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Abstract

This document reports the work of the JVET ad hoc group on draft text and test model algorithm description editing (AHG2) between the 17th meeting in Brussels, BE, (7–17 January 2020) and the 18th meeting by teleconference, (15–24 April 2020).

A joint ad hoc group meeting of AHGs 2, 3, 11, 14, 15 and 16 was held by teleconference on April 9 and April 14, involving 8 sessions of two hours each. The report from the joint AHG meeting sessions can be found in JVET-R0340.

Mandates

At the 17th JVET meeting, AHG2 on draft text and test model algorithm description editing was established with the following mandates:

Produce and finalize JVET-Q2001 VVC text specification draft 8.

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ABSTRACT

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1 Summary



MEETING NOTES

JVET-R0002 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]

This document reports the work of the JVET ad hoc group on draft text and test model algorithm description editing (AHG2) between the 17th meeting in Brussels, BE, (7–17 January 2020) and the 18th meeting by teleconference, (15–24 April 2020).

A joint ad hoc group meeting of AHGs 2, 3, 11, 14, 15 and 16 was held by teleconference on April 9 and April 14, involving 8 sessions of two hours each. The report from the joint AHG meeting sessions can be found in JVET-R0340.

At the 17th JVET meeting, it was decided to include additional coding features as well as simplify, clean up and fix the existing features for intra picture-prediction, inter-picture prediction, transform, CABAC engine and in-loop filter in the eighth draft of Versatile Video Coding (VVC D8) and the VVC Test Model 8 (VTM8) encoding.

The normative decoding process for Versatile Video Coding is specified in the VVC draft 8 text specification document. The VVC Test Model 8 (VTM 8) Algorithm and Encoder Description document provides an algorithm description as well as an encoder-side description of the VVC Test Model 8, which serves as a tutorial for the algorithm and encoding model implemented in the VTM8.x software.

An issue tracker (<https://jvet.hhi.fraunhofer.de/trac/vvc>) was used to facilitate the reporting of errata with the VVC documents.

For JVET-Q2001, the VVC text specification (Draft 8), fourteen versions of JVET-Q2001 were published by the editing AHG between the 17th meeting in Brussels, BE, (7–17 January 2020) and the 18th meeting by teleconference, (15–24 April 2020). JVET-Q2001 had been established based on JVET-P2001. Specific changes were listed in the report.

For JVET-Q2002, the VVC Test Model 8 (VTM 8) Algorithm and Encoder Description, three versions of JVET-Q2002 were published by the editing AHG between the 17th meeting in Brussels, BE, (7–17 January 2020) and the 18th meeting by teleconference, (15–24 April 2020). JVET-Q2002 had been established based on JVET-P2002. It provides the algorithm description for the majority of coding tools in VVC. Specific changes were listed in the report.

The AHG recommended to:

- Approve the edited JVET-Q2001 and JVET-Q2002 documents as JVET outputs,
- Continue to edit the VVC draft and Test Model documents to ensure that all agreed elements of VVC are fully described,
- Compare the VVC documents with the VVC software and resolve any discrepancies that may exist, in collaboration with the software AHG,
- Encourage the use of the issue tracker to report issues with the text of both the VVC specification draft and the algorithm and encoder description,

- Continue to improve the editorial consistency of VVC WD and Test Model documents,
- Ensure that, when considering the addition of new feature to VVC, properly drafted text for addition to the VVC Test Model and/or the VVC Working Draft is made available in a timely manner,
- Review the remaining contributions of the joint AHG meeting (JVET-R0340) and act on them, on the revisits and on the recommendations.

