**3GPP TSG SA WG4 Meeting #130 *S4-241863r01***

USA, Orlando, 18 – 22 November 2024 (revision of S4-240xxx)

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| *CR-Form-v12.2* | | | | | | | | |
| **Pesudo CHANGE REQUEST** | | | | | | | | |
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|  | **26.822** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **1.0.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | KI#2 Solution Periodicity and TTNB with lone PDU | | | | | | | | | |
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| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | SA4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5G\_RTP\_Ph2 | | | | |  | ***Date:*** | | | 2024-11-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Providing a new solution for the KI#2. | | | | | | | | |
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| ***Summary of change:*** | | Some scenarios exist where lone PDUs and PDUs belonging to a PDU Set from different media flows are mapped into the same QoS Flow. And propose the following 3 bullets to avoid the co-existence of lone PDUs and PDUs belonging to a PDU Set in the same QoS Flow :   1. The AS can provide explicit different QoS requirements for different streams to the 5G network. And the 5G network maps different streams into different QoS Flows with different QoS. 2. If different media streams are multiplexed into the same RTP service data flow by the AS, the AS can provide packet filter extension as agreed in R19 TS23.501 to help the 5G network to demultiplex the different media streams from the same RTP service data flow, the AS also provides explicit different QoS requirements for different media streams. In such a way, the R19 5G network can map these different media streams to different QoS Flows. 3. The AS provides the Periodicity and/or TTNB information per demultiplexed media stream (e.g. audio, video) instead of per RTP service data flow. | | | | | | | | |
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| ***Consequences if not approved:*** | | The KI#2 lone PDU continues to exist in R19. | | | | | | | | |
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| ***Clauses affected:*** | | 6.x (new) | | | | | | | | |
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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 (all new text)\* \* \* \*

## 6. x Solution #x: Periodicity and TTNB with the lone PDU

### 6.x.1 Key Issue mapping

This solution intends to give gap analysis on the KI#2: QoS handling requirements for lone PDU.

### 6.x.2 Description

For the downlink direction, the PSA UPF identifies PDUs that belong to PDU Sets and marks them accordingly as described in clause 5.37.5.2 of TS 23.501 [3]. If the PSA UPF receives a PDU that does not belong to a PDU Set based on Protocol Description for PDU Set identification, then the PSA UPF still maps it to a PDU Set and determines the PDU Set Information as described in clause 5.37.5.2 of the TS23.501 [3]. In this case, both the single PDU and the PDUs belonging to a PDU Set are mapped into the same QoS Flow and the single PDU is delivered to the UE in the DL direction following the PDU Set QoS parameters of the QoS Flow.

When PDU Set marking is activated, there should be no lone PDUs with other PDUs belonging to a PDU Set in the same service data flow. There are other scenarios where lone PDUs and PDUs belonging to a PDU Set from different flows are mapped into the same QoS Flow as follows.

- **Scenario #A**: the RTP and RTCP flows are carried over a single RTP service data flow. When the PDU Set Marking is enabled in the UPF for the RTP flow(s), the UPF takes the RTCP traffic as lone PDUs (e.g. there is no RTP HE for the RTCP packets).

- **Scenario #B**: the RTP packets and retransmitted RTP packets are carried over a single RTP service data flow are carried over the same QoS Flow. When the PDU Set Marking is enabled in the UPF for the RTP flow, the UPF takes the retransmitted RTP traffic as lone PDUs.

- **Scenario #C:** Different RTP media streams multiplexed in a single RTP service data flow. In this scenario, multiple RTP media streams with different payload types are multiplexed in a single RTP service data flow. For example, if the audio and real-time subtitle streams are multiplexed in a single RTP service data flow and the video stream is in a different RTP service data flow, the UPF can use the Payload Type and NAL information to identify the audio PDU and does the PDU Set marking for the audio media and treats the realtime subtitle as the lone PDU.

As can be seen from the above, one key reason for the lone PDU handling is that the PDUs belonging to a PDU Set and the lone PDUs are carried over the same QoS Flow and the 5GS performs the PDU Set marking on all PDUs of the QoS Flow.

