**3GPP SA WG2 Meeting #164 *S2-2407483***

**Maastricht, NL, 19 - 23 Aug 2024 *(was S2-240xxxx)***

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.501** | **CR** | **5407** | **rev** | **-** | **Current version:** | **19.0.0** |  |
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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 | **x** |

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| ***Title:*** | Leveraging PDU Set QoS information for DSCP marking over N3/N9 in the transport network | | | | | | | | | |
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| ***Source to WG:*** | Intel, InterDigital Inc, China Telecom, Nokia, Nokia Shanghai Bell… | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | XRM\_Ph2 | | | | |  | ***Date:*** | | | 2024-08-09 |
|  |  | | | |  | |  | | |  |
| ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | The following conclusion was agreed in TR 23.700-70 on Key Issue 3 (“Leverage PDU Set QoS information for DSCP marking over N3/N9 in the transport network”):  *- For every QoS Flow, the SMF shall determine the transport level packet marking value (e.g. the DSCP in the outer IP header) based on the 5QI, the Priority Level (if explicitly signalled) and optionally, the ARP priority level and provide the transport level packet marking value to the UPF as described in clause 5.8.2.7 of TS 23.501 [2]. For a QoS Flow configured for PDU Set QoS handling, besides the above information, the SMF may further consider PDU Set Importance values to be used by the QoS Flow, to provide a list of DSCP values, each of the DSCP values corresponding to one or several PDU Set Importance values.*  *NOTE 1: It is recommended that DSCP markings be used to vary the drop precedence between PDUs in the transport network nodes (e.g. IP routers) on the N3/N9 interfaces. If the Class Selector Codepoint of the DSCP markings varies within a QoS Flow, the packets of the QoS Flow can be reordered by the transport network.*  *NOTE 2: The transport level marking values being provided on per-QoS Flow basis, it is up to operator deployments to enforce consistency of transport level marking in the transport network.*  *- The SMF sends the mapping list of the transport level marking for DL packets (N3/N9 interface) and related PDU set importance value(s) in the FAR to the UPF, and the UPF performs the DSCP value marking based additionally on the PDU Set Importance per PDU Set.* | | | | | | | | |
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| ***Summary of change:*** | | Introduction of functionality for Leveraging PDU Set QoS information for DSCP marking over N3/N9 in the transport network, according to the KI#3 conclusions in TR 23.700-70 clause 8.3. | | | | | | | | |
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| ***Consequences if not approved:*** | | New feature not implemented in the specification. | | | | | | | | |
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| ***Clauses affected:*** | | 5.8.2.7; 5.8.5.6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

>>>>BEGINNING OF CHANGES<<<<

#### 5.8.2.7 PDU Session and QoS Flow Policing

ARP is used for admission control (i.e. retention and pre-emption of the new QoS Flow). The value of ARP is not required to be provided to the UPF.

For every QoS Flow, the SMF shall determine the transport level packet marking value (e.g. the DSCP in the outer IP header) based on the 5QI, the Priority Level (if explicitly signalled) and optionally, the ARP priority level and provide the transport level packet marking value to the UPF.

For QoS Flows that are configured for PDU Set QoS handling, the SMF may provide a list of DSCP values for the downlink direction, each of the DSCP values corresponding to one or several PDU Set Importance values. The SMF sends the list of DSCP values (i.e. the transport level marking for DL packets on the N3/N9 interface) and related PDU Set Importance value(s) in the FAR to the UPF, and based on that, the UPF performs the DSCP value marking based on the PDU Set Importance per PDU Set.

NOTE 1: It is recommended that PDU Set Importance based DSCP marking values be used only to vary the drop precedence between PDUs in the transport network nodes (e.g. IP routers) on the N3/N9 interfaces. This is needed to avoid causing packet reordering in the transport network when different DSCP marking values are used for a single QoS Flow.

NOTE 2: The transport level packet marking values are provided on per-QoS Flow basis and it is up to operator deployments to enforce consistency of transport level marking in the transport network.

The SMF shall provide the Session-AMBR values of the PDU Session to the UPF so that the UPF can enforce the Session-AMBR of the PDU Session across all Non-GBR QoS Flows of the PDU Session.

SMF shall provide the GFBR and MFBR value for each GBR QoS Flow of the PDU Session to the UPF. SMF may also provide the Averaging window to the UPF, if Averaging window is not configured at the UPF or if it is different from the default value configured at the UPF.

SMF may decide to activate ECN marking for L4S by PSA UPF for the QoS Flow (see clause 5.37). In this case, the SMF shall send an ECN marking for L4S indicator to PSA UPF.

>>>>NEXT CHANGE<<<<

#### 5.8.5.6 Forwarding Action Rule

The following table describes the Forwarding Action Rule (FAR) that defines how a packet shall be buffered, dropped or forwarded, including packet encapsulation/decapsulation and forwarding destination.

