**3GPP TSG-SA5 Meeting #141e *S5-221349rev1***

**17 - 26 January 2022, E-meeting**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **32.255** | **CR** | **0368** | **rev** | **-** | **Current version:** | **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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Add charging information for 5GS usage for Edge Computing | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | EDGE\_CH | | | | |  | ***Date:*** | | | 2022-01-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)*  *Rel-17 (Release 17)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The correlation between service data flow and edge application is needed for Edge Computing (EC) charging, according to the conclusion of TR 28.815.  The QoS monitoring report is required to support 5GS usage charging for edge computing, and is currently defined for the PDU session level in this TS. However, the QoS monitoring report is per QoS flow per UE, therefore it is more reasonable to be defined in the charging information per service data flow. Therefore, it is proposed to move the QoS monitoring report from PDU session charging information to PDU Container information. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Added a statement that each application is assigned with a specific service id to support EC charging.  Moved QoS monitoring report from PDU session charging information to PDU Container information. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | There is no way to report QoS monitoring report per service data flow for edge application. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.2.1.2, 6.2.1.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

|  |
| --- |
| **1st modified section** |

### 5.1.2 Requirements

The following are high-level charging requirements specific to the packet domain, derived from the requirements in TS 22.115 [101], TS 22.261 [102], TS 23.501 [200], TS 23.502 [201] and TS 23.503 [202].

- The SMF shall support converged online and offline charging.

- The SMF may support offline only charging.

- The SMF shall support PDU session charging using service based interface.

- The SMF shall support network slice instance charging.

- The SMF shall collect charging information per PDU session for UEs served under 3GPP access and non-3GPP access (untrusted non-3GPP access, trusted non-3GPP access and wireline).

- Every PDU session shall be assigned a unique identity number for billing purposes per PLMN. (i.e. the Charging Id).

- Data volumes on both the uplink and downlink directions shall be counted separately. The data volumes shall reflect the data as delivered to and forwarded from the user.

- The charging mechanisms shall provide the date and time information when the PDU session starts.

- The SMF shall be capable of handling the Charging Characteristics. Charging Characteristics can be specific to a subscription or subscribed DNN.

- The SMF may be capable of identifying data volumes, elapsed time or events for individual service data flows (flow based charging). One PCC rule identifies one service data flow.

- SMF shall allow reporting of the service or the detected application usage per rating group or per combination of the rating group and service id. This reporting level can be activated per PCC rule. Each application shall be assigned with a specific service id.

- The quota management shall be per rating group per PDU session.

- If there are multiple UPFs for one PDU session, the quota management may be one for all UPFs or separate per UPF and the usage and charging information reporting per UPF.

- The SMF shall support charging for PDU Session types of IP, Ethernet and Unstructured.

- In Home Routed scenario, the SMF shall collect charging information per PDU session and, based on Home Operator policy and agreement between Home and Visit Operators, shall be able to collect charging information per Qos Flow for in-bound and out-bound roamers in Home Routed scenario.

- For interworking between 5GS and EPC, the dedicated PGW-C + SMF shall collect charging information using the same mechanisms as the SMF.

- The SMF shall support PDU session charging when the PDU session is served by both I-SMF and SMF.

- The SMF shall support charging for MA PDU Connectivity Service over 3GPP access and non-3GPP access.

- The SMF in VPLMN and in HPLMN shall support charging for MA PDU Connectivity Service in roaming Home Routed scenario with UE registered to the same VPLMN for 3GPP access and non-3GPP access.

- The SMF in HPLMN shall support charging for MA PDU Connectivity Service in roaming Home Routed scenario with UE registered in different PLMNs.

- The SMF shall support the charging of redundant transmission for high reliability communication.

- The SMF shall support the charging of 5G LAN VN group communication.

|  |
| --- |
| **Next modified section** |

#### 6.2.1.2 Definition of PDU session charging information

PDU session specific charging information used for 5G data connectivity charging is provided within the PDU session charging Information.

The detailed structure of the PDU Session Charging Information can be found in table 6.2.1.2.1.

