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| **Joint Video Experts Team (JVET)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  14th Meeting: Geneva, CH, 19–27 March 2019 | Document: JVET-N0114-v1 |

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| *Title:* | **AHG14: A delay analysis for IRAP and GDR** | | |
| *Status:* | Input document to JVET | | |
| *Purpose:* | Information | | |
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| *Source:* | Huawei Technologies Co., Ltd. | | |

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# Abstract

This contribution provides analysis on encoder-decoder delays for access unit (AU) based and decoding unit (DU) based encoder-decoder operations for bitstream coded with intra random access point (IRAP) pictures at regular interval and for bitstream coded with gradual decoding refresh (GDR) picture at regular interval. The objective of this analysis is to understand whether GDR feature can help reduce encoder-decoder end-to-end delay for both AU and DU based operations when compared to using IRAP pictures.

The finding from the analysis is that GDR feature can help reduce encoder-decoder end-to-end delay for both AU and DU based operations.

Details of the analysis are provided in the attachment.

# Introduction

To perform the analysis, we use the software provided for the GDR / progressive intra refresh (PIR) study in AHG14. The software was used to generate anchor (IDR inserted every second) and test (GDR picture inserted every second) bitstreams.

The assumptions used in the analysis and how the analysis was done are provided in the presentation slides file in the attachment of this contribution. The data for the analysis is provided in the spreadsheet files in the attachment. Both the presentation slides and spreadsheet files had been shared via email for AHG14 discussion in the reflector mailing list.

While studying the software before running the simulation, we noticed that the software has problem in calculating the size of intra refresh area which consequently causes the GDR period to be smaller than what is intended. For example, for our simulation we set the GDR period as 32 so that we expected the intra refresh region should spread across 32 pictures. However, upon analyzing the encoder log results, we saw that the software only spread the intra refresh region over 26 pictures.

We fixed the problem by updating the function for calculating the intra refresh size as follows:

***EncCfg.h -- Line 804***

void setIntraRefreshSize (int iIntraRefreshPeriod, int iSourceWidth)

{

m\_intraRefreshSize = m\_intraRefreshType ?

((int)(((iSourceWidth / iIntraRefreshPeriod) / 8) + 0.5) \* 8) : 0;

}