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REFERENCES

1. [B. Bross, J. Chen, S. Liu, Y.-K. Wang, "Versatile Video Coding \(Draft 7\)", JVET-P2001, 16th Meeting: Geneva, October 2019.](#)
2. [J. Chen, Y. Ye, S. Kim, "Algorithm description for Versatile Video Coding and Test Model 7 \(VTM 7\)", JVET-P2002, 16th Meeting: Geneva, October 2019.](#)
3. [T. Nishi, K. Abe, V. Drugeon, "AHG9: Constraint about usage of reference picture resampling and subpictures", JVET-Q0043, 17th Meeting: Brussels, January 2020.](#)
4. [T. Nishi, V. Drugeon, "AHG9/AHG12: Simplification of slice index with subpictures", JVET-Q0044, 17th Meeting: Brussels, January 2020.](#)
5. [V. Drugeon, "AHG9: On order of HRD related SEI messages", JVET-Q0048, 17th Meeting: Brussels, January 2020.](#)
6. [K. Andersson, J. Enhorn, "CE1: CE1-1.1 to CE1-1.3: Fixes for long luma deblocking filter decision", JVET-Q0054, 17th Meeting: Brussels, January 2020.](#)
7. [J. Lainema, "On MTS index signalling", JVET-Q0055, 17th Meeting: Brussels, January 2020.](#)
8. [A. Nalci, H. Wang, M. Coban, M. Karczewicz, T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki, Z.-Y. Lin, T.-D. Chuang, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, T.-C. Ma, H.-J. Jhu, X. Xiu, Y.-W. Chen, X. Wang, "CE3-2.4: Luma and Chroma BDPCM for Lossless Coding with Regular Residual Coding", JVET-Q0089, 17th Meeting: Brussels, January 2020.](#)
9. [T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki, "On Transform Skip in JointCbCr mode", JVET-Q0101, 17th Meeting: Brussels, January 2020.](#)
10. [Y.-K. Wang, Y. He, P. Wu, "On level definitions", JVET-Q0112, 17th Meeting: Brussels, January 2020.](#)
11. [Y.-K. Wang, "AHG9/AHG8/AHG12: Some general HLS syntax cleanups", JVET-Q0113, 17th Meeting: Brussels, January 2020.](#)
12. [Y.-K. Wang, "AHG9: A few more general constraints flags", JVET-Q0114, 17th Meeting: Brussels, January 2020.](#)
13. [Y.-K. Wang, "AHG9: On AU and picture start detection", JVET-Q0115, 17th Meeting: Brussels, January 2020.](#)
14. [Y.-K. Wang, J. Xu, K. Zhang, "AHG9: Cleanups on parameter sets", JVET-Q0117, 17th Meeting: Brussels, January 2020.](#)
15. [Y.-K. Wang, "AHG8/AHG9: Scalability HLS cleanups", JVET-Q0118, 17th Meeting: Brussels, January 2020.](#)
16. [Y.-K. Wang, "AHG12: Cleanups on signalling of subpictures, tiles, and rectangular slices", JVET-Q0119, 17th Meeting: Brussels, January 2020.](#)
17. [J. Xu, Y.-K. Wang, L. Zhang, W. Zhu, K. Zhang, H. Liu, "AHG9: On deblocking control parameters", JVET-Q0121, 17th Meeting: Brussels, January 2020.](#)
18. [T. Chujoh, T. Hashimoto, E. Sasaki, T. Ikai, "On clarification of applicable conditions of DMVR and BDOF", JVET-Q0128, 17th Meeting: Brussels, January 2020.](#)
19. [K. Abe, T. Toma, "AHG9: On JCCR signaling", JVET-Q0147, 17th Meeting: Brussels, January 2020.](#)
20. [K. Andersson, J. Ström, Z. Zhang, J. Enhorn, "Fix for ALF virtual boundary processing", JVET-Q0150, 17th Meeting: Brussels, January 2020.](#)

