**3GPP TSG-SA5 Meeting #133e *S5-205074r1***

**e-meeting 12th Oct-21st Oct 2020** Revision of S5-205074

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v11.4* | | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | | |
|  | | | | | | | | | |
|  | **32.255** | **CR** | **0250** | **rev** | **1** | **Current version:** | **16.6.1** |  |
|  | | | | | | | | | |
| *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:*** | Add the QNC subscription | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16, 5GS\_Ph1-DCH | | | | |  | ***Date:*** | | | 2020-10-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As per the TS 23.503, the PCF can configure QoS Notification Control (QNC) via PCC rule to indicate whether notifications are requested from the access network (i.e.3GPP RAN) when the GFBR can no longer (or can again) be guaranteed for a QoS Flow for 5G charging.The CHF also need to support the QNC. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Clearly specify the QNC support. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The GFBR status trigger may be not applicable. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.1.2.1,5.2.1.4,5.2.1.6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

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| **First change** |

##### 5.2.1.2.1 General

When a charging event is issued towards the CHF, it includes details such as Subscriber identifier (e.g. SUPI), Charging-id, etc. and also containers identifying the volume count (separated for uplink and downlink traffic), with charging condition change information.

Each trigger condition (i.e. chargeable event) defined for the 5G data connectivity converged charging functionality, is specified with the associated behaviour when they are met.

Two categories of chargeable events are identified:

- immediate report: chargeable events for which, when occurring, the current counts are closed and sent together with the charging data generated by the SMF towards the CHF in a Charging Data Request. New counts are started by the SMF.

- deferred report: chargeable events for which, when occurring, the current counts are closed and stored together with the charging data generated by the SMF. The stored counts will be sent to the CHF in next a Charging Data Request. New counts are started by the SMF

When a PDU session starts, and the converged charging is activated, the SMF invokes a Charging Data Request [Initial] towards the CHF to get authorization to start. The SMF is optionally provided in the Charging Data Response [Initial], with a set of chargeable event triggers to be enabled, and the associated category (i.e. immediate or deferred report).

When provided, these triggers override the default triggers in the SMF, they remain active until they are updated or disabled by subsequent Charging Data Response [Update] from the CHF or the PDU session is terminated.

A set of chargeable events are based on trigger thresholds and default ones can be configured in Charging Characteristics which are described in Annex A.  
The SMF is optionally provided in the Charging Data Response [Initial], with trigger thresholds which override the default ones configured in the Charging Characteristics selected by the SMF for the PDU session. They remain active until they are updated by subsequent Charging Data Response [Update] from the CHF or the PDU session is terminated.

When a trigger is enabled, the SMF needs to ensure that monitoring and subscriptions in UPF and RAN are setup so that SMF can report the charging information to the CHF if the trigger event occurs.

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| **Next change** |  |

#### 5.2.1.4 Flow Based Charging (FBC)

For FBC charging, the SMF categorizes the service data flows within PDU session data traffic by rating group and / or combination of the rating group and service id. The level of the reporting and charging method is defined per PCC rule. Details of this functionality are specified in TS 23.503 [202] and TS 32.240 [1].

NOTE: The SMF can only include one QoS Information occurrence per combination of rating group/service id. This implies if an operator wishes to be able to separate usage according to 5QI and ARP for the same charging method, they will need to ensure that service data flows having different 5QI and ARP do not have the same:

- rating group in cases where rating reporting is used;

- rating group/service id where rating group/service id reporting is used.

When a service data flow is governed by a PCC Rule indicated with "Online" charging method, quota management is required before service delivery for controlling this service data flow to be able to start or continue. There is also a special case of "Online" where the SMF may allow traffic to start before quota management.

When a service data flow is governed by a PCC Rule indicated with "Offline" charging method, quota management is not required for this service data flow. Usage reporting is required for this service data flow without affecting the delivery.

According to TS 23.503 [202], FBC shall support different charging models per PCC rule. These charging models may be based on volume and/or time and on number of events matching a specific service data flow template in PCC rule. When a chargeable event occurs for which quota needs to be requested by the SMF to the CHF, the type of requested quota may depend on measurement method configured for the PCC rule.

