**3GPP SA4-e (AH) RTC SWG post 129-eS4aR240065**

Online 23rd of October 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **Pseudo CHANGE REQUEST** | | | | | | | | |
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|  | **26.822** | **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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | FS\_5G\_RTP\_Ph2 clause 7 Analysis | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon, Nokia, Qualcomm | | | | | | | | | |
| ***Source to TSG:*** | SA WG 4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5G\_RTP\_Ph2 | | | | |  | ***Date:*** | | | 23-09-2024 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | 19 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | Clause 7 Analysis is left blank | | | | | | | | |
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| ***Summary of change:*** | | A summary of the progress added and light analysis regarding the next steps | | | | | | | | |
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| ***Consequences if not approved:*** | | Report is incomplete, analysis is missing, discussion of solutions will lack appropriate context for unaware readers. No recommendations for next steps including normative work. | | | | | | | | |
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| ***Clauses affected:*** | | 7( and all subclauses) | | | | | | | | |
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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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| CHANGE 1 |

# 7 Overall Analysis

## 7.0 Key Issue and Solution Overview

Table 7.0-1 summarizes the progress of each of the key issues.

The following clauses provide a more detailed analysis of the progress for each key issue.

**Table 7.0-1 Progress of Key issues**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Key Issue # | Short  Description | Progress | Objectives met | Normative work proposed | Convergence possible ? | Dependencies | Group consensus |
| 1 | PSSize  Accuracy | #4 and #7 | Partially | Yes (#4), Yes (#7) | Same source, Complementary solutions | SA2 TBC | TBD |
| 2 | Lone PDU | #2 and #15 | Partially | TBC (#2), Yes (#15) | Complementary solutions | SA2 TBC | TBD |
| 3 | FEC support | #4 #17 and #18 | Yes | Yes (#5), Yes (#17), Yes (#18) | Complementary solutions FEC schemes, congestion control and FEC awareness | RAN2 TBC  SA2 TBC | TBD |
| 4 | FEC awareness | #8, #10, #17, #18, #19 | Yes | Yes #8 Yes #10 Yes #17 Yes #18 Yes #19 | Complementary solutions | RAN2 TBC  SA2 TBC | TBD |
| 5 | RTP transport for XR | - | - | - | - | - | - |
| 6 | Encryption | #3 | Partially | Yes (but limited) | Single solution | SA2 TBC | TBD |
| 7 | RTCP messages for 5G | #14 | Yes | Yes (TBC what is new and already existing) | Single solution | NO | TBD |
| 8 | RTP retransmission | #9 and #11 | Yes | Yes #9, Yes #11 | Same source | SA2/RAN2 (TBC) | TBD |
| 9 | RTP Multiplexing | #12 | Partially | Yes #12 | Single solution | SA2 TBC | TBD |
| 10 | Use cases | - | - | - | - | - | - |
| 11 | Enhancements to PDU Set HE | - | - | - | - | - | - |
| 12 | Data Burst marking | #6, #13 #16 | Yes | Yes #6, Yes #16 | Convergence needed | SA2 TBC | TBD |
| 13 | Applicability of PDU Set HE | #1 | Partially | Yes #1 | Single solution | SA2, RAN2 (TBC) | TBD |
| 14 | QoS flow multiplex | #12 | Partially | TBC | Single source | TBC | TBD |
| 15 | Media and metadata | - | - | - | - | - | - |

## 7.1 Analysis for Key Issue #1

Two solutions are proposed i.e. solution #4 and solution #7.

Solution #4: First, it shows that due to different factors slight differences in estimated and received PDU Set Size can occur. It explains the significance of the impact of such difference for the NG-RAN. Second, it proposes a measurement-based precompensation scheme. Third, it compares the proposed scheme to two other schemes: NAT46/64 only correction, and IP fragmentation prevention.

It emphasizes that limited correction should happen in the network (e.g. UPF) and shifts logic to client, and that accuracy is important.

In Solution #7 sending remaining PSSize in the RTP Header extension is proposed.

Solution #7 in clause 6.7 discusses the pros and cons of the solution.

NOTE 1: It needs to be clarified how solutions would fit with existing solutions in TS 26.522.

NOTE 2: It needs to be clarified if and what coordination is needed with SA2 and/or RAN2.

Suggested way forward, including recommendations for normative work: TBD

## 7.2 Analysis for Key Issue #2

Two solutions are proposed i.e. #2 and #15.

The solution #2 in clause 6.2 discusses when lone PDU’s can occur, but no detailed proposal on how to overcome the issue in TS 26.522 is yet proposed.

Solution #15 introduces a configurable PSI signalling for lone PDUs according to the protocol type (e.g. RTCP) carried in the PDU. The solution makes use of control plane signalling and extends the RTC provisioning feature defined in TS 26.510 clause 5.2.10 and therefore requires updates to TS 26.510.

NOTE: It needs to be clarified if and what coordination is needed with SA2 and/or RAN2.