1. [M. Coban, Y.-J. Chang, V. Seregin, A. K. Ramasubramonian, M. Karczewicz, "AHG12: On entry point offset signalling", JVET-Q0151, 17th Meeting: Brussels, January 2020.](#)
2. [M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz, "AHG9/AHG12: Miscellaneous HLS topics", JVET-Q0152, 17th Meeting: Brussels, January 2020.](#)
3. [M. Coban, V. Seregin, A. K. Ramasubramonian, Y.-J. Chang, M. Karczewicz, "AHG9: On picture header IRAP/GDR signalling", JVET-Q0154, 17th Meeting: Brussels, January 2020.](#)
4. [V. Seregin, B. Ray, A. K. Ramasubramonian, Y.-J. Chang, M. Coban, G. Van der Auwera, M. Karczewicz, "AHG9: On separate colour plane coding", JVET-Q0155, 17th Meeting: Brussels, January 2020.](#)
5. [V. Seregin, A. K. Ramasubramonian, M. Coban, M. Karczewicz, "AHG8: Enabling inter-layer prediction for STSA pictures", JVET-Q0156, 17th Meeting: Brussels, January 2020.](#)
6. [V. Seregin, Y.-J. Chang, M. Coban, M. Karczewicz, "AHG12: On motion compensation for sub-pictures", JVET-Q0157, 17th Meeting: Brussels, January 2020.](#)
7. [Ping Wu, "AHG9: On indication of rectangular slice height in video subpictures", JVET-Q0164, 17th Meeting: Brussels, January 2020.](#)
8. [C.-Y. Lai, C.-Y. Chen, T.-D. Chuang, O. Chubach, L. Chen, Y.-W. Huang, S.-M. Lei, "AHG9/AHG12: Bitstream conformance requirements on subpicture ID", JVET-Q0169, 17th Meeting: Brussels, January 2020.](#)
9. [T.-D. Chuang, L. Chen, O. Chubach, C.-Y. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, "AHG9: Chroma format and bitdepth constraint for multi-layer structure", JVET-Q0172, 17th Meeting: Brussels, January 2020.](#)
10. [T.-D. Chuang, O. Chubach, C.-Y. Chen, C.-W. Hsu, L. Chen, Y.-W. Huang, S.-M. Lei, "AHG9: Bitstream conformance requirement related to RPR scaling ratio for worst case MC memory bandwidth reduction", JVET-Q0179, 17th Meeting: Brussels, January 2020.](#)
11. [S.-T. Hsiang, Y.-W. Huang, S.-M. Lei, "AHG9: High-level syntax related to transform skip mode", JVET-Q0183, 17th Meeting: Brussels, January 2020.](#)
12. [C.-M. Tsai, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, "Cleanup for checking CTU row boundary location in CCLM", JVET-Q0194, 17th Meeting: Brussels, January 2020.](#)
13. [B. Wang, S. Esenlik, A. M. Kotra, H. Gao, E. Alshina, "AHG9: Miscellaneous fixes for HLS in Specification", JVET-Q0197, 17th Meeting: Brussels, January 2020.](#)
14. [Hendry, S. Kim, S. Lee, "\[AHG9\]: On picture level and slice level tool parameters", JVET-Q0200, 17th Meeting: Brussels, January 2020.](#)
15. [Hendry, S. Paluri, "\[AHG12\]: On signalling of multiple rectangular slices in a tile", JVET-Q0203, 17th Meeting: Brussels, January 2020.](#)
16. [Hendry, J. Zhao, S. Kim \(LGE\), "\[AHG9\]\[AHG15\]: On chroma Qp offsets", JVET-Q0209, 17th Meeting: Brussels, January 2020.](#)
17. [Hendry, S. Paluri, "\[AHG9\]: Miscellaneous HLS clean-ups", JVET-Q0210, 17th Meeting: Brussels, January 2020.](#)
18. [S. Deshpande, "AHG9: On Picture Timing Information Signalling", JVET-Q0216, 17th Meeting: Brussels, January 2020.](#)

