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| *Title:* | **AHG14: cross-check of JCTVC-X0060 on usage of CRI for DRA** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Report | | |
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| *Source:* | Technicolor | | |

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# Abstract

This document reports crosscheck results for proposal JCTVC-X0060 on usage of color remapping information (CRI) SEI message for HDR distribution with SDR backward compatibility. Two SDR compatible modes are investigated in JCTVC-X0060: bitstream SDR backward compatibility and display backward compatibility. Cross-checking results confirm the md5 sums and objective results reported in JCTVC-X0060. During visual check of SDR quality, some colors deviation compared to HDR rendering are observed, but SDR quality is judged as acceptable.

# Introduction

The contribution JCTVC-X0060 proposes the usage of CRI SEI message for SDR backward compatibility. Two modes are investigated. In SDR mode 0, bitstream backward compatibility is addressed. The pre-processing generates an SDR compatible signal from the input HDR signal, and related CRI data. This data are used at decoder to reconstruct the HDR signal from the decoded SDR signal. In SDR mode 1, display backward compatibility is addressed. The pre-processing generates the YCbCr 10 bits ST 2084 HDR signal plus CRI data for HDR-to-SDR conversion. These data are used at decoder to reconstruct an SDR signal from the decoded HDR signal. These two modes are proposed to be described in the Annex A of document “Conversion and Coding Practices for HDR/WCG Video”.

In JCTVC-X0060, only the three Pre-LUTs of CRI are used. The three-by-three matrix and the three Post-LUTs are not used. The reshaping therefore only consists of three piece-wise linear modeled functions applied to each one of the three Y, Cb and Cr components.

# Simulation results

Simulations are performed on Linux platform. Cross-checking confirms the md5 sums of YCbCr sequences resulting from the pre-processing conversion and of the bitstreams after HM encoding. Objective metrics for SDR0 and SDR1 modes are also confirmed (cf attached xls files).

A visual assessment of the SDR versions has been made, with a check of the conformity of the color and texture to the HDR version displayed on a Sim2 monitor. The SDR was displayed both on a consumer TV and on a professional monitor (TVlogic XVM 245W). It was observed that visual quality of resulting SDR version of HDR content is acceptable, with some color shift observed. In more details, the following observations are made:

* balloonFestival: colors in balloons and sky desaturated, texture well rendered
* bikeSparklers: some hue shift and desaturation observed in red, noise in dark areas a bit bluish.
* fireEater: overall rendering conform to HDR
* garageExit: colors a bit less saturated than in HDR
* EBU\_Hurdles: hue shift and desaturation observed
* StEM\_MagicHours: hue shift and desaturation observed in colored areas (flowers, red light), red hat in cut 2, red shirt in cut 3
* market: sky a bit pale, purple umbrella and orange label on left desaturated
* showGirl: hue shift and desaturation observed in colored areas (flowers), texture loss in bright face
* EBU\_Starting: sky a bit pale, hue shift and desaturation observed
* sunrise: hue shift observed in balloon, sky well rendered
* StEM\_WarmNight: hue shift and desaturation observed in colored areas

It may be expected an improved rendering of the SDR by using the full model of CRI, that is, the three Pre-LUTs, the three-by-three matrix and the three Post-LUTs. The usage of the three-by-three matrix may help managing the color shift issues. It is also worth mentioning that the usage of cross-plane scaling, as previously proposed in the ETM (JCTVC-W0031 and JCTVC-W0092), may solve the hue and saturation issues that are observed when applying the reshaping functions independently to each component.

# Conclusion

The cross-checking confirms the md5 sums and objective results reported in JCTVC-X0060. During visual check of SDR quality, SDR quality is judged as acceptable; however some colors deviation compared to the HDR rendering are observed. Usage of full CRI model, or of cross-plane scaling, may solve these issues.