtbSizeY ) \* Ceil( pic\_height\_max\_in\_luma\_samples ÷ CtbSizeY ) − 1, inclusive.

Byte alignment is not an issue, since there is already some other variable-length syntax before it.

Aside from adding the flexibility to use larger numbers, this could save a few bits when the number of subpictures is small.

Decision (cleanup): Adopt (item 1).

It was commented that profile/level constraints are needed, regardless of the specifics of this proposal.

[JVET-Q0222](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9047) AHG12: On Subpicture Signalling [S. Deshpande (Sharp)]

This contribution was discussed Tuesday 7 January 2020 at 1500 (chaired by GJS).

Item 4 of this contribution belongs to this category.

Proposal 4: Either reserve or allow the value 255 for sps\_num\_subpics\_minus1.

This is just basically a text bug report. The specific issue is resolved by the action taken on Q0119.

This contribution was discussed Tuesday 7 January 2020 at 1845 (chaired by GJS).

1. To fix an asserted decoding problem of repositioned sub-pictures by considering boundaries of a reference sub-picture in the motion compensation process and TMVP derivation.

In the current text, inter prediction does not check the subpicture ID of the collocated region in the reference picture.

It was commented that it is intended that when the subpicture ID of a position in the picture changes in bitstream order, the slices of the subpicture would need to be IRAP slices, although this is not currently expressed in the text.

The proposal is to offset the position in the reference picture by the difference in position of the subpicture with the same subpicture ID. (A constraint would be needed that the reference picture must contain a subpicture with the same ID.)

It was commented that we should also think about whether the subpicture would have the same size in the reference picture.

It was commented that the proposed scheme could avoid the need for some post-decoding repositioning of the decoded regions – for example, the decoded picture could be made more spatially sensible, rather than using some post-decoding operation to rearrange the regions into a spatially sensible picture. However, another participant indicated that post-decoding rendering work is ordinarily needed anyway.

This would have an offset per subpicture for the motion compensation position calculation, which has some low-level decoding process change. The range of values of MVs could become larger than what it would otherwise be unless there is some additional constraint.

Temporal MVP would also involve considering the spatial offset relative to the corresponding position in the collocated picture.

While some participants liked the idea, we need to be very conservative about introducing changes to the low-level decoding process.

Further study of this was encouraged.

Revisit to review text of the IRAP constraint to be prepared by YKW.

1. Additionally, it is proposed to replace a current picture size with a reference picture size in the clipping (motion padding) since the reference picture may have different size than the current picture when reference picture resampling is enabled.

Decision (bug fix of existing intent): Adopt this aspect.

[JVET-Q0169](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8994) AHG9/AHG12: Bitstream conformance requirements on subpicture ID [C.-Y. Lai, C.-Y. Chen, T.-D. Chuang, O. Chubach, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

This contribution was discussed Tuesday 7 January 2020 at 1505 (chaired by GJS).

This contribution proposes two constraints:

1. The maximum value of subpicture ID derived by the signalled subpicture ID length shall be greater than or equal to the number of subpicture IDs.

In the discussion, it was commented that it would be better to send only the amount by which the ID length exceeds what is necessary, rather than to send the entire ID length and constrain its value to be sensible. Some participants liked this suggestion, while others said it might be more complicated to understand.

Decision (Ed.): Adopt as originally proposed. (This is not strictly necessary, since there are other constraints that prevent this problem, but it is desirable to limit the allowed range to sensible values.)

1. For each signalled subpicture ID, it shall be different from all other subpicture IDs in the same picture. Decision (Ed.): Adopt, either as a NOTE or as a requirement. (Expressing this as a requirement is not strictly necessary, since there is already an existing constraint that would require this, but it seems helpful to have it clearly expressed.)

[JVET-Q0210](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9035) [AHG9]: Miscellaneous HLS clean-ups [Hendry, S. Paluri (LGE)]

This contribution was discussed Tuesday 7 January 2020 at 1535 (chaired by GJS).

Items 1, 3, and 4 of this contribution belong to this category.

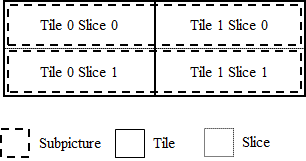
1. Prohibit rectangular slices in a tile belonging to different subpictures.

Specify a constraint as follows: When a picture is partitioned onto two or more subpicture, one or both of the following conditions shall be fulfilled for each subpicture and tile:

* 1. All CTUs in a tile belong to the same subpicture.
  2. All CTUs in a subpicture belong to the same tile.

It was discussed whether there is a real problem caused by the lack of this constraint. One use case was described in which it would be desirable to violate the constraint, which is an ERP viewport-dependent streaming (figs. D.8 and D.9 of OMAF).

The lack of this constraint involves potentially having NAL units of the same tile that not contiguous in decoding order. The scan order of CTUs within a slice is in tile scan order. Slices are ordered consecutively within a subpicture.



In the above picture, the order of slices in the bitstream is 1) tile 0 slice 0, 2) tile 1 slice 0, 3) tile 0 slice 1, then tile 1 slice 1.

Further study was encouraged to determine whether there are additional use cases in which this constraint would be desirable to violate, and to determine whether the lack of the constraint really causes a problem. The relationship of this to the subpicture level information SEI message should also be studied.

1. Specify a constraint such that when subpicture signalling is present, there shall be at least one subpicture that is an independently coded subpicture.

It was commented that this doesn’t really seem necessary. (And some subpicture characteristics may not be fully expressed within the bitstream – e.g., encoder-side MCTS referencing restrictions.) No action was taken on this.

1. Specify a constraint such that when subpicture ID is signalled in PPS or picture header, all subpictures are independently coded subpictures.

It was commented that although bitstream merging would likely be done at boundaries that are independent, some subpicture boundaries that are not at those boundaries may not need to be treated as picture boundaries. There is no clear need for the constraint, so no action was taken on this.

[JVET-Q0271](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9096) AHG9: On Subpicture Ordering [M. Damghanian, R. Sjöberg, M. Pettersson (Ericsson)]

This contribution was discussed Tuesday 7 January 2020 at 1800 (chaired by GJS).