Table 6.2.1.2.1: Structure of PDU Session Charging Information

|  |  |  |
| --- | --- | --- |
| Information Element | Category | Description |
| Charging Id | OM | This field holds the Charging Id for PDU session. |
| Home Provided Charging Id | OC | This field holds the Charging Id generated by H-SMF.This field is only applicable in V-SMF in the home routed roaming scenario for EPS to 5GS interworking. |
| User Information | OM | Group of user information. |
| User Identifier | OC | This field contains the identification of the user (i.e. GPSI). |
| User Equipment Info | OC | This field holds the identification of the terminal (i.e. PEI, MAC Address)  It is used for identifying the user in case SUPI is not present during emergency service. The detail identification of the wireline access is specified in clause 4.7.7 of TS 23.316 [203]. |
| unauthenticatedFlag | OC | This field indicates the served SUPI is not authenticated. |
| Roamer In Out | OC | This field holds an indication if the roamer is in-bound or out-bound. This field is present only if UE is identified as a roamer. |
| User Location Info | OC | This field indicates details of where the UE is currently located (access-specific user location information).  For MA PDU session, this field holds the user location associated to the 3GPP access |
| MA PDU Non 3GPP User Location info | OC | This field holds the user location associated to the non 3GPP access for MA PDU session. |
| User Location Time | OC | This field holds the UTC time at which the UE was last known to be in the location.  For MA PDU session, this field holds the user location time associated to the 3GPP access. |
| MA PDU Non 3GPP User Location Time | OC | This field holds the user location time associated to the non 3GPP access for MA PDU session. |
| UE Time Zone | OC | This field holds the Time Zone of where the UE is located, if available where the UE currently resides. |
| Presence Reporting Area Information | OC | This field contains part of the Presence Reporting Area Information of UE as defined in TS 23.501[200], comprising the Presence Reporting Area identifier(s) and an indication on whether the UE is inside or outside the Presence Reporting Area, if available. |
| PDU Session Information | OC | Group of PDU session information. |
| PDU Session ID | M | This field holds identifier of PDU session. |
| Network Slice Instance Identifier | OM | This field holds network slice information the PDU session belongs to. |
| PDU Type | OM | This field holds the type of PDU session. |
| PDU Address | OC | Group of UE IP address. |
| PDU Ipv4 Address | OC | This field holds the IP Address of the served SUPI allocated for PDU session, i.e. IPv4 address. |
| PDU IPv6 Address with Prefix | OC | This field holds the IP Address of the served SUPI allocated for PDU session, i.e. IPv6 prefix. |
| PDU Address prefix length | OC | PDP/PDN Address prefix length of an IPv6 typed Served PDU Address. The field needs not available for prefix length of 64 bits. |
| IPv4 Dynamic Address Flag | OC | This field indicates whether served PDP/PDN address for IPv4 is dynamically allocated. This field is missing if address is static. |
| IPv6 Dynamic Address Flag | OC | This field indicates whether served PDP/PDN address for IPv6 is dynamically allocated. This field is missing if address is static. |
| Additional PDU IPv6 prefixes | OC | This field holds a list of additional IPv6 prefix allocated for the PDU session, when applicable. |
| SSC Mode | OC | This field holds SSC mode of PDU session. |
| MA PDU session information | OC | This field holds information associated to the MA PDU session. |
| MA PDU session indicator | OC | This field indicates the PDU session is a MA PDU session requested by the UE or requested by Network modification based ATSSS capabilities provided by the UE and the Network. |
| ATSSS capability | OC | This field holds the ATSSS capability supported by the MA PDU session |
| SUPI PLMN ID | OC | This field holds PLMN ID of the SUPI. |
| Serving Network Function ID | OC | This field holds the identity of the serving network function  - AMF identity for the PDU sessions being served by SMF in non-roaming  - V-SMF identity for the home routed roaming  - I-SMF identity for PDU session being served by SMF + I-SMF  - ePDG identity for handover between EPC/ePDG and 5GS  - SGW identity for the EPC/E-UTRAN interworking  In all other cases the identity is implementation specific. |
| Serving Network Function Functionality | M | This field holds the functionality of the serving network function:  - AMF for the PDU sessions being served by SMF in non-roaming  - SMF for the home routed roaming  - I-SMF for the PDU session being served by SMF + I-SMF  - ePDG for handover between EPC/ePDG and 5GS  - SGW for EPC/E-UTRAN interworking. |
| Serving Network Function Name | OC | This field holds the unique identifier of the serving network function instance. |
| Serving Network Function Addresses | OC | This field holds the IP addresses of the serving network function. |
| Serving Network Function FQDN | OC | This field holds the FQDN the serving network function.  When the serving network function is an AMF, this FQDN is the AMF name as defined in clause 5.9.5 of 3GPP TS 23.501 [200]. |
| Serving Network Function PLMN ID | OC | This field holds the PLMN ID of the network the Serving Network Function belongs to. |
| AMF Identifier | OC | This field holds the AMF identifier. |
| Serving CN PLMN ID | OC | This field holds the serving Core Network Operator PLMN ID selected by the UE if different from SMF PLMN ID. |
| RAT Type | OC | This field holds the Radio Access Technology (RAT) currently serving the UE.  For MA PDU session, this field holds the Radio Access Technology (RAT) associated to the 3GPP access |
| MA PDU Non 3GPP RAT Type | OC | This field holds the Radio Access Technology (RAT) serving the UE in non 3GPP access for MA PDU session. |
| Data Network Name Identifier | M | This field contains the identifier of the DNN the user is connected to. |
| DNN Selection Mode | OC | This field indicates whether the requested DNN corresponds to an explicitly subscribed DNN or to the usage of a wildcard subscription. |
| Authorized QoS Information | OC | This field holds the authorized QoS applied to PDU session. |
| Subscribed QoS Information | OC | This field holds the subscribed default QoS for the PDU session. |
| Authorized Session-AMBR | OC | This field holds the authorized Session-AMBR for the PDU session. |
| Subscribed Session-AMBR | OC | This field holds the subscribed Session-AMBR for the PDU session. |
| PDU session start Time | OC | This field holds the timestamp when PDU session starts. |
| PDU session stop Time | OC | This field holds the timestamp when PDU session terminates. |
| Diagnostics | OC | This field holds a detailed reason for the release of the PDU session and complements the "Change Condition" information. |
| Enhanced Diagnostics | OC | This field holds a more detailed reason for the release of the PDU session, when a set of causes are applicable. |
| Charging Characteristics | OC | This field holds the Charging Characteristics for this PDU session. |
| Charging Characteristics  Selection Mode | OC | This field holds information about how the "Charging Characteristics" was selected. |
| 3GPP PS Data Off Status | OC | This field holds the 3GPP Data off Status when UE's 3GPP Data Off status is Activated or Deactivated. |
| Session Stop Indicator | OC | This field indicates to the CHF that the PDU session has been terminated. |
| Redundant Transmission  Type | OC | This field holds the redundant transmission Type. |
| PDU Session Pair ID | OC | This field holds an identifier that may be used to link two redundant PDU Sessions for dual connectivity based end to end redundant user plane paths type. |
|  |  |  |
| Unit Count Inactivity Timer | OC | This field holds the threshold for the time period when no units has been counted by the SMF. It holds either the value configured in SMF, if it is supported, or the value to be used as received from the CHF. A value of zero indicates that this mechanism shall not be used.  This field is not applicable to QBC. |
| RAN Secondary RAT Usage Report | OC | This field holds the secondary RAT usage reported from NG-RAN. |
| NG RAN Secondary RAT Type | OC | This field holds the value of Secondary RAT Type, as provided by the NG-RAN. |
| Qos Flows Usage Reports | OC | This field holds a list of containers per QFI with volumes reported, each container is time stamped. |
| QoS Flow Id | OM | This field holds the QoS flow Identifier (QFI) |
| Start Timestamp | OC | This field holds the start timestamp of the collected usage. |
| End Timestamp | OC | This field holds the end timestamp of the collected usage. |
| Downlink Volume | OC | This field holds the amount of used volume in downlink direction. |
| Uplink Volume | OC | This field holds the amount of used volume in uplink direction. |