9. [S. Deshpande, "AHG9: On Reference Picture List Information Signalling", JVET-Q0217, 17th Meeting: Brussels, January 2020.](#)
10. [S. Deshpande, "AHG12/ AHG9: On Slice Signalling", JVET-Q0218, 17th Meeting: Brussels, January 2020.](#)
11. [S. Deshpande, "AHG9: On Alternative Timing Information Signalling", JVET-Q0219, 17th Meeting: Brussels, January 2020.](#)
12. [S. Deshpande, "AHG9: On Decoding Unit Parameters Signalling", JVET-Q0221, 17th Meeting: Brussels, January 2020.](#)
13. [S. Deshpande, "AHG12: On Subpicture Signalling", JVET-Q0222, 17th Meeting: Brussels, January 2020.](#)
14. [M. M. Hannuksela, "AHG8/AHG9: On STSA pictures in dependent layers", JVET-Q0237, 17th Meeting: Brussels, January 2020.](#)
15. [L. Pham Van, G. Van der Auwera, A. K. Ramasubramonian, H. Huang, W.-J. Chien, M. Karczewicz, "Cleanup of TPM, CIIP and GEO for 4:0:0 format", JVET-Q0242, 17th Meeting: Brussels, January 2020.](#)
16. [S. Paluri, Hendry, S. Kim, "\[AHG12\]: Misc improvements to tile and rectangular slice signalling", JVET-Q0244, 17th Meeting: Brussels, January 2020.](#)
17. [S. Paluri, Hendry, S. Kim, "\[AHG9\]: On virtual boundary signalling", JVET-Q0246, 17th Meeting: Brussels, January 2020.](#)
18. [S. Paluri, Hendry, J. Zhao, S. Kim, "\[AHG9\]: Signalling the prediction weight table in the picture header", JVET-Q0247, 17th Meeting: Brussels, January 2020.](#)
19. [N. Hu, V. Seregin, M. Karczewicz, "Clipping flag clean-up for chroma adaptive loop filters", JVET-Q0249, 17th Meeting: Brussels, January 2020.](#)
20. [J. Samuelsson, S. Deshpande, A. Segall, "AHG9: Temporal sublayer level indication and conformance", JVET-Q0256, 17th Meeting: Brussels, January 2020.](#)
21. [J. Samuelsson, S. Deshpande, A. Segall, "How to do 16:1 reference picture resampling in VVC", JVET-Q0257, 17th Meeting: Brussels, January 2020.](#)
22. [J. Samuelsson, S. Deshpande, A. Segall, "AHG9: On picture header", JVET-Q0259, 17th Meeting: Brussels, January 2020.](#)
23. [J. Samuelsson, S. Deshpande, A. Segall, "AHG9: Intended display resolution", JVET-Q0260, 17th Meeting: Brussels, January 2020.](#)
24. [J. Samuelsson, S. Deshpande, A. Segall, "AHG9: On reference picture resampling enabled flag", JVET-Q0262, 17th Meeting: Brussels, January 2020.](#)
25. [C. Auyeung, X. Li, X. Zhao, S. Liu, "Modifications to VVC Draft 7 to support monochrome and independently coded color planes", JVET-Q0265, 17th Meeting: Brussels, January 2020.](#)
26. [B. Heng, M. Zhou, W. Wan, "AHG16: On Propagation of Chroma CU QP Offsets", JVET-Q0267, 17th Meeting: Brussels, January 2020.](#)
27. [M. Pettersson, R. Sjöberg, M. Damghanian, "AHG9: On Picture Header Modifications", JVET-Q0270, 17th Meeting: Brussels, January 2020.](#)
28. [M. Damghanian, R. Sjöberg, M. Pettersson, "AHG9: On Subpicture Ordering", JVET-Q0271, 17th Meeting: Brussels, January 2020.](#)

- i9. [M. Pettersson, R. Sjöberg, M. Damghanian, "AHG9: Editorial changes related to picture header", JVET-Q0273, 17th Meeting: Brussels, January 2020.](#)
- i10. [A. Filippov, V. Rufitskiy, E. Alshina, "Suggested bugfixes for CCLM filtering in the VVC specification draft", JVET-Q0275, 17th Meeting: Brussels, January 2020.](#)
- i11. [B. Choi, S. Wenger, S. Liu, "AHG8/AHG9: Layer dependency constraints for parameter set reference", JVET-Q0277, 17th Meeting: Brussels, January 2020.](#)
- i12. [B. Choi, S. Wenger, S. Liu, Y.-K. Wang, "AHG8/AHG9: On video parameter set ID", JVET-Q0280, 17th Meeting: Brussels, January 2020.](#)
- i13. [L. Chen, C.-W. Hsu, C.-C. Chen, Y.-W. Huang, S.-M. Lei, "AHG9/AHG12: Comments on miscellaneous HLS text", JVET-Q0289, 17th Meeting: Brussels, January 2020.](#)
- i14. [M. G. Sarwer, Y. Ye, J. Luo, R. -L. Liao, "CE2-related: On maximum palette size of VVC", JVET-Q0291, 17th Meeting: Brussels, January 2020.](#)
- i15. [J. Heo, H. Jang, J. Choi, J. Lim, S. Kim, "Removal of chroma Nx2 blocks in PDPC", JVET-Q0293, 17th Meeting: Brussels, January 2020.](#)
- i16. [H. Huang, W.-J. Chien, T. Hsieh, V. Seregin, C.-C. Chen, K. Reuze, M. Karczewicz, Y.-L. Hsiao, C.-C. Chen, C.-W. Hsu, T.-D. Chuang, C.-Y. Chen, Y.-W. Huang, S.-M. Lei, "AHG16: Merge estimation region with constraint in HMVP update", JVET-Q0297, 17th Meeting: Brussels, January 2020.](#)
- i17. [K. Zhang, L. Zhang, Y.-K. Wang, H. Liu, J. Xu, Z. Deng, H. Jang, J. Nam, "AHG9: A cleanup on deblocking filtering between subpictures", JVET-Q0317, 17th Meeting: Brussels, January 2020.](#)
- i18. [R.-L. Liao, J. Chen, Y. Ye, J. Luo, S.-T. Hsiang, C.-Y. Lai, C.-Y. Chen, Y.-W. Huang, S.-M. Lei, "On block partitioning at picture boundary", JVET-Q0330, 17th Meeting: Brussels, January 2020.](#)
- i19. [J. Samuelsson, S. Deshpande, A. Segall, "AHG9: On slice header", JVET-Q0346, 17th Meeting: Brussels, January 2020.](#)
- '0. [X. Ma, H. Yang, "AHG9: Constraints on ALF APS", JVET-Q0358, 17th Meeting: Brussels, January 2020.](#)
- '1. [X. Ma, H. Yang, "AHG12: Constraints on tile signaling", JVET-Q0359, 17th Meeting: Brussels, January 2020.](#)
- '2. [H. Chen, H. Yang, "On context model for mvp flag and ref_idx", JVET-Q0368, 17th Meeting: Brussels, January 2020.](#)
- '3. [D.-Y. Kim, S.-C. Lim, J. Lee, J. Kang, "Unification of intra reference sample generation", JVET-Q0371, 17th Meeting: Brussels, January 2020.](#)
- '4. [G. Laroche, N. Ouedraogo, P. Onno, "AhG9: On the position of APS IDs in Picture Header", JVET-Q0379, 17th Meeting: Brussels, January 2020.](#)
- '5. [Y. Sanchez, R. Skupin, K. Suehring, T. Schierl, "AHG9: On OLS extraction and scalable nesting SEI message", JVET-Q0394, 17th Meeting: Brussels, January 2020.](#)
- '6. [R. Skupin, Y. Sanchez, K. Suehring, T. Schierl, "AHG12: On subpicture level information SEI message", JVET-Q0395, 17th Meeting: Brussels, January 2020.](#)
- '7. [R. Skupin, Y. Sanchez, K. Suehring, T. Schierl, "AHG12: On subpicture extraction", JVET-Q0397, 17th Meeting: Brussels, January 2020.](#)
- '8. [Y. Sanchez, R. Skupin, K. Suehring, T. Schierl, "AHG9: Sub-layer wise dependency in multi-layer", JVET-Q0398, 17th Meeting: Brussels, January 2020.](#)

