**3GPP TSG SA WG4#115-e meeting S4-211024**

**18th– 27th August 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26**.**955** | **CR** | pseudo | **rev** |  | **Current version:** | **1.2.5** |  |
|  | | | | | | | | |
| *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:*** | **pCR26.955: FullHD Streaming** | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GVideo | | | | |  | ***Date:*** | | | 11/08/2021 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**===== CHANGE =====**

### 6.2.7 Reference Sequences

Table 6.2.7-1 provides the selected SDR reference sequences for this scenario and Table 6.2.7-2 provides the HDR sequences. Keys are defined to refer to the sequences in the context of the scenario. The sequences are named and a reference to the details of the sequence is provided.

The applied sequences are the subsampled versions of selected 4K-TV sequences as defined in clause 6.3.7. Subsampling is done with ffmpeg.

Table 6.2.7-1 SDR Reference Sequences for FullHD scenario

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Key | Name | Reference | Resolution | Frame rate | Colour Gamut | Number of Frames | Scene Cut |
| S1-R1 | Brest-Sedof-FH | Annex C.3.1.3.1 | 1920 x 1080 | 60 | BT.709 | 300 | 0 |
| S1-R2 | Rain Fruits-FH | Annex C.3.1.3.2 | 1920 x 1080 | 50 | BT.709 | 500 | 0 |
| S1-R3 | Park Joy-FH | Annex C.3.1.3.3 | 1920 x 1080 | 50 | BT.709 | 500 | 0 |
| S1-R4 | Soccer-FH | Annex C.3.1.3.4 | 1920 x 1080 | 23.98 | BT.709 | 385 | 4 |
| S1-R8 | Riverbank-FH | Annex C.3.1.3.8 | 1920 x 1080 | 50 | BT.709 | 600 | 0 |

Table 6.2.7-2 HDR Reference Sequences for FullHD scenario

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Key | Name | Reference | Resolution | Frame rate | Colour Gamut | Number of Frames | Scene Cut |
| S1-R12 | Meridian-FH | Annex C.3.2.3.2 | 1920 x 1080 | 59.94 | BT.2020 | 327 | 0 |
| S1-R13 | Sol-Levante-FH | Annex C.3.2.3.3 | 1920 x 1080 | 24 | BT.2020 | 145 | 0 |
| S1-R14 | Cosmos-FH | Annex C.3.2.3.4 | 1920 x 1080 | 24 | BT.2020 | 182 | 0 |
| S1-R17 | Nocturne-FH | Annex C.3.2.3.7 | 1920 x 1080 | 60 | BT.2020 | 370 | 0 |



### 6.2.8 Anchor Definition

#### 6.2.8.1 Overview

This clause provides details on how to generate the anchors for the Full HD Scenario.

#### 6.2.8.2 H.264/AVC Anchors

##### 6.2.8.2.1 Overview

Table 6.2.8.2.1-1 provides an overview of the H.264/AVC anchor tuples. Keys are identified to refer to the anchors in the context of the scenario.

Table 6.2.8.2.1-1 Anchor Tuple generation with H.264/AVC for Full HD Scenario

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Key | Clause | Reference Sequence | Reference Encoder | Configuration | Variations | Anchor Key |
| S1-A1-264 | 6.2.8.2.2 | S1-R1 | JM19.0 | S1-JM-01 | QP = [22,27,32,37] | S1-A1-264-<QP> |
| S1-A2-264 | 6.2.8.2.2 | S1-R2 | JM19.0 | S1-JM-01 | QP = [22,27,32,37] | S1-A2-264-<QP> |
| S1-A3-264 | 6.2.8.2.2 | S1-R3 | JM19.0 | S1-JM-01 | QP = [22,27,32,37] | S1-A3-264-<QP> |
| S1-A4-264 | 6.2.8.2.2 | S1-R4 | JM19.0 | S1-JM-01 | QP = [22,27,32,37] | S1-A4-264-<QP> |
| S1-A8-264 | 6.2.8.2.2 | S1-R8 | JM19.0 | S1-JM-01 | QP = [22,27,32,37] | S1-A8-264-<QP> |

##### 6.2.8.2.2 S1-JM-01

This anchor tuple produces an anchor over 60 seconds with a typical configuration of H.264/AVC:

- Profile H.264/AVC Progressive High-Profile Level 4.2 [7]

