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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  7th Meeting: Geneva, CH, 21-30 November, 2011 | Document: JCTVC-G834 |

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| *Title:* | **Cross-check result of Samsung’s proposal JCTVC-G533 by LG Electronics** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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| *Source:* | LG Electronics | | |

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# Abstract

This document is a cross-check report of JCTVC-G533, which contains two proposed items, they are: coding performance verification for IDR re-ordering for random access and correctness verification for implementation of new flag so called “random\_access\_flag” in NAL unit header. The cross-check result for the first item confirms the BD-rates and encoding / decoding time reported by the proponent. It is also reported that both implementation for the first and second items have been analyzed and found to match the proposed intention in the proposal.

# Verification

The proponent provided their software and results. The code was successfully compiled and run on the following platform: Intel [Xeon5570@2.93GHz](mailto:Xeon5570@2.93GHz) 64 bits Linux machines. The generated bit-streams have decoded on the PCs with the following configurations: Microsoft® Windows® XP 64bits, Intel® Xeon® CPU E5355 @2.66GHz, 16GB of RAM.

This cross check covers two items:

1. IDR re-ordering for random access
2. Random access test using random\_access\_flag

For both items, common test conditions and reference configuration are used with some slight modifications. The modifications are:

* For item 1, in both RAHE and RALC, instead of using DecodingRefreshType 1, DecodingRefreshType 2 (Using IDR) is used.
* For item 2, three new options are added in configuration file for encoder. They are:
  + EncoderSkip                   : 1  # Use Encoder Skip
  + SkipStartCDR                  : 1  # Start skipping Number of CDR
  + SkipEndCDR                    : 3  # End skipping Number of CDR

# Test Results

## For item 1 -- IDR Re-ordering for random access

The simulation results are shown Table below. All of the results exactly match those provided by proponents.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Random Access HE** | | | **Random Access LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.3% | 0.6% | 0.2% | -0.3% | 0.4% | -0.1% |
| Class B | 0.7% | 1.3% | 1.2% | 0.6% | 1.1% | 0.7% |
| Class C | 0.4% | 1.1% | 0.9% | 0.4% | 0.8% | 0.6% |
| Class D | 0.7% | 1.4% | 1.2% | 0.7% | 1.1% | 1.0% |
| Class E |  |  |  |  |  |  |
| **Overall** | 0.4% | 1.1% | 0.9% | 0.4% | 0.9% | 0.5% |
|  | 0.4% | 1.1% | 0.9% | 0.4% | 0.8% | 0.5% |
| Enc Time[%] | 98% | | | 98% | | |
| Dec Time[%] | 103% | | | 100% | | |

## For item 2 -- Code verification Random access test using random\_access\_flag

The source code for verification is provided by Samsung. We have check and analyzed the provided code. The results of the code verification are summarized in points below:

1. We can confirm that the implementation provided by Samsung is correct, works properly, and as it is intended as described in JCTVC-G533.
2. For encoder part, to simulate random access, the encoder does not output some NAL units that are coded between the start of random access until the IDR / CRA NAL unit where the decoding shall resume. While it is not critical, we think that it is better if encoder does not omit writing / outputting those NAL units. For random access simulation, omitting the NAL units between random access starting point to the random access ending point should be the job of other entity (e.g., video player).
3. If the JCTVC group agrees to adopt the concept of random access notification by using one flag in NAL unit header, we recommend considering using the modification done by the proponent as one of candidate implementation to be integrated to decoder part of HM reference software.

# Discussion for IDR Re-ordering for random access

The proponent suspects that there might be issue / problem related to POC and IDR picture in random access settings. It is suggested that when IDR picture is used, POC at IDR picture shall be 0. However, current implementation of HM reference software does not reset POC at the occurrence of IDR picture. Thus, the proponent suggested to re-order IDR picture so that in the new order, it shall encoded / decoded after leading pictures (i.e., pictures that precede IDR picture in display order but follow IDR picture in decoding order).

Our comments after analyzing the problem and compare it to current implementation of HM reference software is as follow:

1. We think that it is not mandatory to reset POC at IDR. Encoder can have freedom whether to reset POC at IDR. Even if encoder decides not to reset POC when an IDR picture occurs, there should be no problem, as it has been demonstrated by the implementation in the current HM software.
2. Consequently, there is no need to re-order encoding / decoding of IDR picture. Not only that such action is not necessary, it also causes a significant performance loss, particularly at leading pictures after the IDR picture because after the re-ordering, the leading pictures lost a very important key picture for inter prediction.
3. We notice that there is an on-going development / discussion in AHG21 which may be related to POC issues. We suggest that this issue can be further discussed within the AHG21.

# Reference

1. JCTVC-G533, “On syntax for clean random access (CRA) pictures,” 7th JCT-VC Meeting, Geneva, CH, 21-30 November, 2011.