9. [Y. Sanchez, R. Skupin, K. Suehring, T. Schierl, "AHG8: On conformance window and scaling window", JVET-Q0399, 17th Meeting: Brussels, January 2020.](#)
10. [K. Suehring, R. Skupin, Y. Sanchez, T. Schierl, "AHG9: On extra picture header bits in VVC", JVET-Q0400, 17th Meeting: Brussels, January 2020.](#)
11. [R. Skupin, Y. Sanchez, K. Suehring, T. Schierl, "AHG12: On subpicture and scalability", JVET-Q0402, 17th Meeting: Brussels, January 2020.](#)
12. [R. Skupin, Y. Sanchez, K. Suehring, T. Schierl, "AHG12: On CBR subpicture extraction", JVET-Q0404, 17th Meeting: Brussels, January 2020.](#)
13. [R. Skupin, Y. Sanchez, K. Suehring, T. Schierl, "AHG12: On CABAC zero words for subpictures", JVET-Q0406, 17th Meeting: Brussels, January 2020.](#)
14. [B. Ray, G. Van der Auwera, M. Karczewicz, "On the combination of JCCR and TS", JVET-Q0408, 17th Meeting: Brussels, January 2020.](#)
15. [J. Chen, R.-L Liao, Y. Ye, J. Luo, "AHG9: A fix for GDR signaling", JVET-Q0414, 17th Meeting: Brussels, January 2020.](#)
16. [J. Chen, Y. Ye, R.-L Liao, J. Luo, "AHG8/AHG9: On horizontal wrap-around motion compensation", JVET-Q0416, 17th Meeting: Brussels, January 2020.](#)
17. [J. Chen, Y. Ye, R.-L. Liao, J. Luo, "AHG8/AHG9: On SPS level virtual boundary", JVET-Q0417, 17th Meeting: Brussels, January 2020.](#)
18. [L. Li, X. Li, C. Auyeung, B. Choi, S. Wenger, S. Liu, "AHG12: Signaling of chroma presence in PPS and APS", JVET-Q0420, 17th Meeting: Brussels, January 2020.](#)
19. [W. Lim, G. Bang, "CE8-related: Modification of palette coding syntax structure", JVET-Q0435, 17th Meeting: Brussels, January 2020.](#)
20. [A. Browne, K. Sharman, S. Keating, "SAO Modification for 12-bit", JVET-Q0441, 17th Meeting: Brussels, January 2020.](#)
21. [K. Sharman, S. Keating, A. Browne, "Independent Subpictures", JVET-Q0443, 17th Meeting: Brussels, January 2020.](#)
22. [K. Naser, M. Kerdranvat, T. Poirier, A. Robert, F. Galpin, F. Le Leannec, "Non-CE: Clean-up of High-Level Syntax Related to AMVR", JVET-Q0444, 17th Meeting: Brussels, January 2020.](#)
23. [J. Pfaff, B. Stallenberger, M. Schäfer, P. Merkle, P. Helle, T. Hinz, H. Schwarz, D. Marpe, T. Wiegand, K. Kondo, M. Ikeda, J. Huo, H. Wang, Y. Ma, F. Yang, S. Wan, Y. Yu, "MIP with constant shifts and offsets", JVET-Q0446, 17th Meeting: Brussels, January 2020.](#)
24. [B. Bross, M. Winken, Y. Sanchez, R. Skupin, H. Schwarz, D. Marpe, T. Wiegand, "On smoothing filter with RPR in VVC", JVET-Q0449, 17th Meeting: Brussels, January 2020.](#)
25. [G. Li, X. Li, X. Xu, S. Liu, "Constraint on minimum CU size", JVET-Q0468, 17th Meeting: Brussels, January 2020.](#)
26. [G. Li, X. Li, X. Xu, S. Liu, "On chroma QT split", JVET-Q0471, 17th Meeting: Brussels, January 2020.](#)
27. [W. Wan, T. Hellman, B. Heng, "AHG9: A More Robust Syntax for Raster Rectangular Slices", JVET-Q0480, 17th Meeting: Brussels, January 2020.](#)
28. [W. Wan, B. Heng, "AHG9: Ordering of partition constraints syntax elements in the sequence parameter set and picture header", JVET-Q0481, 17th Meeting: Brussels, January 2020.](#)