Suggested way forward, including recommendations for normative work: TBD

## 7.3 Analysis for Key Issue #3

Three solutions were proposed i.e. #5 #17 and #18.

The solution in #5 discusses the mechanisms for FEC defined in IETF and dissected different properties, it seems that the (near) MDS codes have some benefits compared to other solutions, but the current WebRTC solution uses a non MDS code.

Solution #17 analyses the overhead and end-to-end perspective of using FEC in 3GPP Setting. In particular it shows that when a frame/access unit is smaller the overhead of FEC increases to achieve the successful reconstruction probabilities.

Solution #18 overviews congestion control used for real time communication and ask the question what the effect could be when using AL-FEC, it also implies that this should be further studied (see solution #19).

Suggested way forward, including recommendations for normative work: TBD

## 7.4 Analysis for Key Issue #4

Five solutions, i.e. #8, #10, #17, #18, #19 are proposed for key issue #4.

Solution #8 adds support for the PDU Set definition when using AL-FEC. It analyses different options with a preference for combining source and repair packets in a single PDU set.

Solution #10 analyzes the effect of upstream and downstream losses in case 3GPP network actively interferes to optimize when using AL-FEC.

Solution #17 and #18 were also proposed for key issue number 3 (see clause 7.3)

Sol #19 considers the case if network components discard some packets how that should be accounted for, also both the case when the network is congested versus the case that a network is not congested are considered. It implies that additional guidelines may be needed to improve the congestion control reviewed in #18.

Suggested way forward, including recommendations for normative work: TBD

## 7.5 Analysis for Key Issue #5

No contributions yet on this Key Issue #5 have been progressed.

## 7.6 Analysis for Key Issue #6

Only a single solution #3 was proposed to address this key issue.

The solution is based on SRTP solution already available in release 18.

It needs to be considered if additional text is needed to improve the support for this solution.

Suggested way forward, including recommendations for normative work: TBD

## 7.7 Analysis for Key Issue #7

A single solution for this key issue was proposed in solution #14.

Commercial systems indeed use different RTCP messaging and these may also be considered in 5G RTP.

NOTE: It should be clarified what and or which messages would need further documentation and specification and what the benefits can be.

Suggested way forward, including recommendations for normative work: TBD.

## 7.8 Analysis for Key Issue #8

Two solutions were proposed, solution #9 and solution #11.

In solution #9 an additional flag is used to indicate that a packet is a retransmitted packet. The solution also identifies that not all fields of the RTP HE for PDU Set marking may be necessary for retransmitted PDUs.

This enables the network to prioritize the packet even if the PSI value is kept the same.

Solution #11 proposes setting a threshold on PSI values to enable senders to indicate a PSI value for which packets have to be retransmitted. This way a receiver can easily identify that retransmissions will happen even is some packets in the PDU Set were discarded or got lost.

The objectives from the key issue description seem to be partially addressed, except perhaps the objective considering the feasibility of RTP retransmission for XR media services, which was not discussed with much detail.

Suggested way forward, including recommendations for normative work: TBD.

## 7.9 Analysis for Key Issue #9

Only a single solution was proposed for this KI so far: solution #12. The solution shows that MID values inserted as a header extension to multiple RTP SSRC multiplexed streams can be used by the 5G System to map to different QoS flows.

Not all objectives of the key issue description have been addressed.

Suggested way forward, including recommendations for normative work: TBD.

## 7.10 Analysis for Key Issue #10

This key issue was not progressed.

## 7.11 Analysis for Key Issue #11

This key issue was not progressed. Enhancements to RTP HE for PDU Set marking have been considered in different key issues.

## 7.12 Analysis for Key Issue #12

Three solutions were proposed for this key issue: #6, #13, #16.

Solution #13 measures dynamic traffic characteristics in different settings using different types of RTP senders.

Solution #6 adds the Time to next Burst to RTP Header extension for PDU Set marking.

Solution #16 introduces a new header extension to support dynamic traffic characteristics such as time to next burst and burst size signalling.

NOTE: Alignment may be needed in the normative work but solutions point in the same direction of extending the header extension

Suggested way forward, including recommendations for normative work: TBD

## 7.13 Analysis for Key Issue #13

A single solution (#1) was proposed for this KI.

Solution #1 identifies the benefits of defining PDU Sets as tiles or subpictures (as opposed to frames or slices) in immersive video use cases and proposes to the signal the PDU Set type (e.g. frame, slice, tile) to the network for potentially improved network handling.

Suggested way forward, including recommendations for normative work: TBD

## 7.14 Analysis for Key Issue #14

One solution #12 was proposed. The mapping of SSRC multiplexed RTP streams to different QoS flows is supported and the bundling of streams is supported.

It seems that the support for PDU Sets as indicated in the description is not yet discussed.

Suggested way forward, including recommendations for normative work: TBD.

## 7.15 Analysis for Key Issue #15

This key issue does not yet have a solution, but the description was progressed.

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| END OF CHANGES |