**3GPP TSG-SA WG2 Meeting #159S2-2310803**

**Xiamen, China, 11 – 15 Oct., 2023**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.501** | **CR** | **5013** | **rev** | **-** | **Current version:** | **18.3.0** |  |
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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 | **X** | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:***  | Clarification on Downlink and Uplink PDU Set based handling  |
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| ***Source to WG:*** | Google |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | XRM |  | ***Date:*** | 2023-09-29 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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)* |
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| ***Reason for change:*** | In TS23.501, for the downlink direction, it has been enabled for supporting non-homogensous support of PDU Set based handling in NG-RAN. However, it is still not clear how 5GS performs uplink PDU Set based handling for two aspects:* what are the criteria for the UE to determine whether to perform the UL PDU Set Identification;
* how to enable non-homogeneous NG-RAN support for uplink PDU Set based handling

RAN2 currently is working on NG-RAN support for UL PDU Set based handling for radio resource management. This CR is proposed to address the agreements for clarification.  |
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| ***Summary of change:*** | It is proposed to clarify the followings:* different support indications for PDU Set based handling in the downlink and uplink directions are needed.
* it is up to NG-RAN decision how to indicate the UE for enabling uplink PDU Set based handling for the PDU Set based QoS flows of the PDU Session in different scenarios.
* the UE can obtain protocol description from the upper layers or from the SMF.
* it is UE implementation whether to enable/disable uplink PDU Set based handling including PDU Set identification based on the available information of protocol description from the upper layers or SMF, the NG-RAN indication for uplink PDU Set based handling, and UE status of available computing power, remaining battery power, and user preference settings, etc.
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| ***Consequences if not approved:*** | Lack of support of uplink PDU Set based handling |
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| ***Clauses affected:*** | 5.37.5 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**\*\*\*\*\*\*\*Start of changes\*\*\*\*\*\*\***

### 5.37.5 PDU Set based Handling

#### 5.37.5.1 General

A PDU Set is comprised of one or more PDUs carrying an application layer payload such as, e.g. a video frame or video slice. The PDU Set based QoS handling by the NG-RAN is determined by PDU Set QoS Parameters in the QoS profile of the QoS Flow (specified in clause 5.7.7) and PDU Set information provided by the PSA UPF via N3/N9 interface as described in clause 5.37.5.2. The PDU Set based QoS Handling can be applied for GBR and non-GBR QoS Flows.

In addition to the PDU related service information, the AF may provide PDU Set related assistance information for dynamic PCC control. One or more of the following PDU Set related assistance information may be provided to the NEF/PCF using the AF session with required QoS procedures in clauses 4.15.6.6 and 4.15.6.6a of TS 23.502 [3].

- PDU Set QoS Parameters as described in clause 5.7.7

- Protocol Description: Indicates transport protocol (e.g. RTP, SRTP), transport protocol header extensions (e.g. RTP Header Extension for PDU Set Marking as defined in TS 26.522 [179]), payload type and format (e.g. H.264, H.265), and format parameters (e.g. H.264 profile level and packetization mode) used by the service data flow.

AF provided PDU Set QoS Parameters and Protocol Description may be used in determining PCC Rules by the PCF as defined in clause 6.1.3.27.4 of TS 23.503 [45] and the Protocol Description may be used for identifying the PDU Set information by the PSA UPF.

When the SMF receives a PCC rule containing one or more PDU Set QoS Parameters (PSER, PSDB and PSIHI), the SMF adds these PDU Set QoS parameters to the QoS Profile of the QoS Flow as described in clause 6.2.2.4 of TS 23.503 [45]. Alternatively, the SMF may be configured to support PDU Set based QoS Handling without receiving PCC rules from a PCF.

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. If the UPF receives a PDU that does not belong to a PDU Set based on Protocol Description for PDU Set identification, then the UPF still maps it to a PDU Set and determines the PDU Set Information as described in clause 5.37.5.2.

NOTE: If the PSA UPF receives a PDU that does not belong to a PDU Set, then it is assumed that the UPF determines the PDU Set Importance value based on pre-configuration.

#### For the uplink direction, it is UE implementation to determine whether to perform PDU Set identification for uplink PDUs.5.37.5.2 PDU Set Information and Identification

To support PDU Set based QoS handling, the PSA UPF identifies downlink PDUs that belong to PDU Sets and determines the below PDU Set Information which it sends to the NG-RAN in the GTP-U header over N3 interface. The PDU Set information is used by the NG-RAN for PDU Set based QoS handling as described above.

The PDU Set Information comprises:

- PDU Set Sequence Number.

- Indication of End PDU of the PDU Set.

- PDU Sequence Number within a PDU Set.

- PDU Set Size in bytes.

- PDU Set Importance, which identifies the relative importance of a PDU Set compared to other PDU Sets within a QoS Flow.

The NG-RAN may use the Priority Level (see clause 5.7.3.3) across QoS Flows and PDU Set Importance within a QoS Flow for PDU Set level packet discarding in presence of congestion.

NOTE 1: In addition to considering the PDU Set Importance within a QoS Flow, NG-RAN could also consider the relative PDU Set Importance across QoS Flows of the same Priority Level when determining which PDU Set needs to be discarded, which is up to implementation and configuration of operator.

NOTE 2: The PDU Set Information can be different for different PDU Sets within a QoS Flow.

For the downlink direction, the SMF instructs PSA UPF to perform PDU Set marking and may provide the PSA UPF the Protocol Description used by the service data flow. The Protocol Description may be received in the PCC rule, based on information provided by the AF or by PCF local policies as described in clause 5.37.5.1.

The PSA UPF can identify the PDU Set Information using the Protocol Description and the received transport protocol headers and payload or using implementation specific means. The details of the RTP/SRTP headers, header extensions and/or payloads used to identify PDU Set Information are defined in TS 26.522 [179].

For each DL PDU received on N6 for which PDU Set based QoS handling is indicated from the SMF, the PSA UPF applies the rules for PDU Set identification and provides PDU Set Information which is available to the RAN in the GTP-U header.

For the uplink direction, the UE can identify the PDU Set based on Protocol Description used by the service data flow. The Protocol Description may be received from the upper layers of the UE or SMF.

#### 5.37.5.3 Non-homogenous support of PDU set based handling in NG-RAN

By sending at least one PDU Set QoS parameter to the NG-RAN, the SMF requests the NG-RAN to activate PDU Set QoS handling for a given QoS flow. For the downlink direction, the NG-RAN provides the SMF with an indication of whether the PDU Set based handling is supported. Based on this, SMF may activate the PDU Set identification and marking in the PSA UPF. For the uplink direction, the NG-RAN provides the UE with an indication of whether the PDU Set based handling is supported. Based on this, UE may determine whether to activate/deactivate the PDU Set identification based on available information, e.g. Protocol Description.

At NG-RAN Xn handover and N2 handover, the target NG-RAN provides to the SMF with an indication of whether the target NG-RAN node supports PDU Set based handling, as specified in TS 38.413 [34]. Based on the NG-RAN indication, the SMF may, upon completion of the handover procedure, initiate the PDU Session modification procedure to provide PDU Set QoS parameters to NG-RAN and configure the PSA UPF to activate/deactivate the PDU Set identification and marking.

In the case where the PSA UPF identifies and marks PDUs with PDU Set information in GTP-U header it shall start doing so from a complete PDU Set.

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