**3GPP TSG-S4 Meeting #115e *S4-211165***

**Electronic Meeting, 18th August – 27th August 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.805** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | 0.2.0 |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | [FS\_NPN5AVProd] Proposal of two bitrate adaptation related Key Issues | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson LM, BBC, EBU, Sennheiser, Dolby | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_NPN4AVProd | | | | |  | ***Date:*** | | | 12/08/21 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The current version of the technical report only contains some few potential key issues. The intention of this contribution is to extend the list of potential key issues with two bitrate adaptation related key issues, which should be studied in more detail. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Two new potential key issues are proposed, focusing on bitrate adaptation. | | | | | | | | |
|  | |  | | | | | | | | |
| ***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:*** | |  | | | | | | | | |

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

#### 5.2.5.6 Key Issue #5: Different bit rates for Standby vs Program Cameras

Editor’s Note: This clause should describe implications on protocol usage, when only the program camera(s) send a high quality stream. Standby cameras only send a video stream with preview quality or no data.

#### 5.2.5.7 Key Issue #6: Dynamic bit rate adaptation

##### 5.2.5.7.1 General

Dynamic bit rate adaptation describes the capability to adjust the encoding bit rate of a compressed stream during operation in order to handle short term network variations, by varying the quality of the encoded media stream. Those network variations can be caused e.g. by high load, interference or mobility events. There can be different triggers for rate adaptation, e.g. a control signal from the network or continuous monitoring the network performance (e.g. by estimating the available bandwidth). Such a capability may not be required for Tier 1 AV productions, since Tier 1 AV productions are typically well planned from a capacity and coverage perspective. Dynamic bitrate adaptation could become an important tool for Tier 2 or Tier 3 production scenarios to improve the overall robustness of the system, e.g. to increase the usage flexibilty and simplify SLA negotiations and fulfillment.

This type of adaptive bit rate is not widely available for professional applications so adoption by the media production industry is needed.

- Solutions can describe different realizations (e.g. using the Temporary Maxmimum Media Bit Rate (TMMBR) RTCP transport layer feedback message defined in RFC 5104 [41] and section 6.2 of RFC 4585 [42], etc)

- Support can be an optional feature of a media protocol.

- Tradeoff between packet loss, quality, etc (different parameters to fit into the bitrate budget) should be studied

NOTE: Dynamic bitrate adaptation is typically applied to video signals, but can also be applied to audio.

\*\*\*\* Next Change \*\*\*\*

# 2 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*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.261: "Service requirements for the 5G system".

[3] 3GPP TS 22.263: "Service requirements for Video, Imaging and Audio for Professional Applications (VIAPA)".

[4] 3GPP TS 22.827: "Study on Audio-Visual Service Production".

[5] M.P. Sharabayko, M.A. Sharabayko, J. Dube, JS. Kim, JW. Kim: "The SRT Protocol", draft-sharabayko-mops-srt-01

[6] VSF: "Reliable Internet Stream Transport (RIST) Activity Group", https://www.videoservicesforum.org/RIST.shtml

[7] VSF TR 06-1: "Reliable Internet Stream Transport (RIST) Protocol Specification – Simple Profile", <https://vsf.tv/download/technical_recommendations/VSF_TR-06-1_2018_10_17.pdf>

[8] VSF TR 06-2, "Reliable Internet Stream Transport (RIST) Protocol Specification – Main Profile", [https://www.vsf.tv/download/technical\_recommendations/VSF\_TR-06-2\_2020\_03\_24.pdf](https://protect2.fireeye.com/v1/url?k=cc406e56-93db577d-cc402ecd-866038973a15-a3187c63f11b10f6&q=1&e=1f3c54ba-abd4-4509-b7b2-0816901e7741&u=https%3A%2F%2Fwww.vsf.tv%2Fdownload%2Ftechnical_recommendations%2FVSF_TR-06-2_2020_03_24.pdf)

[9] NewTek: "NDI Encoding/Decoding", <https://support.newtek.com/hc/en-us/articles/218109667-NDI-Encoding-Decoding>

[10] NewTek: "NDI Network Bandwidth, <https://support.newtek.com/hc/en-us/articles/217662708-NDI-Network-Bandwidth>