In general, the charging of a service data flow shall be linked to the PDU session under which the service data flow has been activated.

The amount of data counted shall be the user plane payload at the UPF separated between UL and DL.

For PDU session specific charging, time metering shall start when PDU session is activated.

Table 5.2.1.4.1 summarizes the set of default trigger conditions and their category which shall be supported by the SMF. For "immediate report" category, the table also provides the corresponding Charging Data Request [Initial, Update, Termination] message sent from SMF towards the CHF.

Table 5.2.1.4.1: Default Trigger conditions in SMF

| Trigger Conditions | Trigger level | Converged Charging default category | Offline only charging default category | CHF allowed to change category | CHF allowed to enable and disable | Message when "immediate reporting" category |
| --- | --- | --- | --- | --- | --- | --- |
| Start of PDU Session. | PDU session | Immediate | Immediate | Not Applicable | Not Applicable | Charging Data Request [Initial] |
| Start of the Service data flow and no charging session exists. | RG | Immediate | Immediate | No | No |
| **Change of Charging conditions** | | | | | | Charging Data Request [Update] |
| QoS change | PDU session/ RG | Deferred | Deferred | Yes | Yes |
| GFBR guaranteed status change | RG | Deferred | Deferred | Yes | Yes |
| User Location change | PDU session/ RG | Deferred | Deferred | Yes | Yes |
| Serving Node change | PDU session/ RG | Deferred | Deferred | Yes | Yes |
| Change of UE presence in Presence Reporting Area(s) | PDU session/ RG | Deferred | Deferred | Yes | Yes |
| Change of 3GPP PS Data off Status | PDU session/ RG | Deferred | Deferred | Yes | Yes |
| Tariff time change | PDU session/ RG | Deferred | Deferred | No | No |
| UE time zone change | PDU session/ RG | Immediate | Deferred | Yes | Yes |
| PLMN change | PDU session/ RG | Immediate | Deferred | Yes | Yes |
| RAT type change | PDU session/ RG | Immediate | Deferred | Yes | Yes |
| Session-AMBR change | PDU session | Immediate | Deferred | Yes | Yes |
| Addition of UPF | PDU Session/RG | Immediate | Deferred | Yes | Yes |
| Removal of UPF | PDU session/RG | Immediate | Deferred | Yes | Yes |
| Insertion of I-SMF | PDU Session | Deferred | Deferred | Yes | Yes |
| Re-allocation of I-SMF | PDU Session | Deferred | Deferred | Yes | Yes |
| Removal of I-SMF | PDU Session | Deferred | Deferred | Yes | Yes |
| Handover cancel | PDU session | Immediate | Deferred | Yes | Yes |
| Handover start | PDU session | Immediate | Deferred | Yes | Yes |
| Handover complete | PDU session | Immediate | Deferred | Yes | Yes |
| Addition of access | PDU session/ RG | Immediate | Deferred | Yes | Yes |
| Removal of access | PDU session/ RG | Immediate | Deferred | Yes | Yes |
| **Limit per PDU session** | | | | | |
| Expiry of data time limit per PDU session | PDU session | Immediate | Immediate | No | Yes |
| Expiry of data volume limit per PDU session | PDU session | Immediate | Immediate | No | Yes |
| Expiry of data event limit per PDU session | PDU session | Immediate | Immediate | No | Yes |
| Expiry of limit of number of charging condition changes | PDU session | Immediate | Immediate | No | Yes |
| **Limit per Rating group** | | | | | |
| Expiry of data time limit per rating group | RG | Deferred | Deferred | Yes | Yes |
| Expiry of data volume limit per rating group | RG | Deferred | Deferred | Yes | Yes |
| Expiry of data event limit per rating group | RG | Deferred | Deferred | Yes | Yes |
| **Quota management** | | | | | |
| Time threshold reached | RG | Immediate | Not applicable | No | Yes |
| Volume threshold reached | RG | Immediate | Not applicable | No | Yes |
| Unit threshold reached | RG | Immediate | Not applicable | No | Yes |
| Time quota exhausted | RG | Immediate | Not applicable | No | Yes |
| Volume quota exhausted | RG | Immediate | Not applicable | No | Yes |
| Unit quota exhausted | RG | Immediate | Not applicable | No | Yes |
| Expiry of quota validity time | RG | Immediate | Not applicable | No | Yes |
| Expiry of quota holding time | RG | Immediate | Not applicable | No | Yes |
| Re-authorization request by CHF | RG | Immediate | Not applicable | No | No |
| Start of service data flow, in case no valid quota for this rating group | RG | Immediate | Not applicable | No | No |
| Start of SDF additional access, in case no valid quota for this access rating group | RG | Immediate | Not applicable | No | No |
| **Others** | | | | | |
| Termination of service data flow - last service data flow under a given Rating Group. | RG | Immediate | Immediate | No | No |
| Management intervention | PDU session | Immediate | Immediate | No | No |
| Expiry of Unit Count Inactivity Timer | PDU session | Immediate | Not applicable | No | Yes | Charging Data Request [Termination] |
| End of PDU session | PDU session | Immediate | Immediate | No | No |
| CHF response with session termination | PDU session | Immediate | Not applicable | No | No |
| Abort request is received from the CHF | PDU session | Immediate | Immediate | No | No |
| NOTE 1: If GFBR guaranteed status change is enabled, SMF needs to ensure the request for the notification from the access network (i.e. 3GPP RAN) when the GFBR can no longer (or can again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. | | | | | | |