This contribution proposes the following changes:

1. To define an independent subpicture as a subpicture for which the subpicture boundaries are treated as picture boundaries in the decoding process and no loop filtering across the subpicture boundaries is done. (Editorial)

It was commented that this does not really seem necessary (esp. since aspect #3 is not adopted), but the question can be left to the editors for consideration.

1. To add a syntax element sps\_independent\_subpics\_flag in the SPS. When equal to 1 it specifies that all subpicture boundaries in the CLVS are treated as picture boundaries and there is no loop filtering across the subpicture boundaries. subpic\_treated\_as\_pic\_flag[ i ] and loop\_filter\_across\_subpic\_enabled\_flag[ i ] are signalled only when sps\_independent\_subpics\_flag is equal to 0. (Signalling efficiency)

This is just a syntax optimization, but it would be a shortcut for a common use case. It was commented that a common example for viewport-dependent streaming uses 96 subpictures, and this would avoid the need to send 2\*96 flags.

Decision (cleanup): Adopt this aspect.

1. To specify that the subpicture availability rule applies only when sps\_independent\_subpics\_flag is equal to 0. (Functionality)

This change would allow arbitrary subpicture order in the bitstream when the subpictures are independent. Currently, subpicture order is constrained by the availability rule.

It was commented that this would impose a substantial buffering burden on decoder implementations with some architectures. Some decoders are envisioned to operate most of the decoding process in raster order. No action was taken on this.

[JVET-Q0406](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9231) AHG12: On CABAC zero words for subpictures [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

TBP.

This contribution asserts that subpicture extraction could result in violating the bin-to-bit ratio constraint as CABAC zero words are not associated to subpictures. Therefore, it is proposed to add a bitstream constraint for the VCL NAL units of subpictures to fulfil the bin-to-bit ratio constraint individually in addition to the picture unit level constraint when the following conditions apply:

– a subpicture has subpic\_treated\_as\_pic\_flag[ ] equal to 1.

– a subpicture level information SEI message is present in the CLVS.

[either or both?]

[JVET-Q0443](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9269) Independent Subpictures [K. Sharman, S. Keating, A. Browne (Sony)]

TBP.

Item 1 (the aspect on CABAC zero words and MinCR constraints) of this contribution belongs to this category.

Subpictures allow regions of a picture to be independently decodable, with care to handle edges of subpictures and describe the subpicture requirements at different levels via a dedicated SEI message.

1. This contribution proposes that constrains are added to subpictures so that CABAC zero words and MinCR picture level constraints are also applied at a subpicture level.

#### Subpicture layout signalling (6)

[JVET-Q0591](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9437) AHG12: A summary of proposals on subpicture layout signalling [Y.-K. Wang (Bytedance)]

This contribution was discussed Tuesday 7 January 2020 at 2000 (chaired by GJS).

This contribution provides a summary of all proposals on subpicture layout signalling submitted to this JVET meeting. It is suggested that this summary is used for the reviewing of these proposals, such that the discussions can be in a more structured and efficient manner.

The proposed changes in this category were summarized as follows:

1. Modify the signalling (in the SPS) for subpicture layout by signalling the bottom-right CTU position and deriving other information needed for a subpicture (i.e., the top-left CTU position, the width, and the height). The reported bit saving is 60% for subpicture signalling. (JVET-Q0202)

This would make the signalling similar to what was previously used to identify bricks in rectangular slices. It would use a map (tileToSliceMap[ m ][ n ]) of the CTUs to derive the subpicture rectangles.

There was a similar contribution JVET-P0143 at the previous meeting. One participant commented that we should avoid needing a complicated derivation scheme. Another participant expressed a general sympathy with that type of concern. No action was thus taken on this.

1. When subpicture signalling is present but there is only one subpicture (e.g., due to extraction of a single subpicture from a larger bitstream), omit the signalling of subpicture layout and the syntax elements subpic\_treated\_as\_pic\_flag[ 0 ], and loop\_filter\_across\_subpic\_enabled\_flag[ 0 ]. (JVET-Q0210, JVET-Q0215, JVET-Q0413).

Decision (cleanup): Adopt. Hendry is responsible for the software. Revisit for text to be prepared (coordinated by Hendry).

1. Remove the following constraint: When subpics\_present\_flag is equal to 0, single\_slice\_per\_subpic\_flag shall be equal to 0, and use the flag to change some derivation equations suitably for this case. (JVET-Q0210, a similar proposal is said to be in Q0224)

It was commented (by those who wrote that sentence) that this sentence had been put into the text by mistake.

Removing the constraint would skip some unnecessary slice syntax elements by setting single\_slice\_per\_subpic\_flag equal to 1.

Decision (cleanup): Adopt. Hendry is responsible for the software. Revisit for text to be prepared (coordinated by Hendry). Editorially, it was suggested to also consider renaming the flag to make it clear that that the flag is not irrelevant when subpics\_present\_flag is equal to 0.

1. Skip the signalling and infer the top-left position for the first subpicture. (JVET-Q0215, JVET-Q0222)

The first one is required to be the top-left one by the availability constraint.

Decision (cleanup): Adopt. S. Deshpande is responsible for the software. Text is in Q0222.

1. Skip the signalling and infer the size of the last subpicture. (JVET-Q0215, JVET-Q0222, JVET-Q0413)

Decision (cleanup): Adopt. S. Deshpande is responsible for the software. Text is in Q0222 (alternative text is in Q0413, and the proponents will check offline whether that is editorially better).

1. Skip the signalling and infer the upper-left corner of the last subpicture position (JVET-Q0215)

Text was not provided for this. It was commented that the text might not be so straightforward. Revisit for review of candidate text.

1. Remove subpicture signalling from SPS, and signal subpicture layout in PPS based on the layout of rectangular slices instead. (JVET-P0475)

The motivation for this would be alignment of the signalling of subpicture layout with slice structure, since slices are a partitioning of subpictures. It was commented that the subpicture structure is required to be constant for a CLVS; with this proposal, that property would need to be achieved by a constraint on the PPS-level syntax. With the current scheme, that constraint cannot be violated.

