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Abstract

This BoG met on 22 Mar 2019 from 18:20 to 21:10 and 23 Mar 2019 from 09:00 to 19:05 to review the CE6-related and Non-CE6 contributions of the 14th JVET meeting. In total, 26 contributions have been reviewed, which are categorized as follows:

Implicit MTS and Transform Derivation for ISP and SBT (9 proposals)

MTS Designs – Modification of Signalling and Transform Kernels (9 proposals)

Secondary Transform (4 proposals)

Other Proposals (4 proposals)

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Joint Video Experts Team (JVET)
of ITU-T SG21 WP3/21 and ISO/IEC JTC 1/SC 29
14th Meeting: Geneva, March 2019

Document: JVET-N0855

Title:	Meeting Report of the 41st Meeting of the Joint Video Experts Team
Status:	Report document from the chair of JVET
Purpose:	Report

1 Summary



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MEETING NOTES

[JVET-N0855](#) BoG report on CE6-related and Non-CE6 contributions [H. E. Egilmez]

This BoG report was presented in Track A, Mon 03-25 11:00, chaired by JRO)

This BoG met on 22 Mar 2019 from 18:20 to 21:10 and 23 Mar 2019 from 09:00 to 19:05 to review the CE6-related and Non-CE6 contributions of the 14th JVET meeting. In total, 26 contributions have been reviewed, which are categorized as follows:

1. Implicit MTS and Transform Derivation for ISP and SBT (9 proposals)
2. MTS Designs – Modification of Signalling and Transform Kernels (9 proposals)
3. Secondary Transform (4 proposals)
4. Other Proposals (4 proposals)

Based on the review of CE6-related and non-CE6 proposals and discussions, the BoG recommended:

- To adopt
 - One of the five candidates proposing simplifications and/or unifications for implicit MTS and transform derivation for ISP (in Section 1.1), and
 - JVET-N0105 proposing to remove intra mode dependency in context selection of secondary transform modes.

From Track A review, Mon 03-25 morning:

For the first bullet point, see notes of discussion further below.

From the results available in JVET-N0105r2, the loss compared to CE6-3.1d is almost negligible. Decision: Adopt JVET-N0105 on top of CE6-3.1d.

It is noted that this does not remove the mode dependency of NSST entirely, but is a step in the right direction.

- To have CE tests based on:
 - JVET-N0424 and JVET-N0491 proposing new MTS designs and fast encoder methods. It has been shown that encoder time can be reduced about 10% with a coding gain loss less than 0.1%, and
 - JVET-N0555 proposing to normatively set all primary coefficients to zeros when a secondary transform is used.

It was agreed in Track A to investigate these in CE.

Further discussions suggested by the BoG:

- ◦ JVET-N0388 proposing to replace implicit MTS by creating a new mode in MTS that uses the same transform derivation in the current MTS,

- JVET-N0121 proposing an editorial change (as one of the aspects), such that DST-VII and DCT-VIII are not both expressed as matrices, but one of them is just described as flipped version of the other, plus sign changes.
- JVET-N0364 proposing to reduce the worst-case in terms of number of multiplies per coefficient,
- JVET-N0363 proposing to change the metric used to estimate RD in intra mode selection, and
- JVET-N0808 proposing to add a high-level syntax for setting maximum transform size.

From Track A discussion:

- About JVET-N0388: See notes further below.
- About JVET-N0121: Up to the discretion of the editor if the suggested editorial change is useful.
- About JVET-N0364: From implementation perspective, there is no problem that this further zeroing-out is necessary. More cases of zeroing are undesirable if not urgently necessary. Furthermore, it is mentioned that 16x16 DST-VII would be an equivalent worst case not resolved here.
- About JVET-N0363: Decision (SW/CTC): Adopt. It is agreed that this is useful to give identical chances to transform skip in early decision stage. It is asked if SAD and SATD are properly scaled, but this seems to be the case as there is a scaling factor depending on block sizes in SATD.
- About JVET-N0808: In the accompanying powerpoint deck, results are provided, where the suggested method is compared against a configuration (a), where split to a maximum size is enforced by CU splits. This has large loss. This loss is becoming lower, when the method (b) performs implicit split into smaller transform blocks is performed for large CU sizes. However, with (a) the encoder runtime is much lower (18% for a versus 98% for b). From this, it cannot be concluded that the suggested method has benefit. The benefit for hardware encoders is also not fully clear. Further study (not CE) suggested to give more evidence about benefit, e.g. comparing encoders of similar complexity with and without the syntax change.