The default "Limit" trigger conditions are trigger thresholds configured in the Charging Characteristics applied to the PDU session. It shall be possible for the CHF to override these default triggers when providing Charging Data Response [Initial], either to disable the triggers, or to enable triggers new thresholds value.

When the traffic is counted in more than one UPF, the CHF overrides these default triggers of volume limit for the all UPFs.

For converged charging, the following details of chargeable events and corresponding actions in the SMF are defined in Table 5.2.1.4.2:

Table 5.2.1.4.2: Chargeable events and their related actions in SMF

| Chargeable event | Conditions | SMF action |
| --- | --- | --- |
| Start of PDU session |  | Charging Data Request [Initial] with a possible request quota for later use |
| Start of service data flow | If quota management is required, and valid quota for this rating group does not exist | Charging Data Request [Update] with a request quota with a possible amount of quota. |
| If service identifier level reporting is required by the PCC rule | Start new counts with time stamps for the combination of the rating group and service id |
| If rating group level reporting is required by the PCC rule | Start new counts with time stamps for the rating group |
| If sponsored connectivity level reporting is required by the PCC rule | Start new counts with time stamps for the combination of the rating group, sponsor identity and application service provider identity |
| If charging resource, i.e. charging session, for the PDU session does not exist | Charging Data Request [Initial] with a possible request quota |
| Start of SDF additional access | If ATSSS is supported with access differentiated rating groups, quota management is required, and valid quota for this access rating group does not exist. | Charging Data Request [Update] with a request quota with a possible amount of quota. |
| If ATSSS is supported with access differentiated rating groups, service identifier level reporting is required by the PCC rule | Start new counts with time stamps for the combination of the access rating group and service id |
| If ATSSS is supported with access differentiated rating groups, rating group level reporting is required by the PCC rule | Start new counts with time stamps for the access rating group |
| If ATSSS is supported with access differentiated rating groups, sponsored connectivity level reporting is required by the PCC rule | Start new counts with time stamps for the combination of the access rating group, sponsor identity and application service provider identity |
| Termination of service data flow | If service identifier level reporting is required by the PCC rule and this is the last service data flow for this combination of the rating group and service id | Close the counts with time stamps |
| If rating group level reporting is required by the PCC rule and this is the last service data flow utilizing that specific rating group | Close the counts with time stamps |
| If sponsored connectivity level reporting is required by the PCC rule and this was the last active service data flow for this combination of rating group, sponsor identity and application service provider identity | Close the counts with time stamps |
| Expiry of the Unit Count Inactivity Timer for the PDU session |  | Charging Data Request [Termination], indicating that charging session is terminated, and the PDU session is still active  May include the configured Unit Count Inactivity Timer value |
| End of PDU session in the SMF |  | Charging Data Request [Termination]  Close the counts with time stamps |
| Quota specific chargeable events (e.g. threshold reached, QHT expires, quota exhaustion, validity time reached, forced re-authorization, expiry of quota holding time) |  | Charging Data Request [Update] with a possible request quota  Close the counts and start new counts with time stamps |
| Change of charging condition in the SMF (e.g. QoS change, Session-AMBR change, user location change, Radio access type change, PLMN change, Serving Node change, UE Time Zone change, change of UE presence in Presence Reporting Area(s), change of 3GPP PS Data Off status, handover cancel, GFBR guaranteed status change) | If the corresponding trigger is enabled | Close the counts and start new counts with time stamps for all active service data flows |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] |
| Handover start | If the corresponding trigger is enabled | Start new counts with time stamps for all active service data flows. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] with a possible request quota. |
| Handover complete | If the corresponding trigger is enabled | Close the counts with time stamps for all active service data flows. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] |
| Addition of UPF | If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] with a request quota with a possible amount of quota. |
