**3GPP SA WG2 Meeting #164 *S2-2408820***

**Maastricht, Nederlands, Aug 19 – 23, 2024 (revision of S2-2408508)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.501** | **CR** | **5595** | **rev** | **1** | **Current version:** | **19.0.0** |  |
|  | | | | | | | | |
| *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 | **X** | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Support of Data Burst Size provisioning to NG-RAN | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, vivo?, Xiaomi?, Huawei, Hisilicon, Samsung | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | XRM\_Ph2 | | | | |  | ***Date:*** | | | 2024-08-22 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The specification of XRM\_Ph2 conclusions on KI#5. Support of Data Burst Size provisioning to NG-RAN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Following enhancements are introduced:   * Traffic detection at UPF includes the detection of the Data Burst Size. * Protocol Description in PDRs is also used to assist Data Burst Size identification. * QER is enhanced to include the Data Burst Size in the GTP-U header of the first PDU(s) of a data burst. * 5.37.x new clause to describe the Data Burst Size provisioning to NG-RAN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Data Burst Size provisioning to NG-RAN is not supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.8.2.4.2, 5.8.5.3, 5.8.5.4, 5.37.1, 5.37.x (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ...  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 \* \* \* \*

##### 5.8.2.4.2 Traffic Detection Information

The SMF controls the traffic detection at the UP function by providing detection information for every PDR.

For IPv4 or IPv6 or IPv4v6 PDU Session type, detection information is a combination of:

- CN tunnel info.

- Network instance.

- QFI.

- IP Packet Filter Set as defined in clause 5.7.6.2.

- Application Identifier: The Application Identifier is an index to a set of application detection rules configured in UPF.

- FQDN Filter for DNS Query message.

For Ethernet PDU Session type, detection information is a combination of:

- CN tunnel info.

- Network instance.

- QFI.

- Ethernet Packet Filter Set as defined in clause 5.7.6.3.

In this Release of the specification for Unstructured PDU Session Type, the UPF does not perform-QoS Flow level traffic detection for QoS enforcement.

Traffic detection information sent by the SMF to the UPF for a PDU Session may be associated with Network instance for detection and routing of traffic over N6. In the case of IP PDU Session Type, Network Instances can, e.g. be used by the UPF for traffic detection and routing in the case of different IP domains or overlapping IP addresses. In the case of Ethernet PDU Session Type, different Network Instances can e.g. be configured in the UPF with different ways to handle the association between N6 and the PDU Sessions.

Based on SMF instructions, UPF may identify the PDU Sets, according to the Protocol Description in PDR, to derive the PDU Set Information for DL traffics and send it to RAN via DL GTP-U header of each PDU identified as belonging to a PDU Set. The PDU Set Information, is described in clause 5.37.5. The PDU Set identification can be done by UPF implementation or by detecting RTP/SRTP header or payload. The details of the RTP/SRTP headers, header extensions and/or payloads used to identify PDU Sets are defined in TS 26.522 [179].

Based on SMF instructions, UPF may identify the End of Data Burst based on Protocol Description or UPF implementation, as described in clause 5.37.8.3.

Based on SMF instructions, UPF may identify the Data Burst Size based on Protocol Description provided by the SMF, as described in clause 5.37.x.1.

\* \* \* \* Next change \* \* \* \*

#### 5.8.5.3 Packet Detection Rule

The following table describes the Packet Detection Rule (PDR) containing information required to classify a packet arriving at the UPF. Every PDR is used to detect packets in a certain transmission direction, e.g. UL direction or DL direction.