- Random access and switching at 1 second interval

- LevelIDC = 52

- NumberBFrames = 4

- BReferencePictures = 2

- Quantization parameters are set as according to Table 6.2.8.2.2-1

Table 6.2.8.2.2-1: Quantization parameters settings for H.264/AVC Anchor definition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **QP** | **QPISlice** | **QPPSlice** | QPBSlice | ExplicitHierarchyFormat |
| 22 | 19 | 23 | 23 | B7r0B3r3B1r4b0e6b2e6B5r4b4e6b6e6B11r3B9r4b8e6b10e6B13r4b12e6b14e6 |
| 27 | 24 | 28 | 28 | B7r1B3r4B1r6b0e8b2e8B5r6b4e8b6e8B11r4B9r6b8e8b10e8B13r6b12e8b14e8 |
| 32 | 29 | 33 | 33 | B7r2B3r5B1r7b0e8b2e8B5r7b4e8b6e8B11r5B9r7b8e8b10e8B13r7b12e8b14e8 |
| 37 | 34 | 38 | 38 | B7r3B3r6B1r7b0e8b2e8B5r7b4e8b6e8B11r6B9r7b8e8b10e8B13r7b12e8b14e8 |

Different sequences are used with resolutions 1080p, 900p and 720p.

The settings are defined in the attached configuration file s1-jm-01.cfg.

The following parameters need to be adapted for each sequence as follows using the JSON parameters of the reference sequence:

- IntraPeriod: Intra Period aligned with GOPSize such that approximately 1 second is achieved, i.e.

- "frameRate": 23.98 or 24.0 or 25 or 30 => IntraPeriod set to 32,

- "frameRate": 50.0 or 59.94 or 60 => IntraPeriod set to 64

#### 6.2.8.3 H.265/HEVC Anchors

##### 6.2.8.3.1 Overview

Table 6.2.8.3.1-1 provides an overview of the H.265/HEVC anchor tuples. Keys are identified to refer to the anchors in the context of the scenario.

The details are also provided here: https://dash-large-files.akamaized.net/WAVE/3GPP/5GVideo/Bitstreams/Scenario1-FullHD/265/anchors.csv.

Table 6.2.8.3.1-1 Anchor Tuple generation with H.265/HEVC for FullHD Scenario

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Key** | **Clause** | **Reference Sequence** | **Reference Encoder** | **Configuration** | **Variations** | **Anchor Key** |
| S1-A01-265 | 6.3.8.3.3 | S1-R1 | HM16.23 | S1-HM-01 | QP: [22,27,32,37] | S1-A1-265-<QP> |
| S1-A02-265 | 6.3.8.3.3 | S1-R2 | HM16.23 | S1-HM-01 | QP: [22,27,32,37] | S1-A2-265-<QP> |
| S1-A03-265 | 6.3.8.3.3 | S1-R3 | HM16.23 | S1-HM-01 | QP: [22,27,32,37] | S1-A3-265-<QP> |
| S1-A03-265 | 6.3.8.3.3 | S1-R3 | HM16.23 | S1-HM-01 | QP: [22,27,32,37] | S1-A3-265-<QP> |
| S1-A08-265 | 6.3.8.3.3 | S1-R8 | HM16.23 | S1-HM-01 | QP: [22,27,32,37] | S1-A8-265-<QP> |
| S1-A12-265 | 6.3.8.3.4 | S1-R12 | HM16.23 | S1-HM-02 | QP: [22,27,32,37] | S1-A12-265-<QP> |
| S1-A13-265 | 6.3.8.3.4 | S1-R13 | HM16.23 | S1-HM-02 | QP: [22,27,32,37] | S1-A13-265-<QP> |
| S1-A14-265 | 6.3.8.3.4 | S1-R14 | HM16.23 | S1-HM-02 | QP: [22,27,32,37] | S1-A14-265-<QP> |
| S1-A17-265 | 6.3.8.3.4 | S1-R17 | HM16.23 | S1-HM-02 | QP: [22,27,32,37] | S1-A17-265-<QP> |

##### 6.2.8.3.2 Common Parameters and Settings

To generate the anchor bitstreams, HM16.23 is used:

- HM16.23 https://hevc.hhi.fraunhofer.de/svn/svn\_HEVCSoftware/tags/HM-16.23/

The common parameters are as follows:

* Profile: main10 (Main 10 Profile)
* DecodingRefreshType: 1 (CRA)
* SearchRange: 384
* InternalBitDepth: 10 (codec operating bit-depth where all sequences (including 8 bit sequences) are coded with an internal bitdeph of 10 in accordance with [44] and metrics are calculated in 10 bits)
* SEIMasteringDisplayColourVolumeSEI is not added. If it would be added, then the metadata in the json file may be used.