| Tariff time change |  | Close the counts and start new counts with time stamps |
| CHF response with session termination (e.g. Not Applicable), abort request |  | Charging Data Request [Termination]  Close the counts with time stamps |
| Removal of a UPF | If quota management is being performed and quota is granted per each UPF | Charging Data Request [Update]  Close the counts with time stamps for the removed UPF |
| If quota management is being performed and quota is shared between UPFs | Close the counts with time stamps for the removed UPF |
| If there is no quota management performed | Close the counts with time stamps for the removed UPF |
| Insertion of I-SMF | If the corresponding trigger is enabled | Close the counts with time stamps for all active service data flows in SMF, open new accounts for all active service data flows with I-SMF information. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" with quota management is being performed and quota is granted per each UPF | Charging Data Request [Update].  Close the counts with time stamps for all active service data flows usage report in SMF, open new accounts for all active service data flows with I-SMF information. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting", with quota management is being performed and quota is shared between UPFs | Charging Data Request [Update].  Close the counts with time stamps for all active service data flows usage report in SMF, open new accounts for all active service data flows with I-SMF information. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting", without quota management | Charging Data Request [Update].  Close the counts with time stamps for all active service data flows usage report in SMF, open new accounts for all active service data flows with I-SMF information. |
| Removal of I-SMF | If quota management being performed and quota is granted per each UPF | Charging Data Request [Update].  Close the counts with time stamps for the removed I-SMF |
| If quota management being performed and quota is shared between UPFs | Charging Data Request [Update].  Close the counts with time stamps for the removed I-SMF |
| If there is no quota management performed | Charging Data Request [Update]. Close the counts with time stamps for the removed I-SMF |
| Change of I-SMF | If quota management being performed and quota is granted per each UPF | Charging Data Request [Update].  Close the counts with time stamps for the removed I-SMF, open active traffic flows’ counts for the new I-SMF |
| If quota management being performed and quota is shared between UPFs | Charging Data Request [Update].  Close the counts with time stamps for the removed I-SMF, open active traffic flows’ counts for the new I-SMF |
| If there is no quota management performed | Charging Data Request [Update]. Close the counts with time stamps for the removed I-SMF, open active traffic flows’ counts for the new I-SMF |
| Addition of access | If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update].  Close the counts with time stamps for all active service data flows usage report in SMF, open new counts for all active service data flows. |
| Removal of access | If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update].  Close the counts with time stamps for all active service data flows usage report in SMF, open new counts for all active service data flows. |
| Expiry of time limit per rating group |  | Close the counts with time stamps |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If any matching service data flow is still active | Start new counts with time stamps |
| Expiry of data volume limit per rating group |  | Close the counts with time stamps |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If any matching service data flow is still active | Open a new service data container |
| Expiry of data event limit per rating group |  | Close the counts with time stamps |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If any matching service data flow is still active | Open a new service data container |
| Expiry of data event limit per PDU session |  | Charging Data Request [Update]  Close the counts with time stamps |
| If the PDU session is still active | Start new counts with time stamps |
| Expiry of time limit per PDU session |  | Charging Data Request [Update]  Close the counts with time stamps |
| If the PDU session is still active | Start new counts with time stamps |
| Expiry of data volume limit per PDU session |  | Charging Data Request [Update]  Close the counts with time stamps |
| If the PDU session is still active | Start new counts with time stamps |
| Expiry of a limit of number of charging condition changes per PDU session |  | Charging Data Request [Update]  Close the counts with time stamps |
| If the PDU session is still active | Start new counts with time stamps |
| Management intervention |  | Charging Data Request [Update]  Close the counts with time stamps |
| If the PDU session is still active | Start new counts with time stamps |