9. [W. Wan, P. Chen, B. Heng, T. Hellman, M. Zhou, "AHG9: Signalling of constant parameter values", JVET-Q0482, 17th Meeting: Brussels, January 2020.](#)
10. [F. Bossen, A. Segall, "On avoiding out of range motion vectors", JVET-Q0483, 17th Meeting: Brussels, January 2020.](#)
11. [W. Wan, T. Hellman, B. Heng, P. Chen, "AHG8: RPR Scaling Window Issues", JVET-Q0487, 17th Meeting: Brussels, January 2020.](#)
12. [W. Wan, B. Heng, "AHG9: Bounding redundant SEI messages", JVET-Q0488, 17th Meeting: Brussels, January 2020.](#)
13. [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang, "CE2-related: Palette escape binarization", JVET-Q0491, 17th Meeting: Brussels, January 2020.](#)
14. [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang, "Non-CE2: Palette encoder improvements for lossless coding", JVET-Q0493, 17th Meeting: Brussels, January 2020.](#)
15. [Y.-W. Chen, X. Xiu, T.-C. Ma, H.-J. Jhu, X. Wang, "AHG16: Simplified clip ranges for NL-ALF", JVET-Q0495, 17th Meeting: Brussels, January 2020.](#)
16. [Y.-W. Chen, X. Xiu, T.-C. Ma, H.-J. Jhu, X. Wang, "AHG16: On derivation of CCLM predictors", JVET-Q0500, 17th Meeting: Brussels, January 2020.](#)
17. [Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz, "Non-CE2: On palette predictor initialization in WPP", JVET-Q0501, 17th Meeting: Brussels, January 2020.](#)
18. [Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz, R.-L. Liao, M. Sarwer, J. Chen, Y. Ye, J. Luo, "CE2-related: Encoder improvement for palette mode", JVET-Q0503, 17th Meeting: Brussels, January 2020.](#)
19. [R.-L. Liao, M. Sarwer, J. Chen, Y. Ye, J. Luo, Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz, "CE2-related: Palette mode for non 4:4:4 color format", JVET-Q0504, 17th Meeting: Brussels, January 2020.](#)
20. [H. Zhang, X. Li, G. Li, L. Li, S. Liu, "AHG15: Improvement for Quantization Matrix Signaling", JVET-Q0505, 17th Meeting: Brussels, January 2020.](#)
21. [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang, "Enabling transform skip and BDPCM for chroma in ACT", JVET-Q0512, 17th Meeting: Brussels, January 2020.](#)
22. [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang, "Encoder improvements on JCCR with chroma transform skip", JVET-Q0514, 17th Meeting: Brussels, January 2020.](#)
23. [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang, "MTS signaling based on last significant coefficient position", JVET-Q0516, 17th Meeting: Brussels, January 2020.](#)
24. [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang, "On RPR down-sampling filters for affine mode", JVET-Q0517, 17th Meeting: Brussels, January 2020.](#)
25. [H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang, "CE2-related: Palette mode excluding small blocks", JVET-Q0629, 17th Meeting: Brussels, January 2020.](#)
26. [K. Suehring, R. Skupin, Y. Sanchez, T. Schierl, "AHG9: Parsing dependency for subpicture level information SEI \(Ticket 775\)", JVET-Q0630, 17th Meeting: Brussels, January 2020.](#)
27. [X. Xiu, Y.-W. Chen, T.-C. Ma, H.-J. Jhu, X. Wang, B. Ray, G. Van der Auwera, M. Karczewicz, T. Tsukuba, M. Ikeda, Y. Yagasaki, T. Suzuki, "Combined encoder improvements of JVET-Q0101/JVET-](#)

