**3GPP TSG-CT WG4 Meeting #98eC4-203225**

**E-Meeting, 02nd – 12th June 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **29.244** | **CR** | **0446** | **rev** | **-** | **Current version:** | **16.3.1** |  |
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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:***  | Quata Reporting Trigger Clarification |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | CT4 |
|  |  |
| ***Work item code:*** | TEI16, CUPS-CT |  | ***Date:*** | 2020-05-15 |
|  |  |  |  |  |
| ***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 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | The CP function use Reporting Trigger to instruct the UP function whether to generate a usage report, " *the CP function shall provide the reporting trigger(s) in the Reporting Triggers IE of the URR which shall cause the UP function to generate and send a Usage Report for this URR to the CP function* ", e.g. through subscribe the following reporting triggers (as specified 8.2.19) to request the UP function to generate a usage report:*- Bit 1 –VOLQU (Volume Quota): when set to "1", this indicates a request for reporting when a Volume Quota is exhausted**- Bit 2 – TIMQU (Time Quota): when set to "1", this indicates a request for reporting when a Time Quota is exhausted.**- Bit 6 – EVEQU (Event Quota): when set to "1", this indicates a request for reporting when an Event Quota is reached.*However, in clause 5.2.2, it specifies the UP function shall send a usage report upon exhausion only when threshold is not provisioned (and the relevant reporting trigger is NOT armed), e.g. for Volume Threshold:"*the Volume Quota IE, to request the UP function to stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) and, if no Volume Threshold is provisioned, to also generate a usage report, when the measured traffic reaches the quota*"Further, it specifies:"*When both a Volume (or Time) Threshold and a Volume (or Time) Quota are provisioned, the UP function shall send a usage report only when reaching the Volume (or Time) Threshold; when subsequently reaching the Volume (or Time) Quota, the UP function shall stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) without sending a new usage report to the CP function.*"Then a question is raised, when both VOLTH and VOLQU are subscribed by the CP function, whether the UP function should send a Usage Report upon reaching the Volume/Time Quota.  |
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| ***Summary of change:*** | It is proposed that when both a Volume (or Time) Threshold and a Volume (or Time) Quota are provisioned, the CP function the CP function may set the reporting trigger for threshold (VOLTH/TIMTH/EVETH) and/or the reporting trigger for quota (VOLQU/TIMQU/EVEQU)) in the Reporting Triggers IE.If the reporting triggers VOLQU, TIMQU and EVEQU are also subscribed in addition to the reporting trigger VOLTH, TIMTH and EVETH, the UP function shall also generate a usage report.  |
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| ***Consequences if not approved:*** | Ambiguous requirements lead interoperability problems. |
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| ***Clauses affected:*** | 5.2.2.2.1 |
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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:*** | CR0xyz and CR0abc propose a change for different issue in the same clause, but they are not overlapping.  |
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| ***This CR's revision history:*** |  |

\* \* \* First Change \* \* \* \*

##### 5.2.2.2.1 General

When provisioning a URR, the CP function shall provide the reporting trigger(s) in the Reporting Triggers IE of the URR which shall cause the UP function to generate and send a Usage Report for this URR to the CP function. When adding or removing reporting trigger(s) to or from the URR, the CP function shall provide the new complete list of applicable reporting triggers in the Reporting Triggers IE in the PFCP Session Modification Request message.

For the volume-based measurement method, the CP function may provision:

- the Volume Threshold IE, to request the UP function to generate a usage report when the measured traffic reaches the threshold;

- the Volume Quota IE, to request the UP function to stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) and, if no Volume Threshold is provisioned, to also generate a usage report, when the measured traffic reaches the quota;

- the Dropped DL Traffic Threshold IE, to request the UP function to generate a usage report when the downlink traffic that is being dropped reaches the threshold; and/or

NOTE 1: For EPC, the Dropped DL Traffic Threshold can be armed in a SGW-U for triggering the PGW Pause of Charging feature (see 3GPP TS 23.401 [14]). For 5GC, the Dropped DL Traffic Threshold can be armed in a UPF for triggering the SMF Pause of Charging feature (see 3GPP TS 23.502 [29]).

- a Measurement Information with the 'Measurement Before QoS Enforcement' flag set to "1", to request the UP function to measure the traffic usage before any enforcement, e.g. bitrate enforcement for QoS, Gate control enforcement (as specified in clause 5.4.3) or packets dropped as requested by the FAR.

- a Measurement Information with the 'Measurement of Number of Packets' flag set to "1", to request the UP function to measure the number of packets be transferred in UL/DL/Total in addition to the measurement in octets, if the UP function supports the MNOP feature.