It was remarked that if multiple PPSs are used in the bitstream, this would require repeating the identical subpicture map information in all of them.

No action was taken on this.

[JVET-Q0202](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9027) [AHG12]: On signalling of subpicture and rectangular slice [Hendry, S. Paluri (LGE)]

The subpicture layout signalling part of this contribution belongs to this category.

[JVET-Q0210](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9035) [AHG9]: Miscellaneous HLS clean-ups [Hendry, S. Paluri (LGE)]

Items 2 and 5 of this contribution belong to this category.

[JVET-Q0215](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9040) AHG9/AHG12: Comments on signalling subpicture layout [L. Chen, C.-C. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0222](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9047) AHG12: On Subpicture Signalling [S. Deshpande (Sharp)]

Items 1-2 of this contribution belong to this category.

[JVET-Q0413](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9238) AHG9/AHG12: On subpicture partitioning signaling [J. Chen, R.-L. Liao, Y. Ye, J. Luo (Alibaba)]

[JVET-Q0475](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9301) [AHG9/AHG12] On subpicture signaling [Y. He, A. Hamza (InterDigital)]

Items 1 and 2 of this contribution belong to this category.

#### Subpicture ID signalling (9)

[JVET-Q0590](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9436) AHG12: A summary of proposals on subpicture ID signalling [Y.-K. Wang (Bytedance)]

This contribution was discussed Tuesday 7 January 2020 at 2145 (chaired by GJS).

This contribution provides a summary of all proposals on subpicture ID signalling submitted to this JVET meeting. It is suggested that this summary is used for the reviewing of these proposals, such that the discussions can be in a more structured and efficient manner.

1. When subpics\_present\_flag is equal to 0, i.e., there is no subpicture layout informaton signalled and no subpicture ID signalled in SHs, the current draft allows subpicture ID mapping to be explicitly signalled in the SPS/PPS/PH. A subpicture map can be sent even when there are no subpicture IDs in the slice headers, which doesn’t make sense. Proposals to fix this bug are:
   1. Condition slice\_subpic\_id on "if( subpics\_present\_flag  | |  sps\_subpic\_id\_present\_flag )"? (JVET-Q0222)
   2. Condition sps\_subpic\_id\_present\_flag on "if( subpics\_present\_flag )" and infer the value of sps\_subpic\_id\_present\_flag to be equal to 0 when it is not present. (JVET-Q0119, JVET-Q0290, JVET-Q0222)
   3. Constrain the value of sps\_subpic\_id\_present\_flag to be equal to 0 when subpics\_present\_flag is equal to 0.

Decision (BF): Adopt approach “b”. Y.-K. Wang is responsible for the software. Text is in Q0119.

1. Remove signalling of the subpicture ID mapping from PH? (JVET-Q0119)

If the mapping is in the PH, then subpicture-based extraction would have to change PHs.

Decision (cleanup): Adopt. Y.-K. Wang is responsible for the software. Text is in Q0119 (but may need separation from other proposed changes).

1. There is a bug in the text where SubpicIdList[ i ] is used without being defined in some cases. Proposals to fix this bug are:
   1. Require signalling in the SPS or PPS when sps\_subpic\_id\_present\_flag is equal to 1. (JVET-Q0119, JVET-Q0222, JVET-Q0375, JVET-Q0412)
   2. Infer a value for pps\_subpic\_id[ i ] when sps\_subpic\_id\_present\_flag is equal to 1 but the subpicture ID mapping is not signalled in SPS, PPS or PH. This is said to be what the software does. (JVET-Q0412)

It was remarked that approach b is not especially useful since it is just a description of what happens when sps\_subpic\_id\_present\_flag is equal to 0, saying that sps\_subpic\_id\_present\_flag equal to 1 was intended to indicate that explicit signalling was present. There was discussion of whether this remark was correct or not. Revisit to resolve.

[JVET-Q0119](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8944) AHG12: Cleanups on signalling of subpictures, tiles, and rectangular slices [Y.-K. Wang (Bytedance)]

Items 2-5 of this contribution belong to this category.

[JVET-Q0290](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9115) AHG9/AHG12: Modifications related to subpicture signalling and RPR [S.-T. Hsiang, C.-Y. Chen, T.-D. Chuang, L. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

Item 3 of this contribution belongs to this category.

[JVET-Q0152](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8977) AHG9/AHG12: Miscellaneous HLS topics [M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz (Qualcomm)]

Item 1 of this contribution belongs to this category.

[JVET-Q0213](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9038) [AHG9/AGH12] On subpicture ID mapping signaling [Y. He, A. Hamza (InterDigital)]

[JVET-Q0222](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9047) AHG12: On Subpicture Signalling [S. Deshpande (Sharp)]

Item 3 and 5 of this contribution belong to this category.

[JVET-Q0235](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9060) AHG12 Simplifying the nesting condition of subpicIdList[i] [M. Hirabayashi, M. Katsumata, T. Suzuki (Sony)]

[JVET-Q0285](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9110) AHG9: On adaptation parameter set ID [B. Choi, S. Wenger, S. Liu (Tencent)] [late]

Item 1 of this contribution belongs to this category.

[JVET-Q0375](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9200) AHG9: A cleanup on the signalling of subpicture IDs [D. Kim, G. Ko, J. Jung, J. Son, J. Kwak (WILUS)]

[JVET-Q0412](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9237) AHG9/AHG12: A syntax and semantics fix for subpicture ID mapping [J. Chen, R.-L. Liao, Y. Ye, J. Luo (Alibaba)]

#### Subpicture based bitsream merging (5)

[JVET-Q0233](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9058) AHG17 Signaling subpicture without slice for merged and other use cases [M. Hirabayashi, M. Katsumata, T. Suzuki (Sony)]

[JVET-Q0401](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9226) AHG9/AHG12: On bitstream merging [R. Skupin, Y. Sanchez, K. Sühring, T. Schierl (HHI)]

[JVET-Q0409](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9234) AHG12: On APS id for bitstream merging for VVC [N. Ouedraogo, E. Nassor, F. Denoual, F. Mazé (Canon)]

[JVET-Q0410](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9235) AHG12: Bitstream merging with variable initial Qp [N. Ouedraogo, E. Nassor, G. Kergourlay, F. Mazé (Canon)]

[JVET-Q0411](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9236) AHG12: On Subpictures merging for VVC [N. Ouedraogo, F. Denoual, F. Mazé (Canon)]

### Slices and tiles (19)

[JVET-Q0586](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9432) AHG9/AHG12: A summary of HLS contributions on tiles and slices [Hendry (LGE)]

#### Tile and rectangular slice signalling in the PPS (14)

[JVET-Q0164](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8989) AHG9: On indication of rectangular slice height in video subpictures [P. Wu (ZTE)]

[JVET-Q0202](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9027) [AHG12]: On signalling of subpicture and rectangular slice [Hendry, S. Paluri (LGE)]

The rectangular slice signalling part of this contribution belongs to this category.

