**3GPP TSG- S4 Meeting #115e *S4-211511***

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

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| *CR-Form-v12.1* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.805** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **<Version#>** |  |
|  | | | | | | | | |
| *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:*** | Update of SRT and RIST description | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson LM | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_NPN4AVProd | | | | |  | ***Date:*** | | | <Res\_date> |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **<Cat>** |  | | | | | ***Release:*** | | | <Release> |
|  | *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 RIST Simple and Main Profile specification were updated. Some additional information is available for SRT. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | |  | | | | | | | | |
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| ***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 \*\*\*\*

# 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*.

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[5] M.P. Sharabayko, M.A. Sharabayko, J. Dube, JS. Kim, JW. Kim: "The SRT Protocol", draft-sharabayko-mops-srt-01, https://datatracker.ietf.org/doc/html/draft-sharabayko-mops-srt-01

[6] VSF: "Reliable Internet Stream Transport (RIST) Activity Group".

[7] VSF TR 06-1:2020: "Reliable Internet Stream Transport (RIST) Protocol Specification – Simple Profile", https://vsf.tv/download/technical\_recommendations/VSF\_TR-06-1\_2020\_06\_25.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)

…

[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)".

[43] ISO/IEC 13818‑1: "Information technology — Generic coding of moving pictures and associated audio information — Part 1: Systems".

[44] IETF RFC 3550|STD 64: "RTP: A Transport Protocol for Real-Time Applications".

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

[46] IETF RFC 2250: "RTP Payload Format for MPEG1/MPEG2 Video".

[47] IETF RFC 7798: "RTP Payload Format for High Efficiency Video Coding (HEVC)".

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

### 4.2.3 Secure Reliable Transport (SRT)

Secure Reliable Transport (SRT) [5] is an open-source media transport protocol that uses the UDP transport protocol. It has been presented to IETF as a potential candidate for standardisation. SRT provides connection and control, reliable transmission similar to TCP at the application layer. It supports packet recovery while maintaining low latency. SRT also supports encryption using AES.

The protocol was derived from the UDT project, designed for fast file transmission. UDT provides its reliability mechanism by using similar methods for connection, sequence numbers, acknowledgements and retransmission of lost packets. UDT uses selective and immediate (NACK-based) retransmission.

SRT has all these features, but also adds several more to support live streaming mode:

1. Controlled latency, with source time transmission (timestamp-based packet delivery).

2. Sender bandwidth control.

3. Conditional “too late” packet dropping (prevents head-of-line blocking caused by a lost packet that wasn’t recovered on time).

4. Eager packet re-transmission (periodic NACK report).

SRT can be used to convey any suitable application payload, including MPEG‑2 Transport Stream [43] and RTP [44].

### 4.2.4 Reliable Internet Stream Transport (RIST)

Reliable Internet Stream Transport [6] is an open source, open specification transport protocol designed for reliable transmission of media over lossy networks (including the internet) with low latency and high quality. It is currently being developed and maintained by the Video Services Forum (VSF).

Technically, RIST seeks to provide reliable, high performance media transport by using RTP/UDP [44] at the transport layer to avoid the limitations of TCP. Reliability is achieved by using NACK-based retransmissions to realise an Automatic Repeat Query (ARQ) capability. SMPTE-2022 Forward Error Correction can be combined with RIST but is known to be significantly less effective than ARQ.

RIST Simple Profile [7] was initially published by the VSF in October 2018 and revised in June 2020. It includes the following features:

- The base stream uses RTP for compatibility with existing equipment.

- Retransmission requests use RTCP. Two types of retransmission requests are defined:

- A Bitmask-based NACK, defined as a Transport Layer Feedback message in section 6.2.1 of RFC 4585 [42].

- A Range-based NACK, defined by RIST Simple Profile [7] as an application-specific (APP) RTCP packet (see also section 6.7 of RFC 3550 [44]).

- Bonding of multiple links for load sharing.

- Seamless switching using SMTPE-2022-7 [25].

- Out-of-band transmission of protection data (retransmissions may use a separate link).

- RTT Echo Request/Response procedure to estimate the round-trip time of the network path.

RIST Simple Profile does not require or recommend any RTP Payload Format. As result, deployments may embed, for example, HEVC frames into an MPEG‑2 Transport Stream container according to RFC 2250 [46] or directly into RTP according to RFC 7798 [47].

RIST Main Profile [8] was published in March 2020 and adds the following features to Simple Profile:

- GRE-in-UDP encapsulation based on RFC 8086 [45], with bidirectional send/receive in the same tunnel.

- Multiplexing of multiple RTP sessions into the same tunnel.

- In-band data support in the tunnel, useful for remote management.

- Client/Server architecture.

- Firewall traversal.

- DTLS encryption or Pre-Shared Key encryption, with multicast support, access control, and authentication.

- Advanced authentication options using either public key certificates or TLS-SRP.

- Bandwidth optimization based on null packet deletion.

- Support for high bit rate streams by extending the size of the RTP sequence number space.

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