Table 5.8.5.3-1: Attributes within Packet Detection Rule

|  |  |  |  |
| --- | --- | --- | --- |
| Attribute | | Description | Comment |
| N4 Session ID | | Identifies the N4 session associated to this PDR. NOTE 5. |  |
| Rule ID | | Unique identifier to identify this rule. |  |
| Precedence | | Determines the order, in which the detection information of all rules is applied. |  |
| Packet | Source interface | Contains the values "access side", "core side", "SMF", "N6-LAN", "5G VN internal". | Combination of UE IP address (together with Network instance, if necessary), CN tunnel info, |
| Detection | UE IP address | One IPv4 address and/or one IPv6 prefix with prefix length (NOTE 3). | packet filter set, application identifier, Ethernet PDU Session |
| Information.  NOTE 4. | Network instance (NOTE 1) | Identifies the Network instance associated with the incoming packet. | Information and QFI are used for traffic detection.  Source interface identifies the |
|  | CN tunnel info | CN tunnel info on N3, N9 interfaces, i.e. F-TEID. | interface for incoming packets |
|  | Packet Filter Set | Details see clause 5.7.6. | where the PDR applies, e.g. from access side (i.e. up-link), |
|  | Application identifier |  | from core side (i.e. down-link), |
|  | QoS Flow ID | Contains the value of 5QI or non-standardized QFI. | from SMF, from N6-LAN (i.e. the |
|  | Ethernet PDU Session Information | Refers to all the (DL) Ethernet packets matching an Ethernet PDU session, as further described in clause 5.6.10.2 and in TS 29.244 [65]. | DN), or from "5G VN internal" (i.e. local switch). |
|  | Framed Route Information | Refers to Framed Routes defined in clause 5.6.14. | Details like all the combination possibilities on N3, N9 interfaces are left for stage 3 decision. |
|  | FQDN Filter for DNS Query | Contains one or more FQDN, FQDN range, and/or any FQDN. | The FQDN or FQDN range only used for detection of plain DNS Query message (i.e. not subject to ciphering). The usage is described in TS 23.548 [130]. |
|  | Protocol Description | Indicates service protocol used by the flow (NOTE 8). |  |
| Packet replication and detection carry on information | Packet replication skip information NOTE 7 | Contains UE address indication or N19/N6 indication. If the packet matches the packet replication skip information, i.e. source address of the packet is the UE address or the packet has been received on the interface in the packet replication skip information, the UP function neither creates a copy of the packet nor applies the corresponding processing (i.e. FAR, QER, URR). Otherwise the UPF performs a copy and applies the corresponding processing (i.e. FAR, QER, URR). |  |
| NOTE 6 | Carry on indication | Instructs the UP function to continue the packet detection process, i.e. lookup of the other PDRs. |  |
| Outer header removal | | Instructs the UP function to remove one or more outer header(s) (e.g. IP+UDP+GTP, IP + possibly UDP, VLAN tag), from the incoming packet. | Any extension header shall be stored for this packet. |
| Forwarding Action Rule ID (NOTE 2) | | The Forwarding Action Rule ID identifies a forwarding action that has to be applied. |  |
| Multi-Access Rule ID (NOTE 2) | | The Multi-Access Rule ID identifies an action to be applied for handling forwarding for a MA PDU Session. |  |
| List of Usage Reporting Rule ID(s) | | Every Usage Reporting Rule ID identifies a measurement action that has to be applied. |  |
| List of QoS Enforcement Rule ID(s) | | Every QoS Enforcement Rule ID identifies a QoS enforcement action that has to be applied. |  |
| NOTE 1: Needed e.g. if:  - UPF supports multiple DNN with overlapping IP addresses;  - UPF is connected to other UPF or AN node in different IP domains.  - UPF "local switch", N6-based forwarding and N19 forwarding is used for different 5G LAN groups.  - UPF "local switch" may be used for DNN/S-NSSAI dedicated for PIN.  NOTE 2: Either a FAR ID or a MAR ID is included, not both.  NOTE 3: The SMF may provide an indication asking the UPF to allocate one IPv4 address and/or IPv6 prefix. When asking to provide an IPv6 Prefix the SMF provides also an IPv6 prefix length.  NOTE 4: When in the architecture defined in clause 5.34, a PDR is sent over N16a from SMF to I-SMF, the Packet Detection Information may indicate that CN tunnel info is to be locally determined. This is further defined in clause 5.34.6.  NOTE 5: 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 6: Needed in the case of support for broadcast/multicast traffic forwarding using packet replication with SMF-provided PDRs and FARs as described in clause 5.8.2.13.3.2.  NOTE 7: Needed in the case of packet replication with SMF-provided PDRs and FARs as described in clause 5.8.2.13.3.2, to prevent UPF from sending the broadcast/multicast packets back to the source UE or source N19/N6.  NOTE 8: Not for PDR matching. It may be provided to assist PDU Set identification when PDU Set Identification and marking applies to the PDR and/or to assist identification of the last packet of the Data burst in downlink when End of Data Burst identification and marking in downlink applies to the PDR. It may also assist determination of the Data Burst Size of the data burst when Data Burst Size determination and marking in downlink applies to the PDR. See clause 5.8.2.4.2 and TS 26.522 [179]. | | | |