[JVET-Q0203](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9028) [AHG12]: On signalling of multiple rectangular slices in a tile [Hendry, S. Paluri (LGE)]

[JVET-Q0204](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9029) [AHG12]: On single tile per slice flag [Hendry, S. Paluri (LGE)]

[JVET-Q0218](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9043) AHG12/ AHG9: On Slice Signalling [S. Deshpande (Sharp)]

[JVET-Q0228](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9053) AHG12: Signalling of rectangular slices [B.-K. Lee (Xris), D. Jun (Kyungnam University)]

[JVET-Q0230](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9055) AHG12: Signalling of multiple slices in a tile [B.-K. Lee (Xris), D Jun (Kyungnam University)]

[JVET-Q0244](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9069) [AHG12]: Misc improvements to tile and rectangular slice signalling [S. Paluri, Hendry (LGE)]

[JVET-Q0289](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9114) AHG9/AHG12: Comments on miscellaneous HLS text [L. Chen, C.-W. Hsu, C.-C. Chen, Y.-W. Huang, S.-M. Lei (MediaTek)]

Items 1 and 3 of this contribution belong to this category.

[JVET-Q0332](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9157) AhG12: On the numbers of slices and subpictures [Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0359](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9184) AHG12: Constraints on tile signaling [X. Ma, H. Yang (Huawei)]

[JVET-Q0373](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9198) AHG12: On signalling of slice [J. H. Do, Y.-U. Yoon, D. H. Park, J.-G. Kim (KAU)]

[JVET-Q0377](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9202) AHG12: On "tile-fraction" slices and signaling of slices per subpicture [N. Ouedraogo, G. Laroche, P. Onno (Canon)]

[JVET-Q0480](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9307) AHG9: A More Robust Syntax for Raster Rectangular Slices [W. Wan, T. Hellman, B. Heng (Broadcom)]

#### Other aspects of slices (5)

[JVET-Q0119](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8944) AHG12: Cleanups on signalling of subpictures, tiles, and rectangular slices [Y.-K. Wang (Bytedance)]

Item 6 of this contribution belongs to this category.

[JVET-Q0201](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9026) [AHG12]: On slice data signalling [Hendry, S. Paluri (LGE)]

[JVET-Q0223](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9048) AHG9/AHG12: On dependent slice and slice header [L. Chen, C.-C. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0224](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9049) AHG9/AHG12: On raster scan slice within a picture [L. Chen, C.-C. Chen, C.-W. Hsu, Y.-L. Hsiao, Y.-W. Huang, S.-M. Lei (MediaTek)]

See also the notes for Q0210 aspect #5 (section 6.20.1.2) for one aspect of this contribution.

[JVET-Q0579](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9425) Crosscheck report of JVET-Q0224 [X. Xu (Tencent)] [late]

[JVET-Q0225](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9050) AHG9/AHG12: On raster scan slice within a tile [L. Chen, C.-C. Chen, C.-W. Hsu, Y.-L. Hsiao, Y.-W. Huang, S.-M. Lei (MediaTek)]

### Control of loop filtering across subpicture/tile/slice boundaries (4)

See also

[JVET-Q0120](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8945) AHG12: Control of loop filtering across subpicture/tile/slice boundaries [L. Zhang, Y.-K. Wang, K. Zhang (Bytedance)]

[JVET-Q0317](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9142) AHG9: A cleanup on de-blocking filtering between subpictures [K. Zhang, L. Zhang, Y.-K. Wang, H. Liu, J. Xu, Z. Deng (Bytedance)]

This includes some changes to the deblocking filtering process.

[JVET-Q0352](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9177) AHG9/AHG12: On subpicture boundary [H. Jang, J. Nam, N. Park, S. Kim, J. Lim (LGE)]

Item 1 of this contribution belongs to this category.

[JVET-Q0475](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9301) [AHG9/AHG12] On subpicture signaling [Y. He, A. Hamza (InterDigital)]

Item 3 of this contribution belongs to this category.

### Tile/WPP entry point offset signalling (2)

[JVET-Q0151](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8976) AHG12: On entry point offset signalling [M. Coban, Y.-J. Chang, V. Seregin, A. K. Ramasubramonian, M. Karczewicz (Qualcomm)]

[JVET-Q0205](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9030) [AHG12]: On the presence of entry point signalling [Hendry, S. Kim, S. Lee (LGE)]

## AHG8: layered coding and resolution adaptivity (19)

### Scalability specific HLS (19)

#### VPS scalability information signalling (5)

[JVET-Q0046](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8871) AHG9: On signalling of PTL/HRD parameters for single layer OLSs and DPB parameters for independent layers [T. Nishi, K. Abe, V. Drugeon (Panasonic)]

[JVET-Q0047](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8872) AHG9: Unified signalling of PTL and HRD parameters in VPS [T. Nishi, K. Abe, V. Drugeon (Panasonic)]

[JVET-Q0118](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8943) AHG8/AHG9: Scalability HLS clean-ups [Y.-K. Wang (Bytedance)]

[JVET-Q0122](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8947) AHG9/AHG8: Some HRD clean-ups [Y.-K. Wang (Bytedance)]

[JVET-Q0220](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9045) AHG8/ AHG9: On VPS and Output Layer Set Signalling [S. Deshpande (Sharp)]

#### DPB operation for multi-layer OLSs (2)

[JVET-Q0158](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8983) AHG8: Clarification on DPB structure and picture output [V. Seregin, A. K. Ramasubramonian, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0308](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9133) [AHG9]: On DPB parameter for output layer set [Hendry (LGE)]

#### STSA picture related (3)

[JVET-Q0156](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8981) AHG8: Enabling inter-layer prediction for STSA pictures [V. Seregin, A. K. Ramasubramonian, M. Coban, M. Karczewicz (Qualcomm)]

[JVET-Q0237](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9062) AHG8/AHG9: On STSA pictures in dependent layers [M. M. Hannuksela (Nokia)]

[JVET-Q0279](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9104) AHG8/AHG9: On alignment across layers [B. Choi, S. Wenger, S. Liu (Tencent)]

Item 2 of this contribution belongs to this category.