BoG recommended to adopt one of the following five candidates:

Proposal(s)	Coding gains (AI / RA / LDB)	Comments
(1) Change Implicit MTS to unify with current transform derivation in ISP JVET-N0089 , JVET-N0161 , JVET-N0338	Implicit MTS: -0.24% / -0.04% / -0.03% CTC: 0.00% (No impact)	- replaces the shape-dependent derivation in implicit MTS with the mode-dependent one in ISP - more complex than current design - keeps the current ISP design
(2) Simplify both Implicit MTS and transform derivation in ISP	Implicit MTS:	- removes the shape dependency in implicit MTS by using DST-7 whenever size is ≤ 16

JVET-N0172 , JVET-N0375 , JVET-N0419 , JVET-N0420	-0.11% / -0.02% / 0.02% CTC: -0.01% / 0.00% / 0.01%	- removes the mode-dependency in ISP by using DST-7 whenever size is ≤ 16 and ≥ 4 - simple HEVC-like design
(3) Same as above (2) except 2-pt DST-7 is added for ISP in JVET-N0420 JVET-N0419 , JVET-N0420	Implicit MTS: -0.11% / -0.02% / 0.02% CTC: -0.04% / -0.02% / -0.02%	- removes the shape-dependency by using DST-7 whenever size is ≤ 16 - removes the mode-dependency in ISP by using DST-7 whenever size is ≤ 16 - simple HEVC-like design - design consistency: allows ISP to use DST-7 in $N \times 2$ and $2 \times N$ - 4 bytes of additional memory - does not change the overall worst-case

The following proposal only provided test results on VTM 4.0.1

Proposal(s)	Coding gains (AI / RA / LDB)	Comments
(4) JVET-N0375	CTC: -0.01% / 0.00% / 0.01%	- keeps the current implicit MTS - removes mode-dependency in by using DST-7 whenever size is ≤ 16 (same as (2) in the above table)
(5) JVET-N0375	CTC: -0.01% / -0.01% / -0.04%	- keeps the current implicit MTS - removes mode-dependency in by using DST-7 whenever size is ≤ 8

From Track A discussion:

Implicit MTS as such has an average loss of around 0.6%-0.7% compared to explicit MTS. It however still gains compared to not using MTS at all, and does not require extensive encoder checks.

1 and 2 unify ISP and implicit MTS. However, 1 introduces an intra mode dependency of the transform which may be undesirable if the inverse transform and the prediction are performed in different pipelines. 3

also unifies, but introduces a length-2 DST-7, which would require some additional specification, and the additional gain in CTC is marginal.

4 and 5 keep the current MTS (which is also not mode dependent), and simplify ISP giving up the mode dependency, but not fully harmonizing with implicit MTS.

From the results above, 2 is asserted to be the best approach, as it provides a small compression benefit over the current implicit MTS, and gives up the mode dependency in ISP, and unifies all cases between ISP and implicit MTS transform selection where the block sizes are identical. As for block size 2 only 1 transform exists, it is obvious that there cannot be an implicit choice along that direction.

It is noted that it would be desirable to also remove the mode dependency of secondary transform.

It was decided to adopt approach (2) (the proponents of the 4 documents were requested to provide a joint document with the specification text) – see further notes under JVET-N0866.

In this context, the proposal JVET-N0388 (recommended for further discussion in Track A) was also discussed. It introduces implicit MTS (in the VTM4 style) as a replacement mode in explicit MTS. Furthermore, it is unifying ISP with the VTM4 MTS, giving up the undesirable intra mode dependency of ISP transform. As this comes with no loss, and the modification of ISP likely introduces some loss, it could be anticipated that the introduction of the implicit MTS as a mode in explicit MTS gives some additional coding gain. As a total package, it does not have advantage over the adopted approach. Proponents are suggested to investigate if it might also give gain together with the new version of MTS/ISP.

[JVET-N0855](#) BoG report on CE6-related and Non-CE6 contributions [H. E. Egilmez]

See the notes in section 6.6.

CITATION

H.E. Egilmez, "BoG report on CE6-related and Non-CE6 contributions", JVET-N0855, 14th Meeting: Geneva, March 2019.

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