\* \* \* \* Next change \* \* \* \*

#### 5.8.5.4 QoS Enforcement Rule

The following table describes the QoS Enforcement Rule (QER) that defines how a packet shall be treated in terms of bit rate limitation and packet marking for QoS purposes. All Packet Detection Rules that refer to the same QER share the same QoS resources, e.g. MFBR.

Table 5.8.5.4-1: Attributes within QoS Enforcement Rule

|  |  |  |
| --- | --- | --- |
| Attribute | Description | Comment |
| N4 Session ID | Identifies the N4 session associated to this QER |  |
| Rule ID | Unique identifier to identify this information. |  |
| QoS Enforcement Rule correlation ID (NOTE 1) | An identity allowing the UP function to correlate multiple Sessions for the same UE and APN. | Is used to correlate QoS Enforcement Rules for APN-AMBR enforcement. |
| Gate status UL/DL | Instructs the UP function to let the flow pass or to block the flow. | Values are: open, close, close after measurement report (for termination action "discard"). |
| Maximum bitrate | The uplink/downlink maximum bitrate to be enforced for the packets. | This field may e.g. contain any one of:  - APN-AMBR (for a QER that is referenced by all relevant Packet Detection Rules of all PDN Connections to an APN) (NOTE 1).  - Session-AMBR (for a QER that is referenced by all relevant Packet Detection Rules of the PDU Session)  - QoS Flow MBR (for a QER that is referenced by all Packet Detection Rules of a QoS Flow)  - SDF MBR (for a QER that is referenced by the uplink/downlink Packet Detection Rule of a SDF)  - Bearer MBR (for a QER that is referenced by all relevant Packet Detection Rules of a bearer) (NOTE 1). |
| Guaranteed bitrate | The uplink/downlink guaranteed bitrate authorized for the packets. | This field contains:  - QoS Flow GBR (for a QER that is referenced by all Packet Detection Rules of a QoS Flow)  - Bearer GBR (for a QER that is referenced by all relevant Packet Detection Rules of a bearer) (NOTE 1). |
| Averaging window | The time duration over which the Maximum and Guaranteed bitrate shall be calculated. | This is for counting the packets received during the time duration. |
| Down-link flow level marking | Flow level packet marking in the downlink. | For UPF, this is for controlling the setting of the RQI in the encapsulation header as described in clause 5.7.5.3. |
| QoS Flow ID | QoS Flow ID to be inserted by the UPF. | The UPF inserts the QFI value in the tunnel header of outgoing packets. |
| Paging Policy Indicator | Indicates the PPI value the UPF is required to insert in outgoing packets (see clause 5.4.3.2). | PPI applies only for DL traffic. The UPF inserts the PPI in the outer header of outgoing PDU. |
| Packet rate (NOTE 1) | Number of packets per time interval to be enforced. | This field contains any one of:  - downlink packet rate for Serving PLMN Rate Control (the QER is referenced by all PDRs of the UE belonging to PDN connections using CIoT EPS Optimisations as described in TS 23.401 [26]).  - uplink/downlink packet rate for APN Rate Control (the QER is referenced by all PDRs of the UE belonging to PDN connections to the same APN using CIoT EPS Optimisations as described in TS 23.401 [26]). |
| End of Data Burst Marking Indication | Indicates to the UPF to provide an End of Data Burst indication of the last PDU of a Data burst to the NG-RAN over GTP-U | NG-RAN can configure UE power management schemes like connected mode DRX when UPF provides an indication of the End of Data Burst, see clause 5.37.8.3. |
| Data Burst Size Marking Indication | Indicates to the UPF to insert the Data Burst Size of the data burst to the GTP-U header of the first PDU(s) of the data burst. | NG-RAN may use the received Data Burst Size to assist radio resource management, see clause 5.37.X. |
| PDU Set Information marking Indicator | Indicates the UPF to insert PDU Set Information related to packets belonging to a PDU Set into GTP-U header. | UPF identifies PDU Sets in DL traffic and forwards PDU Set related information of each PDU to the NG-RAN over GTP-U, as described in clause 5.37.5. |
| ECN marking for L4S indicator | Indicates the UPF to perform ECN marking for L4S for the corresponding QoS Flow. | UPF uses information sent by NG-RAN in GTP-U header extension to perform ECN marking for L4S for the corresponding direction. |
| NOTE 1: This parameter is only used for interworking with EPC. | | |