#### Colour format and bit depth cross layers (3)

[JVET-Q0172](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8997) AHG9: Chroma format and bitdepth constraint for multi-layer structure [T.-D. Chuang, L. Chen, O. Chubach, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0279](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9104) AHG8/AHG9: On alignment across layers [B. Choi, S. Wenger, S. Liu (Tencent)]

Item 2 of this contribution belongs to this category.

[JVET-Q0355](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9180) AHG8/AHG9: Cleanup on multi-layer coding [X. Ma, H. Yang (Huawei)]

Item 2 of this contribution belongs to this category.

#### Misc. scalability HLS topics (6)

[JVET-Q0170](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8995) AHG9: On inter-layer referencing of ALF [O. Chubach, C.-Y. Lai, C.-Y. Chen, L. Chen, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0180](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9005) AHG9: On inter-layer referencing of scaling list and LMCS [C.-Y. Lai, O. Chubach, C.-Y. Chen, L. Chen, T.-D. Chuang, Y.-W. Huang, S.-M. Lei (MediaTek)]

[JVET-Q0277](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9102) AHG8/AHG9: Layer dependency constraints for parameter set reference [B. Choi, S. Wenger, S. Liu (Tencent)]

[JVET-Q0279](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9104) AHG8/AHG9: On alignment across layers [B. Choi, S. Wenger, S. Liu (Tencent)]

Item 1 of this contribution belongs to this category.

[JVET-Q0342](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9167) AHG9: on signaling inter-layer dependency information in SPS [B. Wang, S. Esenlik, A. M. Kotra, H. Gao, E. Alshina (Huawei)]

[JVET-Q0355](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9180) AHG8/AHG9: Cleanup on multi-layer coding [X. Ma, H. Yang (Huawei)]

Item 1 of this contribution belongs to this category.

### Reference picture resampling (RPR) specific HLS (0)

# Complexity analysis (3)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0049](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8874) Bit Stream Feature Analyzer (BSFA) for Coding Tool Statistics Based on VTM-7.0 [C. J. Herglotz, M. Kränzler, A. Kaup]

[JVET-Q0051](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8876) Analysis of the Energy-Time Relationship for VVC and HEVC Software Video Decoders [M. Kränzler, C. J. Herglotz, A. Kaup]

[JVET-Q0052](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8877) Modeling of the Decoding Energy for VTM-7.0 with a Bit Stream Feature-Based Model [M. Kränzler, C. J. Herglotz, A. Kaup]

# Encoder optimization (2)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

[JVET-Q0433](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9258) Encoder only: On unbalanced luma/chroma gains for dependent quantization [H. Schwarz (Fraunhofer HHI)]

[JVET-Q0447](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=9273) Encoder estimation of weighted\_prediction parameters [P. Bordes, T. Poirier, F. Le Léannec (InterDigital)]

# Metrics and evaluation criteria (0)

Contributions in this category were discussed XXday X Jan. XXXX–XXXX in Track X (chaired by XXX).

# Withdrawn (13)

Section kept for future use.

JVET-Q0083 Withdrawn

JVET-Q0087 Withdrawn

JVET-Q0135 Withdrawn

JVET-Q0231 Withdrawn

JVET-Q0252 Withdrawn

JVET-Q0286 Withdrawn

JVET-Q0383 Withdrawn

JVET-Q0384 Withdrawn

JVET-Q0415 Withdrawn

JVET-Q0418 Withdrawn

JVET-Q0454 Withdrawn

JVET-Q0465 Withdrawn

JVET-Q0574 Withdrawn

# Plenary meetings, joint meetings, BoG reports, and summary of actions taken

## High-level syntax / systems relation meeting

This planned session was cancelled due to a lack of identified need, as communicated by the relevant MPEG AHG chair.

## Plenary meeting XXday X Jan. XXXX-XXXX

Reports of the tracks were presented as follows:

The general status of tracks A and B was presented and discussed, which particularly included the following aspects:

Decisions recommended from trackA and B were agreed and approved, unless otherwise noted:

Conformance testing was discussed (see section 4.6).

Profile, tier and level were discussed (see section 4.6).

Need more consideration of potential removal of low-coding-gain stuff.

## Closing Plenary meeting Friday 17 Jan.

… .

## Joint meeting XXday XX March XXXX-

JVET with … .

## BoGs (X)

## List of actions taken affecting the draft text of VVC, the VTM, and 360Lib

The following is a summary, in the form of a brief list, of the actions taken at the meeting that affect the text of the VVC draft text, VTM or 360Lib description. Both technical and editorial issues are included. This list is provided only as a summary – details of specific actions are noted elsewhere in this report and the list provided here may not be complete and correct. The listing of a document number only indicates that the document is related, not that it was adopted in whole or in part. The description given in the “Tool” column is a best effort for the sake of understanding but may not precisely reflect the functionality of the tool. It is also noted that in cases where several contributions proposed the same method, usually only one of the is listed as adoption below; refer to the meeting notes about the adoption to see which other contributions are related.

…

# Project planning

## Core experiment planning

See final planning under JVET-Q2021…Q202X.

## 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 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:

* No review of normative contributions without draft specification text
* VTM algorithm description text is strongly encouraged for non-normative contributions
* Early upload deadline to enable substantial study prior to the meeting
* Using a clock timer to ensure efficient proposal presentations (5 min) and discussions

The document upload deadline for the next meeting was planned to be XXday XX Apr 2020.

