**3GPP TSG-SA WG4 Meeting #127S4-240176**

**Sophia-Antipolis, France, 29 January - 2 February 2024**

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| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
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|  | **26**.**966** | **CR** | **-** | **rev** | **-** | **Current version:** | **1.0.0** |  |
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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 | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | **[FS\_HEVC\_Profiles] Conclusions** | | | | | | | | | |
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| ***Source to WG:*** | Apple Inc. | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | **FS\_HEVC\_Profiles** | | | | |  | ***Date:*** | | | 15/01/2024 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | 18 |
|  | *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:*** | | This CR provides conclusions and proposed future work. | | | | | | | | |
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| ***Summary of change:*** | | Conclusions are provided for scenario #1.1, #1.2, #2, and #3 | | | | | | | | |
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| ***Consequences if not approved:*** | | Conclusions will be missing in the TR. | | | | | | | | |
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| ***Clauses affected:*** | | 7 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

7 Conclusions and proposed next steps

7.1 Conclusions for scenario #1.1, #1.2:

Comparing solution #1.1 (HEVC simulcast), solution #1.2 (HEVC frame packing) and solution#1.3 (Multiview HEVC coding), the following conclusions can be drawn for the stereoscopic content delivery scenarios:

* HEVC simulcast:
  + This is the most basic solution to address the stereoscopic HEVC delivery scenario.
  + It adds no new signalling.
  + Uses 2x HEVC encode/decode chains to provide stereoscopic video.
  + Does not exploit inter-view redundancy.
  + Application addresses the needed signalling aspects to realize immersive viewing.
* HEVC frame packing:
  + Reuses existing decoding hardware, albeit to achieve full resolution of the two views, a higher profile/level may be needed.
  + Addresses signalling via SEI messages.
  + For temporally interleaved frame packing, it could exploit inter-view redundancies for referenced frames, but not for non-referenced ones. However, the same frame packing scheme also results in a reduction of the available reference frames for each view given specified reference buffer constraints in the specification, which can impact coding performance.
* MV-HEVC:
  + Reuses the same low-level decoding tools as single layer HEVC decoding.
  + Better exploits inter-view redundancies by even allowing inter-view prediction from non-reference frames, without also additionally limiting the size of the reference buffer.
  + When used on a non-3D capable device, the content can be played back using only the base view for a 2D presentation.
  + Has better coding efficiency compared to either HEVC simulcast and HEVC frame packing.

Based on the assessment, MV-HEVC and HEVC frame packing are suitable solutions for addressing scenario#1.1 and #1.2 for stereoscopic content delivery, where MV-HEVC represents a more versatile tool. With HEVC simulcast and HEVC frame packing already included in SA4 specifications, and given the coding benefits it provides compared to alternative solutions, it is recommended to add support for stereoscopic MV-HEVC to the related specifications.

7.2 Conclusions for scenario #2:

Solution #2.3 (native 4:4:4 coding) and solution #2.4 (derived 4:4:4 coding) can achieve better visual quality than the baseline solution #2.1 (HEVC 4:2:0 coding). Solution #2.4 (derived 4:4:4 coding) however can achieve this improvement by reusing existing hardware support, without a need for a specialised hardware (as is needed for solution #2.3). However, a higher level may be needed for Solution #2.4.

At the time of drawing the conclusions, MPEG has agreed to include the technology for the solution #2.4 (derived 4:4:4 coding) into the HEIF amendment.

7.3 Conclusions for scenario #3:

Solution #3.1 (scalable HEVC coding) shows improvement potential for enhancing the adaptive streaming experience by allowing more switchable representations to be made available, while optimising storage overhead for this purpose. Scalable HEVC is also supported by MPEG specifications such as CMAF. The need to do normative work will be driven by industry interest in this direction.

7.4 Conclusions for scenario #4:

Solution #4.1 “MV-HEVC with depth/alpha channels” shows feasibility of the combination of MV-HEVC with depth and/or alpha channels, both in terms of additional data rate and complexity. The support and usage of depth and alpha channels in the industry is relevant for various application, potentially including closed caption insertion and pose-correction. Based on such usage cases and their potential benefits, it may be desirable to add support for carriage of these channels in 3GPP specifications.

\* \* \* End of Changes \* \* \* \*