When event based charging applies, the first occurrence of an event matching a service data flow template in PCC rule shall be considered as the start of a service.

How the termination of service data flows is detected, is specified in TS 23.503 [202]. Termination of the service data flow itself does not trigger Charging Data Request [Update].

The CDR generation mechanism processed by the CHF upon receiving Charging Data Request [Initial, Update, Termination] issued by the SMF for these chargeable events, is specified in clause 5.2.3.

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| **Next change** |

#### 5.2.1.6 QoS flow Based Charging

QoS flow Based Charging allows the SMF to collect charging information related to data volumes per PDU session, categorized per QoS Flow.

The user can be identified by SUPI.

For a given PDU session, QBC shall be performed by the SMF within the same charging session used for Flow Based Charging. For the case where QBC is performed from SMF in VPLMN, Flow Based Charging is not applicable and there is no possibility to have quota management for the PDU Session.

The SMF categorizes the volume within PDU session by QoS Flow identified by QoS Flow Identifier (QFI).

The amount of data counted for the QoS Flow shall be the user plane payload at the UPF.

Table 5.2.1.6.1 summarizes the set of default trigger conditions and their category which shall be supported by the SMF in QBC. For "immediate report" category, the table also provides the corresponding Charging Data Request [Initial, Update, Termination] message sent from SMF towards the CHF.

Table 5.2.1.6.1: Default Chargeable events in SMF for QBC

| Chargeable event | Trigger level | Default category | CHF allowed to change category | CHF allowed to enable and disable | Message when "immediate reporting" category |
| --- | --- | --- | --- | --- | --- |
| Start of PDU session | PDU session | Immediate | Not Applicable | Not Applicable | Charging Data Request [Initial] |
| Start of a QoS Flow | QoS Flow | Deferred | Not Applicable | Not Applicable | Charging Data Request [Update] |
| **Change of Charging conditions** | | | | |
| QoS change | QoS Flow | Deferred | Yes | Yes |
| GFBR guaranteed status change | QoS Flow | Deferred | Yes | Yes |
| User Location change | PDU session | Deferred | Yes | Yes |
| Serving Node change | PDU session | Deferred | Yes | Yes |
| Change of UE presence in Presence Reporting Area(s) | PDU session | Deferred | Yes | Yes |
| Change of 3GPP PS Data off Status | PDU session | Deferred | Yes | Yes |
| Tariff time change | PDU session | Deferred | No | No |
| UE time zone change | PDU session | Immediate | Yes | Yes |
| PLMN change | PDU session | Immediate | Yes | Yes |
| RAT type change | PDU session | Immediate | Yes | Yes |
| Session-AMBR change | PDU session | Immediate | Yes | Yes |
| Addition of UPF | PDU session | Immediate | Yes | Yes |
| Removal of UPF | PDU session | Immediate | Yes | Yes |
| Handover cancel | PDU session | Immediate | Yes | Yes |
| Handover start | PDU session | Immediate | Yes | Yes |
| Handover complete | PDU session | Immediate | Yes | Yes |
| **Limit per PDU session** | | | | |
| Expiry of data time limit per PDU session | PDU session | Immediate | Yes | Yes |
| Expiry of data volume limit per PDU session | PDU session | Immediate | Yes | Yes |
| Expiry of data event limit per PDU session | PDU session | Immediate | Yes | Yes |
| Expiry of limit of number of charging condition changes | PDU session | Immediate | Yes | Yes |
| **Limit per QoS Flow** | | | | |
| Expiry of data time limit per QoS Flow | QoS Flow | Deferred | Yes | Yes |
| Expiry of data volume limit per QoS Flow | QoS Flow | Deferred | Yes | Yes |
| **Others** | | | | |
| End of QoS Flow | QoS Flow | Deferred | Yes | Yes |
| Management intervention | PDU session | Immediate | No | No |
| End of PDU session | PDU session | Immediate | No | No | Charging Data Request [Termination] |
| Abort request is received from the CHF | PDU session | Immediate | No | No |
| NOTE 1: If GFBR guaranteed status change is enabled, SMF needs to ensure the request for the notification from the access network (i.e. 3GPP RAN) when the GFBR can no longer (or can again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. | | | | | |

