**3GPP TSG-SA4 SA4#114-eS4-210734**

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| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
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|  | **26**.**955** | **CR** |  | **rev** |  | **Current version:** | **1.1.2** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | H.265 Characterization against H.264 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | InterDigital | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GVideo | | | | |  | ***Date:*** | | | 11th May 2021 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | | 17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Provide initial text for the section 7.2 of the TR | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
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| ***Clauses affected:*** | |  | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

Start of first Change:

# References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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End of fist Change

Start of second Change:

# 7 Characterization for Existing Codecs

## 7.1 Introduction

This clause provides a characterization of existing codecs. This serves pre-dominantly as an example to introduce the characterization framework.

## 7.2 H.265/HEVC Characterization against H.264/AVC

### 7.2.1 Introduction

This clause provides characterization results for H.265/HEVC against H.264/AVC for different scenarios and metrics.

## 7.3 External Characterization Results

### 7.3.1 Introduction

This clause introduces external characterization results that have been conducted in a similar fashion as introduced in clause 5.7, but are not based on the metrics developed in this report.

### 7.3.2 H.265/HEVC Characterization against H.264/AVC.

In JCTVC-Q1011 [xx] the JCTVC verification test reports that the HEVC standard achieves a substantial improvement in compression capability relative to its predecessor, the AVC standard, in accordance with the “HEVC verication test plan” in JCTVC-P1011 [xx].

The verification test was conducted using the HM12.1 (reference HEVC codec) and JM18.5 (reference AVC codec). Four picture resolutions UHD, 1080p, 720p and 480p were tested. Each resolution was represented by 5 test sequences, giving a total of 20 test sequences. For each test sequence 4 test points were chosen.

A bit depth of 8 bits for 480p, 720p and 1080p sequence and of 8 & 10 bits for 4K sequences was used. The coding structure was a combination of Random Access (RA) with an Intra refresh period at approximately 1 second intervals with picture reordering allowed and Low Delay (LD) with no intra refesh and no picture reordering.

A subjective evaluation was conducted comparing the HEVC Main profile to the AVC High profile. The test compared visual quality for twenty video sequences with resolutions ranging from 480p to Ultra HD (UHD) that were encoded at various bit rates or quality levels.

Analysis of the subjective test results show that HEVC test points at half or less than half the bit rate of the AVC reference were found to achieve comparable quality in 86% of the cases.

Figure 7.3.2-1 provides an overview of the results. Estimation of the bit rate savings from these results confirmed that the HEVC Main profile achieves the same subjective quality as AVC High profile while requiring on average approximately 59% fewer bits.

The bit rate savings are similar for the different resolutions tested, with higher resolution sequences having slightly more savings. The average bit rate savings for test sequences with UHD, 1080p, 720p and 480p resolutions are estimated at approximately 64%, 62%, 56% and 52%, respectively.

Timeline

Description automatically generated

Figure 7.3.2-1: Average bit rate savings (measured by BD-Rate) of HEVC compared to AVC. The average of highest bit rate points over all sequences in each resolution was used in this illustration.

End of Second Change