The following parameters need to be adapted for each sequence as follows using the JSON parameters of the reference sequence:

- IntraPeriod: Intra Period aligned with GOPSize such that approximately 1 second is achieved, i.e.

- "frameRate": 23.98 or 24.0 or 25 or 30 => IntraPeriod set to 32,

- "frameRate": 50.0 or 59.94 or 60 => IntraPeriod set to 64

The following parameters are variables and triggered through updates of the config-file.

* QP: [22,27,32,37]

In cases where the anchor uses temporal filtering and the codec being tested does not, additional results may be included for information to show the comparison with temporal filtering turned off for the anchor. Alternatively, an external document, which details the improvement due to temporal filtering for the anchor, may be referenced.

##### 6.2.8.3.3 S1-HM-01: SDR Settings

The common parameters as defined in 6.2.8.3.2 apply.

In addition, the following parameters apply:

* VuiParametersPresent: 0 (VUI absent)
* SEIDecodedPictureHash: 0 (md5 checksum absent)

The settings are defined in the attached configuration file s1-hm-01.cfg.

##### 6.2.8.3.4 S1-HM-02: HDR PQ Settings

The common parameters as defined in 6.3.8.3.2 apply.

In addition, the following parameters apply:

* VuiParametersPresent: 1 (VUI present)
* ColourPrimaries: 9
* TransferCharacteristics: 16
* MatrixCoefficients: 9
* ChromaLocInfoPresent: 1
* ChromaSampleLocTypeTopField: 2
* ChromaSampleLocTypeBottomField: 2
* SEIDecodedPictureHash: 0 (md5 checksum absent)

The settings are defined in the attached configuration file s1-hm-02.cfg.

**===== CHANGE =====**

##### 6.3.8.3.1 Overview

Table 6.3.8.3.1-1 provides an overview of the H.265/HEVC anchor tuples. Keys are identified to refer to the anchors in the context of the scenario.

The details are also provided here: https://dash-large-files.akamaized.net/WAVE/3GPP/5GVideo/Bitstreams/Scenario-2-4K/265/anchors.csv.

Table 6.3.8.3.1-1 Anchor Tuple generation with H.265/HEVC for 4K-TV Scenario

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Key** | **Clause** | **Reference Sequence** | **Reference Encoder** | **Configuration** | **Variations** | **Anchor Key** |
| S2-A01-265 | 6.3.8.3.3 | S2-R1 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A1-265-<QP> |
| S2-A02-265 | 6.3.8.3.3 | S2-R2 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A2-265-<QP> |
| S2-A03-265 | 6.3.8.3.3 | S2-R3 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A3-265-<QP> |
| S2-A04-265 | 6.3.8.3.3 | S2-R4 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A4-265-<QP> |
| S2-A05-265 | 6.3.8.3.3 | S2-R5 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A5-265-<QP> |
| S2-A06-265 | 6.3.8.3.3 | S2-R6 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A6-265-<QP> |
| S2-A07-265 | 6.3.8.3.3 | S2-R7 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A7-265-<QP> |
| S2-A08-265 | 6.3.8.3.3 | S2-R8 | HM16.23 | S2-HM-01 | QP: [22,27,32,37] | S2-A8-265-<QP> |
| S2-A11-265 | 6.3.8.3.4 | S2-R11 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A11-265-<QP> |
| S2-A12-265 | 6.3.8.3.4 | S2-R12 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A12-265-<QP> |
| S2-A13-265 | 6.3.8.3.4 | S2-R13 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A13-265-<QP> |
| S2-A14-265 | 6.3.8.3.4 | S2-R14 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A14-265-<QP> |
| S2-A15-265 | 6.3.8.3.4 | S2-R15 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A15-265-<QP> |
| S2-A16-265 | 6.3.8.3.4 | S2-R16 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A16-265-<QP> |
| S2-A17-265 | 6.3.8.3.4 | S2-R17 | HM16.23 | S2-HM-02 | QP: [22,27,32,37] | S2-A17-265-<QP> |