**Observation 1: the co-existence of lone PDUs and PDUs belonging to a PDU Set in the same QoS Flow is due to PDU Set marking performed per QoS Flow.**

The UL and/or DL Periodicity information may be provided by the application to the CN and then to NG-RAN to configure UE power saving management scheme for connected mode DRX and radio resource scheduling, normally the Periodicity is for the RTP stream of audio and video (it is unclear whether the Periodicity is provided to RTP stream of the realtime subtitle). If the single/lone PDUs are multiplexed into the PDU belonging to a PDU Set with Periodicity, the DL PDUs of the QoS Flow are received randomly in time by the NG-RAN and it is almost impossible for the NG-RAN to do Periodicity-based radio resource scheduling and UE power saving management.

**Observation 2: the co-existence of lone PDUs and PDUs belonging to a PDU Set in the same QoS Flow makes the Periodicity information provided by the AS useless to the NG-RAN.**

The TTNB is proposed in R19 to improve the UE power saving management scheme for connected mode DRX and radio resource scheduling by the NG-RAN, the TTNB can be provided in the RTP HE by the application. However, similarly as above, If the single/lone PDUs are multiplexed into the PDU belonging to a PDU Set with Periodicity, the DL PDUs of the QoS Flow to be received randomly in time by the NG-RAN and it is almost impossible for the NG-RAN to do Periodicity-based radio resource scheduling and UE power saving management.

**Observation 3: the co-existence of lone PDUs and PDUs belonging to a PDU Set in the same QoS Flow makes the TTNB provided by the AS useless to the NG-RAN.**

To solve the problems described above, the following information can be provided to the AS.

1. **The AS can provide explicit different QoS requirements for different streams to the 5G network. And the 5G network maps different streams into different QoS Flows with different QoS. For the RTCP, the 5G network can provide the same QoS parameters with the associated RTP media stream but with different QoS Flow. NG-RAN will normally bind the different QoS Flows with the same QoS parameters into the same DRB, in such case, the RTCP and RTP share the same radio channel and the SR and RR of the RTCP can have the same results as the RTCP and RTP in the single QoS Flow.**
2. **If different media streams are multiplexed into the same RTP service data flow by the AS, the AS can provide packet filter extension as agreed in R19 TS23.501 to help the 5G network to demultiplex the different media streams from the same RTP service data flow, the AS also provides explicit different QoS requirements for different media streams. In such a way, the R19 5G network can map these different media streams to different QoS Flows.**
3. **The AS provides the Periodicity and/or TTNB information per demultiplexed media stream (e.g. audio, video) instead of per RTP service data flow.**

Via the potential R19 enhancements in 5GS, it is possible to avoid the co-existence of lone PDUs and PDUs belonging to a PDU Set in the same QoS Flow.

### 6.x.3 Conclusion

Based on the gap analysis in the above, it is proposed to make the following conclusions.

1. **The AS can provide explicit different QoS requirements for different streams to the 5G network. And the 5G network maps different streams into different QoS Flows with different QoS. For the RTCP, the 5G network can provide the same QoS parameters with the associated RTP media stream but with different QoS Flow. NG-RAN will normally bind the different QoS Flows with the same QoS parameters into the same DRB, in such case, the RTCP and RTP share the same radio channel and the SR and RR of the RTCP can have the same results as the RTCP and RTP in the single QoS Flow.**
2. **If different media streams are multiplexed into the same RTP service data flow by the AS, the AS can provide packet filter extension as agreed in R19 TS23.501 to help the 5G network to demultiplex the different media streams from the same RTP service data flow, the AS also provides explicit different QoS requirements for different media streams. In such a way, the R19 5G network can map these different media streams to different QoS Flows.**
3. **The AS provides the Periodicity and/or TTNB information per demultiplexed media stream (e.g. audio, video) instead of per RTP service data flow.**

\* \* \* \* End of changes \* \* \* \*