For the time-based measurement method, the CP function may provision:

- a Time Threshold IE, to request the UP function to generate a usage report when the measured traffic reaches the threshold;

- a Time Quota, to request the UP function to stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) and, if no Time Threshold is provisioned, to also generate a usage report, when the measured traffic reaches the quota;

- a Measurement Information with the "Immediate Start Time Metering" flag set to "1", to request the UP function to start time metering immediately at receiving the flag; otherwise, the UP function shall start time metering when the first packet is received; and/or

- an Inactivity Detection Time, to request the UP function to suspend the time measurement when no packets are received during the provisioned Inactivity Detection Time. The time measurement shall then be resumed by the UP function when subsequent traffic is received. If an Inactivity Detection Time value of zero is provided, or if no Inactivity Detection Time has been provided by the CP function, the time measurement shall be performed continuously until a new non-zero Inactivity Detection Time is received or the time-based usage measurement is stopped. See Figure 5.2.2.2-1:



Figure 5.2.2.2-1: IDT based charging

NOTE 2: The Inactivity Detection Time can be set to the Quota Consumption Timer if received. The Inactivity Detection Time is not used to control when the time metering starts.

- For EPC, a Time Quota Mechanism, including a Base Time Interval Type, which is either Continuous Time Period (CTP) or Discrete Time Period (DTP), and a Base Time Interval (BTI), to the UP function. See clause 6.5.7 in 3GPP TS 32.299[18].

- For CTP (Continuous Time Period), the time measurement starts from the time that traffic has occurred up to the first Base Time Interval (BTI) which contains no traffic. The time measurement shall include the last Base Time Interval, i.e. the one which contained no traffic. The time measurement resumes by the UP function when subsequent traffic is received. See Figure 5.2.2.2-2:



Figure 5.2.2.2-2: CTP based charging

- For DTP (Descrete Time Period), the time measurement starts from the time that traffic has occurred up to the Base Time Interval end. The time measurement shall be resumed by the UP function when subsequent traffic is received. See Figure 5.2.2.2-3:



Figure 5.2.2.2-3: DTP based charging

When the time-based measurement method applies, and when the Envelope Reporting is required for EPC, the CP function shall request the UP function to report the usage by setting the reporting trigger to Envelope Closure in addition to other Reporting Trigger(s), in the Reporting Triggers IE. The CP function may indicate the UP function to report for just time, time and volume, time and events, or time and volume and number of events by setting Measurement Method accordingly. The CP function may set the Reduced Application Detection Information flag in the Measurement Information of the URR, when requesting the detection of start and stop of an application solely for the purpose of envelope reporting for EPC.

The CP function may provision a Volume Threshold IE, a Volume Quota IE, or both (and/or respectively a Time/Event Threshold IE, a Time/Event Quota IE, or both). In such a case, the CP function may set the reporting trigger for threshold (VOLTH/TIMTH/EVETH) and/or the reporting trigger for quota (VOLQU/TIMQU/EVEQU)) in the Reporting Triggers IE.

When both a Volume (or Time or Event) Threshold IE and a Volume (or Time or Event) Quota IE are provisioned and only the reporting trigger for threshold (VOLTH/TIMTH/EVETH) is set, the UP function shall send a usage report only when reaching the Volume (or Time or Event) Threshold. When subsequently reaching the Volume (or Time or Event) Quota, the UP function shall stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) without sending a new usage report to the CP function.

If both a Volume (or Time or Event) Threshold IE and a Volume (or Time or Event) Quota IE are provisioned and both of the respective Threshold and Quota reporting triggers are set, the UP function shall send a usage report when reaching the Volume (or Time or Event) Threshold and also later on when subsequently reaching the Volume (or Time or Event) Quota.

NOTE x: A UPF complying with an earlier release of the specification may only send one usage report when the threshold is reached, even if both reporting triggers (for the threshold and the quota) are set.

NOTE 3: For online charging, the Volume Threshold (or Time Threshold) can be set in a PGW-U or TDF-U to the value of the granted volume (or time) quota minus the volume (or time) quota threshold, such as to get a usage report from the UP function when the volume (or time) based credit falls below the remaining quota thresholds provided by the OCS.

NOTE 4: The Volume Quota or Time Quota can be armed in a PGW-U or TDF-U for online charging to enable the traffic to be forwarded up to an intermediate or final quotas granted by the OCS. The CP function can provision both a Volume (or Time) Threshold and a Volume (or Time) Threshold to request the UP function to:
- send a usage report when the consumed resources reach the volume (or time) usage threshold provided by the OCS, and
- to stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function), without sending a second usage report, when the granted volume (or time) quota is exhausted.