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 during the opening plenary on January 9 that those rules which had been set up or refined during the 12th meeting should be observed. In particular, for some CEs, results were available late, and some changes in the experimental setup (particularly in CE4) were not 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 the draft standard by the next meeting.
* 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 tha 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; the method for members to obtain the credentials is TBA on the reflector).
* During the experiment, revisions of the experiment plans can be made, but not substantial changes to the proposed technology.
* 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 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 are described in the output document JVET-N1010.

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”, 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.

[Add info on software access.]

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 is 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 marked as “withdrawn”.

T2 = Test model software release + 2 weeks or X XX, whichever is earlier: 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 – 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 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 straightforwared 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, we would like see comprehensive cross-checking done, with analysis that the description matches the software, and recommendation of value of the tool 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.

Availability of spec text is important to have a detailed understanding of the technology and also to judge what its impact on the complexity of the spec will be. There must also be sufficient time to study it in detail. CE contributions without sufficiently mature draft spec 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.

## Software development and anchor generation (update)

The planned timeline for software releases was established as follows:

* VTM7.0 will be released by 2019-11-11 including all adoptions necessary for CTC and CE basis references. VTM7.1 with non-CTC adoptions will be released later. Further versions of VTM may be released for additional bug fixing, as appropriate.
* Preparation of the VTM software will include immediate removal of macros that were added in the previous meeting cycle. The software coordinator has the discretion to retain some such macros.
* No change of of 360lib or HDRTools was noted in response to meeting.