The default "Limit" trigger conditions, are trigger thresholds configured in the Charging Characteristics applied to the PDU session for QBC. It shall be possible for the CHF to override these default triggers when providing Charging Data Response [Initial], either to disable the triggers, or to enable triggers new thresholds value.

For QBC the following details of chargeable events and corresponding actions in the SMF are defined in Table 5.2.1.6.2:

Table 5.2.1.6.2: Chargeable events and their related actions in SMF for QBC

| Chargeable event | Conditions | SMF action |
| --- | --- | --- |
| Start of PDU session |  | Charging Data Request [Initial] |
| Start of a QoS Flow | Start of the QoS Flow associated with the default QoS rule | Charging Data Request [Update]. |
| Start of a QoS Flow | Start new counts with time stamps. |
| End of a QoS Flow |  | Close the counts with time stamps for the QoS flows |
| End of PDU session |  | Charging Data Request [Termination]  Close the counts with time stamps |
| Change of charging condition in the SMF (e.g. QoS change, Session-AMBR change, user location change, Radio access type change, PLMN change, Serving Node change, UE Time Zone change, change of UE presence in Presence Reporting Area(s), change of 3GPP PS Data Off status, handover cancel, GFBR guaranteed status change) | If the corresponding trigger is enabled | Close the counts and start new counts with time stamps for all active QoS flows. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] |
| Handover start | If the corresponding trigger is enabled | Start new counts with time stamps. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] |
| Handover complete | If the corresponding trigger is enabled | Close the counts with time stamps for all active QoS flows. |
| If the corresponding trigger is enabled and the category is set to "immediate reporting" | Charging Data Request [Update] |
| Addition of UPF |  | Charging Data Request [Update]. |
| Removal of UPF |  | Close the counts with time stamps for the removed UPF |
| Expiry of time limit per QoS Flow | If the corresponding trigger is enabled | Close the counts with time stamps. |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If the QoS Flow is still active | Start new counts with time stamps |
| Expiry of data volume limit per QoS Flow | If the corresponding trigger is enabled | Close the counts with time stamps |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If the QoS Flow is still active | Start new counts with time stamps |
| Expiry of time limit per PDU session | If the corresponding trigger is enabled | Close the counts with time stamps for all QoS flows. |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If the PDU session is still active | Start new counts with time stamps for all active QoS flows |
| Expiry of data volume limit per PDU session | If the corresponding trigger is enabled | Close the counts with time stamps for all QoS flows. |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If the PDU session is still active | Start new counts with time stamps for all active QoS flows |
| Expiry of a limit of number of charging condition changes per PDU session | If the corresponding trigger is enabled | Close the counts with time stamps for all QoS flows. |
| If the category is set to "immediate reporting" | Charging Data Request [Update] |
| If the PDU session is still active | Start new counts with time stamps for all active QoS flows |
| Management intervention |  | Charging Data Request [Update]  Close the counts with time stamps for all QoS Flows |
| If the PDU session is still active | Start new counts with time stamps |
| Abort |  | Charging Data Request [Termination]  Close the counts with time stamps |

The CDR generation mechanism processed by the CHF upon receiving Charging Data Request [Initial, Update, Termination] issued by the SMF for these chargeable events in QBC, is specified in clause 5.2.3.

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| **End of change** |