Table 5.8.5.6-1: Attributes within Forwarding Action Rule

|  |  |  |
| --- | --- | --- |
| Attribute | Description | Comment |
| N4 Session ID | Identifies the N4 session associated to this FAR. | NOTE 9. |
| Rule ID | Unique identifier to identify this information. |  |
| Action | Identifies the action to apply to the packet | Indicates whether the packet is to be forwarded, duplicated, dropped or buffered.  When action indicates forwarding or duplicating, a number of additional attributes are included in the FAR.  For buffering action, a Buffer Action Rule is also included and the action can also indicate that a notification of the first buffered and/or a notification of first discarded packet is requested (see clause 5.8.3.2).  For drop action, a notification of the discarded packet may be requested (see clause 5.8.3.2). |
| Network instance  (NOTE 2) | Identifies the Network instance associated with the outgoing packet (NOTE 1). | NOTE 8. |
| Destination interface  (NOTE 3)  (NOTE 7) | Contains the values "access side", "core side", "SMF", "N6-LAN", "5G VN internal". | Identifies the interface for outgoing packets towards the access side (i.e. down-link), the core side (i.e. up-link), the SMF, the N6-LAN (i.e. the DN), or to 5G VN internal (i.e. local switch). |
| Outer header creation  (NOTE 3) | Instructs the UP function to add an outer header (e.g. IP+UDP+GTP, VLAN tag), IP + possibly UDP to the outgoing packet. | Contains the CN tunnel info, N6 tunnel info or AN tunnel info of peer entity (e.g. NG-RAN, another UPF, SMF, local access to a DN represented by a DNAI) (NOTE 8).  Any extension header stored for this packet shall be added.  The time stamps should be added in the GTP-U header if QoS Monitoring for packet delay is enabled for the traffic corresponding to the PDR(s). |
| Send end marker packet(s)  (NOTE 2) | Instructs the UPF to construct end marker packet(s) and send them out as described in clause 5.8.1. | This parameter should be sent together with the "outer header creation" parameter of the new CN tunnel info. |
| Transport level marking  (NOTE 3) | Transport level packet marking in the uplink and downlink, e.g. setting the DiffServ Code Point. When the network is configured to take the PDU Set Importance into account for transport level marking, the SMF may provide a list of DSCP values for the downlink direction, each of the DSCP values corresponding to one or several PDU Set Importance values. | NOTE 8. |
| Forwarding policy  (NOTE 3) | Reference to a preconfigured traffic steering policy or http redirection (NOTE 4). | The Forwarding policy refers to a preconfigured forwarding behaviour in UPF, which may be related to:  - N6-LAN steering to steer the subscriber's traffic to the appropriate N6 Service Functions deployed by the operator;  - local N6 steering to enable traffic steering in the local access to the DN according to the routing information provided by an AF as described in clause 5.6.7;  - a Redirect Destination and values for the forwarding behaviour (always, after measurement report (for termination action "redirect")). |
| Metadata  (NOTE 10) | Metadata the UPF needs to add to traffic sent over a SFC. | The metadata information is associated with a TSP ID related to N6-LAN steering. |
| Request for Proxying in UPF | Indicates that the UPF shall perform ARP proxying and / or IPv6 Neighbour Solicitation Proxying as specified in clause 5.6.10.2. | Applies to the Ethernet PDU Session type. |
| Container for header enrichment  (NOTE 2) | Contains information to be used by the UPF for header enrichment. | Only relevant for the uplink direction. |
| Buffering Action Rule  (NOTE 5) | Reference to a Buffering Action Rule ID defining the buffering instructions to be applied by the UPF  (NOTE 6) |  |
| NOTE 1: Needed e.g. if:  - UPF supports multiple DNN with overlapping IP addresses;  - UPF is connected to other UPF or NG-RAN node in different IP domains;  - UPF "local switch" and N19 forwarding is used for different 5G LAN groups.  NOTE 2: These attributes are required for FAR action set to forwarding.  NOTE 3: These attributes are required for FAR action set to forwarding or duplicating.  NOTE 4: The TSP ID is preconfigured in the SMF and used to determine the Forwarding Policy included in the FAR according to the description in clause 5.6.7 and clause 6.1.3.14 of TS 23.503 [45] for local N6 steering and in clause 5.6.16 and clause 6.1.3.14 of TS 23.503 [45] for N6-LAN steering. The Forwarding Policy action is enforced before the Outer header creation actions.  NOTE 5: This attribute is present for FAR action set to buffering.  NOTE 6: The buffering action rule is created by the SMF and associated with the FAR in order to apply a specific buffering behaviour for UL/DL packets requested to be buffered, as described in clause 5.8.3 and clause 5.2.4 of TS 29.244 [65].  NOTE 7: The use of "5G VN internal" instructs the UPF to send the packet back for another round of ingress processing using the active PDRs pertaining to another N4 session of the same 5G VN group.  NOTE 8: When in architectures defined in clause 5.34, a FAR is sent over N16a from SMF to I-SMF, the FAR sent by the SMF may indicate that the I-SMF is to locally determine the value of this attribute in order to build the N4 FAR rule sent to the actual UPF controlled by the I-SMF. This is further defined in clause 5.34.6.  NOTE 9: In the architecture defined in clause 5.34, the rules exchanged between I-SMF and SMF are not associated with a N4 Session ID but are associated with a N16a association.  NOTE 10: The use of Metadata is described in clause 5.6.16. How the UPF transforms the Metadata into actual information sent with the traffic (e.g. in the encapsulation header) is based on local policies related with the Forwarding Policy and not specified. | | |

>>>>END OF CHANGES<<<<