# 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)).

|  |  |  |
| --- | --- | --- |
| **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 CE and AHG studies. * Report on project status to JVET reflector. * Provide a report to the next meeting on project coordination status. | J.-R. Ohm, G. J. Sullivan (co-chairs) | N |
| **Draft text and test model algorithm description editing (AHG2)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Produce and finalize JVET-P2001 VVC text specification draft 7. * Produce and finalize JVET-P2002 VVC Test Model 7 (VTM 7) Algorithm and Encoder Description. * Gather and address comments for refinement of these documents. * Coordinate with test model software development AhG to address issues relating to mismatches between software and text. | B. Bross, J. Chen (co-chairs), J. Boyce, S. Kim, S. Liu, 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 model (VTM) software and associated configuration files. * Produce documentation of software usage for distribution with the software. * Discuss and make recommendations on the software development process. * Propose improvements to the guideline document for developments of the test model software. * Perform tests of VTM behaviour relative to HEVC and the previous VTM using the VTM common test conditions. * 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. * Coordinate with AHG6 for integration with 360lib software. | F. Bossen, X. Li, K. Sühring (co-chairs) | N |
| **Test material and visual assessment (AHG4)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Maintain the video sequence test material database for development of the VVC standard. * Identify and recommend appropriate test materials for use in the development of the VVC standard. * Identify missing types of video material, solicit contributions, collect, and make available a variety of video sequence test material. * Evaluate new test sequences. * Maintain and update the directory structure for the test sequence repository as necessary. * Prepare availability of viewing equipment and facilities arrangements for the next meeting, and prepare testing upon consultation with CE coordinators. * Begin planning for verification testing of VVC capability. * Coordinate with AHG11 on test material for screen content coding. | V. Baroncini, T. Suzuki, M. Wien (co-chairs), R. Chernyak, A. Norkin (vice-chairs) | N |
| **Conformance testing (AHG5)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study the requirements of VVC conformance testing to ensure interoperability. * Propose a work plan, including timeline, for preparation of a conformance testing specification and conformance bitstream database. * Study potential testing methodology to fulfil the requirements of VVC conformance testing. | J. Boyce and W. Wan (co-chairs), E. Alshina, I. Moccagatta, K. Kawamura, S. McCarthy, K. Sühring (vice-chairs) | N |
| **360° video coding tools, software and test conditions (AHG6)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study the effect on compression and subjective quality of different projections formats, resolutions, and packing layouts. * Discuss refinements of common test conditions, test sequences, and evaluation criteria. * Solicit additional test sequences, and evaluate suitability of test sequences on head-mounted displays and normal 2D displays. * Study coding tools dedicated to 360° video, their impact on compression, and implications to the core codec design, including consideration of subpicture segmentations and adaptive viewport usage. * Study the effect of viewport resolution, field of view, and viewport speed/direction on visual comfort. * Study complexity of GPU rendering of projection formats. * Study syntax for signalling of projection formats, cubeface layouts, spherical rotations. * Prepare and deliver the 360Lib-10 software version and common test condition configuration files according to JVET-M1012. * Generate CTC anchors and PERP results for the VTM according to JVET-M1012 within two weeks of availability of SDR CTC anchors. * Produce documentation of software usage for distribution with the software. | J. Boyce and Y. He (co-chairs), K. Choi, J.-L. Lin, Y. Ye (vice-chairs) | N |
| **Coding of HDR/WCG material (AHG7)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study and evaluate available HDR/WCG test content. * Study objective metrics for quality assessment of HDR/WCG material, including investigation of the correlation between subjective and objective results. * Compare the performance of the VTM and HM for HDR/WCG content. * Generate CTC anchors for the VTM according to JVET-P2011 within two weeks of availability of SDR CTC anchors. * Prepare for expert viewing of HDR content at the next JVET meeting if feasible. * Coordinate implementation of HDR anchor aspects in the test model software with AHG3. * Study additional aspects of coding HDR/WCG content. | A. Segall (chair), E. François, W. Husak, S. Iwamura, D. Rusanovskyy (vice-chairs) | N |
| **Layered coding and resolution adaptivity (AHG8)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study adaptive-resolution coding approaches for real-time communication, adaptive streaming, and 360-degree viewport-dependent streaming, including subpicture-based resampling, reference picture management and related scope and signalling. * Study approaches for temporal scalability to avoid temporal judder when temporal scalability sub-bitstream extraction is used for achieving lower frame rate, and consider whether this should have a normative impact. * Develop software for layered coding and resolution adaptivity modalities in the context of the VTM software. * Propose common test conditions for layered coding and resolution adaptivity. * Study approaches for support of layered coding scalability including spatial, temporal, quality, view, and region-of-interest scalability; and analyse their coding efficiency and complexity characteristics | S. Wenger and A. Segall (co-chairs), M. M. Hannuksela, Hendry, S. McCarthy, Y.-C. Sun, P. Topiwala, M. Zhou (vice-chairs) | N |
| **High-level syntax (AHG9)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study NAL unit header, decoding parameter set, video parameter set, sequence parameter set, picture parameter set, adaptation parameter set, picture header, and slice header syntax designs. * Study reference picture buffering and list construction. * Study random access signalling and random access approaches. * Study detection of AU and picture boundaries and properties. * Study the appropriate syntax level and signalling approaches for high-level signalling of control information for lower-level coding tools. * Coordinate with AHG2 and AHG3 for text drafting and software development for the high-level syntax in the VVC design. * Study syntax approaches for interoperability point signalling. * Study selection of constraint flags and their impact on syntax, semantics, and decoding process. | R. Sjöberg, J. Boyce (co-chairs), B. Choi, S. Deshpande, M. M. Hannuksela, R. Skupin, A. Tourapis, Y.-K. Wang, W. Wan (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 GOP structures and perceptually optimized adaptive quantization for encoder optimization. * Study quality metrics for measuring subjective quality using e.g. the CfP response MOS scores. * Study the impact of adaptive quantization on individual tools in the test model. * Investigate other methods of improving objective and/or subjective quality, including adaptive coding structures and multi-pass encoding. * Study methods of rate control and their impact on performance, subjective and objective quality. | A. Duenas, A. Tourapis (co-chairs), S. Ikonin, A. Norkin, R. Sjöberg, J. Le Tanou, J.-M. Thiesse (vice-chairs) | N |
| **Screen content coding (AHG11)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Investigate coding tools targeted at screen content in terms of compression benefit and implementation complexity. * Identify test materials, discuss testing conditions for screen content coding, and propose associated updated common test conditions. * Study the impact of loop filters on screen content coding. | S. Liu (chair), J. Boyce, A. Filippov, Y.-C. Sun, J. Xu, H. Yang (vice-chairs) | N |
| **High-level parallelism and coded picture regions (AHG12)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study wavefront processing including the relationship with tiles and low delay characteristics. * Study flexible loop filter control and tile size restrictions, including identifying implications on coding tools and implementation. * Study support of independently coded picture regions, including easy extraction and merging of such regions into conforming bitstreams. * Prepare software and configurations for the test model to facilitate parallel processing tests. * Study the coding efficiency impact of parallel processing and coded picture regions. | S. Deshpande (chair), B. Choi, M. M. Hannuksela, R. Sjöberg, R. Skupin, W. Wan, Y.-K. Wang (vice-chairs) | N |
| **Tool reporting procedure and testing (AHG13)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Prepare output document JVET-P2005, which describes the methodology of tool-off testing and a list of tools to be tested by identified testers, including non-CTC configurations as appropriate. * Provide configurations files, bitstreams, and results of tool-on/tool-off testing. * Maintain VTM software aspects for memory bandwidth analysis in coordination with AHG3. * Use the tool usage counts and memory bandwidth usage to study the decoder complexity of features in on/off testing. * Prepare a report with results of the tests. | W.-J. Chien, J. Boyce (co-chairs), W. Chen, Y.-W. Chen, R. Chernyak, K. Choi, R. Hashimoto, Y.**-**W. Huang, H. Jang, R.-L. Liao, S. Liu (vice-chairs) | N |
| **Lossless and near-lossless coding (AHG14)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study lossless and near-lossless coding, including transform skip, BDPCM, and other potential technologies. * Consider the interaction between coding tools and other processing such as loop filtering and LMCS for lossless and near-lossless coding. * Develop proposals for lossless and near-lossless coding for chroma and non-YCbCr colour space content. * Consider throughput bottlenecks for lossless and near-lossless coding at high resolutions and frame rates. | T. Nguyen and T.-C. Ma (co-chairs), M. Ikeda, H. Jang, X. Zhao (vice-chairs) | N |
| **Quantization control (AHG15)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Identify methods for quantization step size control for luma and chroma, including spatially and frequency-adaptive approaches. * Develop methods for evaluating quantization step size control operation. * Study the association between transforms and quantization scaling matrices. * Develop testing conditions for evaluating QP signalling improvements including rate control and perceptual optimization strategies as appropriate. * Evaluate the performance of the current VVC QP design using the adaptive quantization control techniques currently available in the VTM. | R. Chernyak (chair), E. François, C. Helmrich, S. McCarthy, A. Segall (vice-chairs) | N |
| **Implementation studies (AHG16)**  ([jvet@lists.rwth-aachen.de](mailto:jvet@lists.rwth-aachen.de))   * Study current and proposed coding tools to identify implementation issues relating to decoder pipelines, decoder throughput, and other aspects of implementation difficulty. * Solicit hardware analysis of complex tools. * Provide feedback on potential solutions to address identified issues. | M. Zhou (chair), J. An, E. Chai, K. Choi, S. Sethuraman, T. Hsieh, X. Xiu (vice-chairs) | N |

# Output documents (update)

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 MPEG output document, a separate version under the MPEG document header should be generated. This version should be sent to GJS and JRO for upload.

[JVET-P2000](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8865) Meeting Report of the 16th JVET Meeting [G. J. Sullivan, J.-R. Ohm] (2020-xx-xx, near next meeting)

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

[JVET-P2001](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8857) Versatile Video Coding (Draft 7) [B. Bross, J. Chen, S. Liu, Y.-K. Wang] [WG 11 DIS 23090-3, N18873] (2019-11-09)

Disposition of comments: WG11 N18875 also output by MPEG.

(Initial version planned to be made available by 2019-10-18.)

(Resolution impact: Adding Y.-K. Wang as editor)

DoCR also output by MPEG.

See the list of elements under section 11.7, [revisit to check].

[JVET-P2002](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8858) Algorithm description for Versatile Video Coding and Test Model 7 (VTM 7) [J. Chen, Y. Ye, S. Kim] [WG 11 N 18874] (2019-11-22)

(Initial version planned to be made available by 2019-10-31.)