[11] David Aleksandersen: "What is NDI® (Network Device Interface)?", <https://newsandviews.dataton.com/what-is-ndi-network-device-interface>

[12] Kieran Kunhya and Ciro Noronha: "RIST and SRT: What’s the difference?", <https://www.tvbeurope.com/ip-migration/rist-and-srt-whats-the-difference>

[13] Tofik Sonono: "Interoperable Retransmission Protocols with Low Latency and Constrained Delay: A Performance Evaluation of RIST and SRT", Masters Thesis, KTH Stockholm, 2019, http://kth.diva-portal.org/smash/get/diva2:1335907/FULLTEXT01.pdf

[14] EBU: "Minimum User Requirements to Build and Manage an IP-Based Media Facility", 15 July 2020, <https://tech.ebu.ch/files/live/sites/tech/files/shared/tech/tech3371.pdf>.

[15] AMWA: "NMOS Overview", <https://www.amwa.tv/nmos-overview>.

[16] EBU: "The Technology Pyramid For Media Nodes", https://tech.ebu.ch/publications/technology\_pyramid\_for\_media\_nodes.

[17] EBU: "Technology Pyramid Media Node Maturity Checklist", September 2021, <https://tech.ebu.ch/publications/technology-pyramid-media-node-maturity-checklist?rec=1>.

[18] AMWA: "NMOS Technical Overview", <https://specs.amwa.tv/nmos/branches/main/docs/2.0._Technical_Overview.html>.

[19] AMWA: "Networked Media Systems – the Big Picture",  
<https://static.amwa.tv/networked-media-systems-big-picture-2021-03-05.pdf>.

[20] AMWA: "NMOS specification repository", <https://specs.amwa.tv/nmos>.

[21] SMPTE ST 2110: "Professional Media over Managed IP".

[22] IEEE 1588-2008: "Precision Time Protocol".

[23] SMPTE ST 2022-1:2007: "Forward Error Correction for Real-Time Video/Audio Transport Over IP Networks".

[24] SMPTE ST 2022-6:2012: "Transport of High Bit Rate Media Signals over IP Networks (HBRMT)",

[25] SMPTE ST 2022-7:2019: "Seamless Protection Switching of RTP Datagrams".

[26] SMPTE ST 2059-2:2015: "SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications".

[27] SMPTE ST 2110-10:2017: "Professional Media Over Managed IP Networks: System Timing and Definitions".

[28] SMPTE ST 2110-20:2017: "Professional Media Over Managed IP Networks: Uncompressed Active Video".

[29] SMPTE ST 2110-22:2019: "Professional Media Over Managed IP Networks: Constant Bit-Rate Compressed Video".

[30] SMPTE ST 2110-30:2017: "Professional Media Over Managed IP Networks: PCM Digital Audio".

[31] SMPTE ST 2110-31:2018: "Professional Media Over Managed IP Networks: AES3 Transparent Transport".

[32] IETF RFC 4585: "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)".

[33] IETF RFC 8086: "GRE-in-UDP Encapsulation".

[34] Ember+ control protocol, https://github.com/Lawo/ember-plus

[35] SMPTE ST 259:2008: "For Television — SDTV Digital Signal/Data — Serial Digital Interface".

[36] SMPTE ST 292-1:2012: "1.5 Gb/s Signal/Data Serial Interface".

[37] 3GPP TR 26.925: "Typical traffic characteristics of media services on 3GPP networks".

[38] Wikipedia, 2021, MADI, last modified 19th April 2021, <https://en.wikipedia.org/wiki/MADI>

[39] Wikipedia, 2021, Time-Sensitive Networking, last modified 23rd June 2021, <https://en.wikipedia.org/wiki/Time-Sensitive_Networking>

[40] AES67 / SMPTE ST 2110: "COMMONALITIES AND CONSTRAINTS", <https://aimsalliance.org/wp-content/uploads/2019/04/AES67-SMPTE-ST-2110-Commonalities-and-Constraints-Updated-April-2019.pdf>

[41] IETF RFC 5104: "Codec Control Messages in the RTP Audio-Visual Profile with Feedback (AVPF) ".

[42] IETF RFC 4585: "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF) ".

\*\*\*\*Last Change \*\*\*\*