- [Q0408/JVET-Q0514 on JCCR with chroma transform skip](#)", [JVET-Q0695](#), [17th Meeting: Brussels, January 2020](#).
8. [Y.-H. Chao, C.-H. Hung, W.-J. Chien, V. Seregin, M. Karczewicz, H.-J. Jhu, X. Xiu, Y.-W. Chen, T.-C. Ma, X. Wang, R.-L. Liao, M. Sarwer, J. Chen, Y. Ye, J. Luo, "Non-CE2: Extention of error limit table in JVET-Q0503 to high QP", JVET-Q0712, 17th Meeting: Brussels, January 2020.](#)
 9. [J. Samuelsson, S. Deshpande, M. M. Hannuksela, Hendry, S. Paluri, B. Choi, S. Wenger, R. Skupin, Y. Sanchez, K. Sührling, T. Schierl, "AHG9: On mixed NAL unit types", JVET-Q0751, 17th Meeting: Brussels, January 2020.](#)
 10. [B. Choi, S. Wenger, S. Liu, B. Heng, P. Chen, T. Hellman, W. Wan, M. Zhou, M. M. Hannuksela, Y.-J. Chang, V. Seregin, M. Coban, M. Karczewicz, "AHG9: Text for combination of wrap around offset and RPR", JVET-Q0764, 17th Meeting: Brussels, January 2020.](#)
 11. [J. Samuelsson, S. Deshpande, R. Sjöberg, M. Pettersson, M. Damghanian, D. Saffar, L. Li, B. Choi, X. Xu, X. Li, S. Wenger, S. Liu, "AHG9: Picture Header in Slice Header", JVET-Q0775, 17th Meeting: Brussels, January 2020.](#)
 12. [X. Xu, B. Choi, L. Li, X. Li, S. Wenger, S. Liu, S. Paluri, Hendry, J. Zhao, S. Kim, Z. Deng, L. Zhang, Y.-K. Wang, M. Coban, V. Seregin, Y.-J. Chang, M. Karczewicz, S.-T. Hsiang, Y.-W. Huang, S.-M. Lei, J. Samuelsson, S. Deshpande, A. Segall, "AHG 9: On conditioning the presence of inter-/intra- related syntax elements in PH", JVET-Q0781, 17th Meeting: Brussels, January 2020.](#)
 13. [H.E. Egilmez, A. Nalci, A.K. Ramasubramonian, M. Coban, V. Seregin, M. Karczewicz, T. Hashimoto, T. Chujoh, E. Sasaki, T. Ikai, "Combination of JVET-Q0106, JVET-0686 and JVET-Q0133 for LFNST Signaling, Latency Reduction and Scaling Process", JVET-Q0784, 17th Meeting: Brussels, January 2020.](#)
 14. [S. Deshpande, Y.-K. Wang, V. Drugeon, "AHG9: On PTL and HRD Parameters Signalling in VPS", JVET-Q0786, 17th Meeting: Brussels, January 2020.](#)
 15. [K. Suehring, J. Li, Y.-K. Wang, "AHG9: Subpicture location signalling bugfix", JVET-Q0787, 17th Meeting: Brussels, January 2020.](#)
 16. [K. Misra, F. Bossen, P. Cowan, A. Segall, N. Hu, J. Dong, V. Seregin, M. Karczewicz, P. Onno, C. Gisquet, G. Laroche, J. Li, C.S. Lim, C.-W. Kuo, J. Nam, J. Choi, J. Lim, S. Kim, O. Chubach, C.-Y. Lai, C.-Y. Chen, T.-D. Chuang, Y.-W. Huang, S.-M. Lei, Z. Zhang, J. Ström, K. Andersson, A. M. Kotra, S. Esenlik, B. Wang, H. Gao, E. Alshina, Y. Wang, L. Zhang, K. Zhang, W. Zhu, F. Chen, L. Xu, L. Wang, X.W. Meng, X. Zheng, S.S. Wang, S.W. Ma, G. Li, X. Li, X. Xu, S. Liu, J. Yao, L.-H. Xu, J.-Q. Zhu, K. Kazui, "CC-ALF: Integrated Text for the Cross Component Adaptive Loop Filter", JVET-Q0795, 17th Meeting: Brussels, January 2020.](#)
 17. [L. Li, X. Li, S. Liu, Y.-J. Chang, W.-J. Chien, V. Seregin, M. Coban, M. Karczewicz, S. Esenlik, H. Gao, A. M. Kotra, B. Wang, H. Chen, H. Yang, A. Filippov, E. Alshina, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, "SPS level control over the number of merge candidates", JVET-Q0798, 17th Meeting: Brussels, January 2020.](#)
 18. [H. Gao, S. Esenlik, E. Alshina, A. M. Kotra, B. Wang, R.-L. Liao, J. Chen, Y. Ye, J. Luo, K. Reuzé, C.-C. Chen, H. Huang, W.-J. Chien, V. Seregin, Z. Deng, L. Zhang, H. Liu, K. Zhang, Y. Wang, J. Li, C. S. Lim, Y.-L. Hsiao, C.-C. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, L.-F. Chen, X. Li, G. Li, S. Liu, L. P. Van, G. Van der Auwera, A. K. Ramasubramonian, H. Huang, W.-J. Chien, M. Karczewicz, M. Bläser, J. Sauer, H. Chen, H. Yang, "Integrated Text for GEO", JVET-Q0806, 17th Meeting: Brussels, January 2020.](#)