|  |
| --- |
| **Next modified section** |

#### 6.2.1.3 Definition of PDU Container information

Used Unit Container, described in table 6.1.1.2.1, specific charging information used for 5G data connectivity charging is provided within the PDU Container Information described in table 6.2.1.3.1.

Table 6.2.1.3.1: Structure of PDU Container Information

| Information Element | Category | Description |
| --- | --- | --- |
| Time of First Usage | OC | This field holds the Timestamp when the first transmitted IP packet of the service data flow matching the current used unit container |
| Time of Last Usage | OC | This field holds the Timestamp when the last transmitted IP packet of the service data flow matching the current used unit container |
| QoS Information | OC | This field holds the QoS applied during the service data container interval |
| QoS Characteristics | OC | This field holds the QoS characteristics applied for QoS information. It is only be used when the non-standardized 5QI is present in QoS information. |
| AF Charging Identifier | OC | An identifier, provided from the AF, may be used to correlate the measurement for the Charging key/Service identifier values in this PCC rule with application level reports. |
| AF Charging Id String | OC | A string that, may be provided from the AF instead of AF Charging Identifier, depending on support. |
| User Location Information | OC | This field holds the user location during the used unit container interval |
| UE Time Zone | OC | This field holds the Time Zone of where the UE is located, during the used unit container interval. |
| Presence Reporting Area Information | OC | This field holds the Presence Reporting Area Information of UE during the used unit container interval. |
| Serving Network Function ID | OC | Serving Network Function identifier. |
| RAT Type | OC | This field holds the RAT type during the used unit container interval.  For MA PDU session, this field holds the RAT type associated to the access which activated the rating group. |
| Sponsor Identity | OC | This field holds the identifier of the sponsor when sponsored data connectivity is used |
| Application Service Provider Identity | OC | This field holds the identifier of the application service provider that is delivering a service to the end user. |
| Charging Rule Base Name | OC | This field holds the reference to group of PCC rules predefined at the SMF |
| 3GPP PS Data Off Status | OC | This field holds the 3GPP Data off Status during the used unit container interval |
| MA PDU Steering functionality | OC | This field holds the Steering functionality used during the used unit container interval when MA PDU session |
| MA PDU Steering mode | OC | This field holds the Steering mode used during the used unit container interval when MA PDU session. |
| QoS Monitoring Report | OC | This field holds the QoS monitoring result (i.e., average packet delay per QoS flow per UE) for the service data flow. |

|  |
| --- |
| **End of modified sections** |