\* \* \* \* Next change \* \* \* \*

### 5.37.1 General

This clause provides an overview of 5GS functionalities for support of XR services (AR/VR applications) and interactive media services that require high data rate and low latency communication, e.g. cloud gaming and tactile/multi-modal communication services according to service requirements documented in TS 22.261 [2]. The standardized 5QI characteristics for such interactive services are provided in Table 5.7.4-1 and TSCAI is used to describe the related traffic characteristics as defined in clause 5.27.2. Further enhancements for these interactive media services are as follows:

- The 5GS may support QoS policy control for multi-modal traffic, see clause 5.37.2.

- The 5GS may support network information exposure which can be based on ECN markings for L4S, see clause 5.37.3 or 5GS exposure API, see clause 5.37.4.

- The 5GS may support PDU Set based QoS handling including PDU Set identification and marking, see clause 5.37.5.

- The 5GS may ensure that the UL and DL packets together meet the requested round trip delay and also update the delay for UL and DL considering QoS monitoring results, see clause 5.37.6.

- The 5GS may perform per-flow Packet Delay Variation (PDV) monitoring and policy control according to AF provided requirements, see clause 5.37.7.

- The 5GC may provide traffic assistance information to the NG-RAN to enable Connected mode DRX power saving, see clause 5.37.8.

- The 5GS may consider dynamically changed traffic characteristics for better resource management, see clause 5.37.x.

\* \* \* \* Next change \* \* \* \*

### 5.37.x Supporting dynamically changed traffic characteristics

#### 5.37.x.1 DL Data Burst Size notification

The Data Burst Size may be provided to the NG-RAN by the UPF in order to assist radio resource management like downlink scheduling.

The AF may provide to the PCF via NEF or directly to the PCF (when the AF is trusted) information in the DL Protocol Description to assist the identification of the Data Burst Size. The PCF may include an indication for SMF to request the UPF to identify and marking the Data Burst Size of the data burst within the PCC Rules. The PCF may also include the Protocol Description received from AF or based on local policies.

Based on the Data Burst Size Marking indication in a PCC Rule and/or local operator policies, the SMF instructs the UPF to identify and mark the Data Burst Size in the GTP-U header of the first PDU(s) of the data burst in downlink. The SMF may provide the UPF the Protocol Description received in the PCC Rule.

According to the Data Burst Size Marking indication and Protocol Description from the SMF, the UPF identifies the Data Burst Size carried in a downlink N6 packet header of the first PDU(s) of the data burst. The UPF sends the Data Burst size to NG-RAN in a downlink GTP-U header of the first PDU(s) of the data burst.

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