9. [V. Seregin, A. K. Ramasubramonian, M. Coban, M. Karczewicz, Hendry, Y.-K. Wang, "AHG8/AHG9: DPB structure and picture output", JVET-Q0814, 17th Meeting: Brussels, January 2020.](#)
10. [Hendry, S. Paluri, L. Chen, C.-W. Hsu, Y.-W. Huang, S.-M. Lei, J. Chen, R.-L. Liao, Y. Ye, J. Luo, "AHG12: On subpicture signalling when there is only one subpicture", JVET-Q0816, 17th Meeting: Brussels, January 2020.](#)
11. [Hendry, S. Paluri, L. Chen, C.-C. Chen, C.-W. Hsu, Y.-L. Hsiao, Y.-W. Huang, S.-M. Lei, "AHG12: On single slice per subpic flag constraint", JVET-Q0817, 17th Meeting: Brussels, January 2020.](#)
12. [V. Drugeon, Y.-K. Wang, "Moving the frame-field information SEI message to the SEI specification", JVET-Q0818, 17th Meeting: Brussels, January 2020.](#)
13. [Y.-K. Wang, "AHG2: Editorial input of integrated text of PH changes", JVET-Q0819, 17th Meeting: Brussels, January 2020.](#)
14. [P. de Lagrange, W. Zhu, R. Sjöberg, K. Unno, X. Xiu, J. Zhao, H. Huang, T. Tsukuba, K. Kondo, J. Jung, "ACT: common text for bug fixes and transform change", JVET-Q0820, 17th Meeting: Brussels, January 2020.](#)
15. [B. Bross, J. Chen, S. Liu, Y.-K. Wang, "Versatile Video Coding \(Draft 8\)", JVET-Q2001, 17th Meeting: Brussels, January 2020.](#)
16. [J. Chen, Y. Ye, S. Kim, "Algorithm description for Versatile Video Coding and Test Model 8 \(VTM 8\)", JVET-Q2002, 17th Meeting: Brussels, January 2020.](#)
17. [J.-R. Ohm, B. Bross, A. Segall, Y. Ye, "Agenda and report of the category 2 AHG pre-meeting of the 18th JVET meeting", JVET-R0340, 18th Meeting: Teleconference, April 2020.](#)