For event based measurement method, the CP function may provision:

- the Event Threshold IE, to request the UP function to generate a usage report when the number of events reaches the event threshold;

- the Event Quota IE, to request the UP function to stop forwarding packets applicable to the event (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) and, if no Event threshold is provisioned, to also generate a usage report, when the number of events reaches the event quota;

NOTE 5: An event is preconfigured with one or more event detection logic in the UPF. Each event detection logic is associated with an Application ID. The CP function activates the detection and reporting of an event by provisioning PDR(s) with the PDI set to an Application ID and by provisioning a URR with an event threshold or event quota reporting trigger. The CP function identifies an event reported in a Usage Report by the URR ID.

For all the measurement methods (i.e. volume, time or event), the CP function may also provision:

- a Quota Holding Time, to request the UP function to send a usage report and to also stop forwarding packets (or only allow forwarding of some limited user plane traffic, based on operator policy in the UP function) when no packets have been received for the duration indicated in this parameter;

NOTE 6: A Quota Holding Time can be armed in a PGW-U or TDF-U for online charging to request the UP function to send a Usage Report when the Quota Holding Time provided by the OCS (see 3GPP TS 32.299 [18]) expires. The UP function can be instructed in the same Usage Reporting Rule with the Report Triggers – START to generate a new Usage Report upon receiving any subsequent packets associated with this URR.

- a Quota Validity Time, if the VTIME feature is supported by UP function, to request the UP function to send a usage report after the validity duration is over. After Quota validity timer expiry, if packets are received on UPF, the UPF shall stop forwarding packets or only allow forwarding of limited user plane traffic, based on operator's policy in the UP function;

- a Monitoring Time IE and zero or more Additional Monitoring IEs, to request the UP function to measure the network resources usage before and after the monitoring time in separate counts and to re-apply the volume and/or time, and/or event thresholds at the monitoring time. The CP function may additionally provision a Subsequent Volume (or Time or Event) Threshold IE and/or a Subsequent Volume (or Time or Event) Quota IE, for a volume (or time or event) based measurement. When being provisioned with a Monitoring Time, the UP function shall:

- reset its usage thresholds at the monitoring time to the value provided in the Subsequent Volume (or Time or Event) Threshold IE, if provisioned in the URR, or to the remaining value of the Volume (or Time or Event) threshold used before the monitoring time (i.e. excluding the already accumulated volume or time usage);

- shall indicate the usage up to the Monitoring time and usage after the Monitoring time in the first usage report after the Monitoring Time is reached;

- a Measurement Period, indicating the period to generate periodic usage reports to the CP function.

Action" IE identifying the substitute FAR the UP function shall apply, for the traffic identified by the PDR to which the URR is associated, when exhausting any of these quotas. This FAR may require the UP function to drop the packets or redirect the traffic towards a redirect destination as specified in clause 5.4.7.

NOTE 7: A PDR can be associated with multiple URRs. If one of these URRs requires the UP function to drop the user data packets, e.g. when the Quota has been exhausted, the other URRs associated to the PDR need also to stop their measurements, except for URRs including the Measurement Information with the 'Measurement Before QoS Enforcement' flag set to "1".

The CP function may request at any time the UP function to activate or deactivate a network resources usage measurement, using the Inactive Measurement flag of the Measurement Information IE of the URR.

NOTE 8: This can be used in a PGW-U for the PGW Pause of Charging procedure (see 3GPP TS 23.401 [14]).

The CP function may request the UP function to measure network resources usage and generate the corresponding Usage Reports only for a number of times, by provisioning the "Number of Reports" IE in a URR, if the UP function supports the NORP feature (see clause 8.2.25-1). If so, the URR shall become inactive in the UP function after the requested "Number of Reports" have been reported.

The CP function may resume the measurement for an inactive URR by setting the Inactive Measurement flag of the Measurement Information IE of the URR to "0" in the Update URR IE in a PFCP Session Modification Request message, with or without the Number of Report IE. If the CP function wishes the UP function to perform continuous measurement for a URR which was provisioned with a Number of Reports (i.e. to no longer limit the number of reports to be generated), the CP function shall provide the Number of Reports IE in the Update URR with a null length to delete the limit on the number of reports to be generated.

NOTE 9: The Number of Reports can be provisioned in a URR regardless which Measurement Method is used.

\* \* \* End of Changes \* \* \* \*