Remains valid – not updated: [JVET-N1003](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=6638) Guidelines for VVC reference software development [K. Sühring] (2019-04-01)

Remains valid – not updated: [JVET-M1004](http://phenix.int-evry.fr/jvet/doc_end_user/current_document.php?id=5757) Algorithm descriptions of projection format conversion and video quality metrics in 360Lib (Version 9) [Y. Ye, J. Boyce] (2019-02-15)

[JVET-P2005](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8859) Methodology and reporting template for coding tool testing [W.-J. Chien and J. Boyce] (2019-11-25)

Initial version to be available by 2019-10-25; final version expected by two weeks after VTM 7 availability.

Remains valid – not updated: [JVET-M1006](http://phenix.int-evry.fr/jvet/doc_end_user/current_document.php?id=5758) Methodology and reporting template for neural network coding tool testing [Y. Li, S. Liu, K. Kawamura] (2019-02-01)

This output was produced to capture aspects specific to enable study of neural network techniques.

[JVET-P2007](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8860) Supplemental enhancement information messages for coded video bitstreams [J. Boyce, G. J. Sullivan, Y.-K. Wang] [WG 11 DIS ISO/IEC 23002-7, N18873] (2019-11-09)

Disposition of comments: WG11 N18872 also output by MPEG.

See the list of elements under section 11.8 [revisit to check].

[JVET-P2008](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8861) Conformance testing for versatile video coding (Draft 1) [J. Boyce, E. Alshina, K. Kawamura, S. McCarthy, I. Moccagatta, W. Wan] [WG 11 N18927] (2019-11-22)

List volunteers (may be recruited later also).

No output P2009

Remains valid – not updated: [JVET-N1010](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=6643) JVET common test conditions and software reference configurations for SDR video [F. Bossen, J. Boyce, X. Li, V. Seregin, K. Sühring] (2019-04-12)

[JVET-P2011](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8862) JVET common test conditions and evaluation procedures for HDR/WCG video [A. Segall, E. François, W. Husak, S. Iwamura, D. Rusanovskyy] (2019-07-31)

(Will include correction of description of quantization aspects.)

Remains valid – not updated: [JVET-L1012](http://phenix.int-evry.fr/jvet/doc_end_user/current_document.php?id=4840) JVET common test conditions and evaluation procedures for 360° video [P. Hanhart, J. Boyce, K. Choi, J.-L. Lin] (2018-10-26)

Drafts of CE plans were not reviewed during the meeting due to lack of time.

[JVET-P2021](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8855) Description of Core Experiment 1 (CE 1): Deblocking filtering [K. Andersson, A. Norkin]

See track A notes under JVET-P1033 about what to test.

[JVET-P2022](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8854) Description of Core Experiment 2 (CE2): Palette mode coding [X. Xu, Y.-H. Chao, Y.-C. Sun, J. Xu]

See track A notes under JVET-P0999 about what to test.

[JVET-P2023](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8856) Description of Core Experiment 3 (CE3): Lossless coding [T.-C. Ma, A. Nalci, T. Nguyen]

See track A notes under JVET-P0606 about what to test.

[JVET-P2024](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8863) Description of Core Experiment 4 (CE4): Inter prediction with geometric partitioning [C.-C. Chen, R.-L. Liao, X. Xiu, H. Yang]

To test P0884/P0885; also to test current design with TPM off

Combination with CIIP P0071 to also test

(P0174 and P0250 were not reviewed in detail, not to be tested in the CE, more complex)

P0583 (which part of P0248) disallows SBT with GEO, to also test.

It was suggested and agreed to test P0449

Also test blending disabling

[JVET-P2025](http://phenix.it-sudparis.eu/jvet/doc_end_user/current_document.php?id=8864) Description of Core Experiment 5 (CE5): Cross-component adaptive loop filtering [C.-Y. Chen, A. Segall]

See track A notes under JVET-P1033 about what to test.

# Future meeting plans, expressions of thanks, and closing of the meeting

Future meeting plans were established according to the following guidelines:

* Meeting under ITU-T SG 16 auspices when it meets (ordinarily starting meetings on the Tuesday of the first week and closing it on the Wednesday of the second week of the SG 16 meeting – a total of 9 meeting days), and
* Otherwise meeting under ISO/IEC JTC 1/SC 29/WG 11 auspices when it meets (ordinarily starting meetings on the Tuesday prior to such meetings and closing it at lunchtime on the last day of the WG 11 meeting – a total of 9.5 meeting days).

In cases where an exceptionally high workload is expected for a meeting, an earlier starting date may be defined. For the upcoming meeting in October 2019, the SG16 parent-level meeting dates had been shifted after the JVET and MPEG meeting plans were established, which has caused an additional adjustment in the JVET dates.

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

* Wed. 15 – Fri. 24 April 2020, 18th meeting under WG 11 auspices in Alpbach, AT.
* Tue. 23 June – Wed. 1 July 2020, 19th meeting under ITU-T auspices in Geneva, CH.
* Wed. 7 – Fri. 16 October 2020, 20th meeting under WG 11 auspices in Rennes, FR.
* Wed. 6 – Fri. 15 January 2021, 21st meeting under WG 11 auspices in Capetown, ZA.

The agreed document deadline for the 18th JVET meeting was planned to be Tuesday 7 April 2020. CE proposal documents are due one week ahead of that date. HLS only on 1st day if Tuesday.

XXX was thanked for the excellent hosting of the 17th meeting of the JVET.

Barco, GBTech, Philips, and Sharp Labs of America were thanked for providing equipment used for subjective viewing during the 17th JVET meeting. Kenneth Andersson, Vittorio Baroncini, Andrey Norkin, Andrew Segall, and Mathias Wien were thanked for preparing and conducting the subjective test efforts. The experts who participated in the role as test subjects were also thanked.

The 17th JVET meeting was closed at approximately XXXX hours on Friday 17 Jan. 2020.

# Annex A to JVET report: List of documents

# Annex B to JVET report: List of meeting participants

The participants of the sixteenth meeting of the JVET, according to an attendance sheet circulated during the meeting sessions (approximately 319 people in total), were as follows: