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| *Title:* | **AHG6: Cross-check for non-normative ALF improvements (JCTVC-J0048)** | | |
| *Status:* | Input Document to JCT-VC | | |
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| *Author(s) or Contact(s):* | Semih Esenlik Matthias Narroschke | Tel: Email: | +49 6103 766 - 1306 semih.esenlik@eu.panasonic.com |
| *Source:* | Panasonic Corp. | | |

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# Abstract

This contribution presents results of cross-verification of JCTVC-J0048, “AHG6: ALF with non-normative encoder-only improvements”. The contribution improves the coding performance of the ALF in the HEVC design with small complexity penalty, using only non-normative changes in the encoder. The bitrate and PSNR measurements that are provided by the proponents have been verified. Additional simulation results for KTA sequences are going to be provided in a later revision.

# Simulation Results

ALF coding tool in HM7.0 utilize two different encoder algorithms, namely low-latency and high-latency. The proponents provided improvements for both of the encoder algorithms. Moreover the proponents requested simulation results for KTA sequences as well in addition to the Common Test Condition (CTC) sequences. Therefore the following simulation results are collected:

1. Improved ALF vs. ALF off, High-latency encoding, CTC sequences.
2. Improved ALF vs. ALF off, Low-latency encoding, CTC sequences.
3. Improved ALF vs. ALF off, High-latency encoding, KTA sequences.
4. Improved ALF vs. ALF off, Low-latency encoding, KTA sequences.

HM7.0 was used as anchor in all of the simulations and ALF was switched off both in the main and high efficiency test configurations. In the tested software the ALF was switched on both in the main and high efficiency configurations. Therefore the obtained simulation results show the coding gain that is provided by the improved ALF implementation. The following tables present the simulation results:



Table : Simulation results for improved ALF vs. ALF off, High-latency encoding, CTC sequences



Table 2: Simulation results for improved ALF vs. ALF off, Low-latency encoding, CTC sequences

The decoding times and the simulation results for the KTA sequences are going to be provided in the next revision of the document.

# Source Code Inspection

ALF coding tool in HM7.0 utilize two different encoder algorithms, namely low-latency and high-latency. The proponents provided improvements for both of the encoder algorithms. The key modification that applies to both encoder algorithms is the reuse of Adaptation Parameter Sets (APS) that are transmitted before. According to the modification, in order to reduce the overhead of transmitting the adaptive filter coefficients of the ALF with every picture frame, previously sent filter coefficients are reused in certain frames. The decision of reuse is taken according to an rate-distortion measure.

A second key modification that applies only to the high-latency encoding algorithm is the increase of encoding passes from one to three in order to improve the performance of the filter parameter estimation.

The source code that is provided by the proponents is inspected with respect to the description in the contribution document [2]. The source code was found to follow the description.

# Conclusions

This contribution presents results of the cross-verification of JCTVC-J0048, “AHG6: ALF with non-normative encoder-only improvements”. It has been verified that the proposal improves the coding gain of the ALF with non-normative encoder optimization techniques. The PSNR and bitrate measurements that are provided by the proponents are verified. Moreover the software inspection revealed that the implemented modifications follow the description in the contribution document. Additional simulation results for KTA sequences are going to be provided in a later revision.

# References

1. HM7.0 Software available under the website: <http://hevc.kw.bbc.co.uk/trac/browser/tags/HM-7.0>
2. C.-Y. Chen et al, “AHG6: ALF with non-normative encoder-only improvements”, JCT-VC Document, JCTVC-J0048, 10th Meeting: Stockholm, Sweden, July, 2012.