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| *Title:* | **TE12.2 report on asymmetric motion prediction unit (AMP) on/off by NHK** |
| *Status:* | Input Document to JCT-VC |
| *Purpose:* | Information |

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| *Source:* | NHK(Japan Broadcasting Corporation) |

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# Abstract

The purpose of this document is to report the performance evaluation test results on asymmetric motion prediction on/off according to the conditions specified in JCTVC-B312 [1]. The evaluation test results have been cross-tested by Technicolor/INRIA and Huawei/HiSilicon and confirmed successfully.

# 1  Test Condition

Simulation results has been generated by exercising turning off AMP tool in the four inter-coding configurations specified for TMuC 0.7 in JCTVC-B300[2]. We have used TMuC version 0.7 compiled by Visual Studio 2008, and simulation has been done by using Windows XP pro 64bit workstations with Xeon processor 3.33GHz clock. We have used the same workstations for all test sequences.

# 2  Results

We evaluated PSNR as well as encoding/decoding time for each sequences, and the summary of the results are shown below. More detailed results are also shown in the attached excel file. The tested is the TMuC version 0.7 with AMP disabled by setting "AMP: 0" in configuration files. Other conditions are same as JCTVC-B300.

| | Random access | | | Random access LoCo | | |
|---|---|---|---|---|---|---|
| | Y BD-rate | U BD-rate | V BD-rate | Y BD-rate | U BD-rate | V BD-rate |
| Class A | 1.5 | 1.7 | 1.5 | 2.2 | 2.2 | 2.2 |
| Class B | 1.0 | 1.2 | 1.2 | 1.6 | 1.4 | 1.3 |
| Class C | 1.4 | 1.3 | 1.6 | 1.9 | 2.1 | 2.1 |
| Class D | 1.3 | 1.3 | 1.5 | 1.7 | 1.7 | 1.8 |
| Class E | | | | | | |
| All | 1.3 | 1.3 | 1.4 | 1.8 | 1.8 | 1.8 |
| Enc Time[%] | 65% | | | 66% | | |
| Dec Time[%] | 100% | | | 100% | | |

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| | Low delay | | | Low delay LoCo | | |
|---|---|---|---|---|---|---|
| | Y BD-rate | U BD-rate | V BD-rate | Y BD-rate | U BD-rate | V BD-rate |
| Class A | | | | | | |
| Class B | 1.2 | 1.7 | 2.0 | 1.8 | 1.4 | 1.3 |
| Class C | 1.3 | 1.6 | 1.6 | 1.7 | 1.5 | 1.7 |
| Class D | 1.4 | 1.8 | 1.7 | 1.6 | 1.4 | 1.3 |
| Class E | 2.8 | 3.7 | 2.7 | 3.8 | 3.6 | 3.0 |
| All | 1.6 | 2.1 | 2.0 | 2.1 | 1.8 | 1.7 |
| Enc Time[%] | 66% | | | 66% | | |
| Dec Time[%] | 100% | | | 100% | | |

According to the tables, we can see that the coding efficiency is decreased on the all cases when AMP is off. The minimal loss of BD-rate is 1.0% on average for Random-access High Efficiency conditions of Class B, and the maximum loss is 3.8% on average for Low-delay Low Complexity conditions of Class E. The performance tends to be more decreased on Low complexity conditions. As AMP increases the pattern of motion partitioning, it affects the number of motion estimation. Therefore the encoding time was significantly decreased when AMP was off. The encoding time is constantly decreased to 66%. On the other hand, the decoding time is not affected by AMP.

# 3  Conclusion

According to the results, when AMP is off, the coding gain decreased within 4%. However the encoding complexity affects the encoding time significantly. The decreased encoding time is over 30%. AMP should be considered about the trade-off of each condition carefully for adopting to the new standard.

The cross-test results are reported in JCTVC-C030 [3].

# 4  References

[1]    Ken McCann, "Tool Experiment 12: Evaluation of TMuC Tools," Doc. JCTVC-B312, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T VCEG and ISO/IEC MPEG, Geneva, CH, July 2010

[2]    Frank Bossen, "Common test conditions and software reference configurations," Doc. JCTVC-B300, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T VCEG and ISO/IEC MPEG, Geneva, CH, July 2010

[3]    Edouard Francois, Laurent Guillo, Atsuro Ichigaya, Haoping Yu, "TE12 : report on AMP evaluation," Doc. JCTVC-C030 Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T VCEG and ISO/IEC MPEG, Guangzhou, CN, Oct 2010