**3GPP TSG-CT3 Meeting #121e C3-222151**

**E-Meeting, 6th – 12th April 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **29.512** | **CR** | **0924** | **rev** | **-** | **Current version:** | **17.6.0** |  |
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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:*** | Resolve the issue of individual QoS parameters | | | | | | | | | |
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| ***Source to WG:*** | Huawei, Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IIoT | | | | |  | ***Date:*** | | | 2022-04-12 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As defined 6.1.3.22 of TS 23.503, the AF may provide either QoS reference and alternative QoS reference additionally or the individual QoS parameters and Alternative QoS Parameter Set additionally. The QoS notification control is also applied to the Alternative QoS Parameter Set(s). | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Authorize the PCC rule based on the individual QoS parameters and Alternative QoS Parameter Set.  Support the QoS notification control for the requested alternative QoS parameter set(s). | | | | | | | | |
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| ***Consequences if not approved:*** | | Not aligned with stage 2. AF can’t be aware of the QoS enforced at the access network. PCF can’t authorize the PCC rule based on the individual parameters. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.3.22, 4.2.3.24, 5.8 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 does not impact the OpenAPI file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* \* Start of Changes \* \* \* \*

#### 4.2.3.22 Policy provisioning and enforcement of the AF session with required QoS

If the PCF receives a QoS reference parameter during the initial provisioning of service information as defined in subclause 4.2.2.32 of 3GPP TS 29.514 [17], or if the PCF receives individual QoS parameters during the initial provisioning of service information as defined in subclause 4.2.2.24 of 3GPP TS 29.514 [17], the PCF shall authorize the service information from the AF and derive the QoS parameters of the related PCC rule(s) based on the received service information and the indicated QoS reference parameter or the indicated individual QoS parameters (i.e. Requested Priority, Maximum Burst Size, Requested 5GS Delay, Requested Maximum Bitrate and Requested Guaranteed Bitrate).

NOTE: A SLA has to be in place between the operator and the ASP defining the possible QoS levels and their charging rates. For each possible pre-defined QoS information set, the PCF needs to be configured with the corresponding QoS parameters and their values as well as the appropriate Charging key (or receive this information from the UDR).

If the PCF receives a different QoS reference parameter or a different individual QoS parameters during the modification of service information as defined in subclause 4.2.3.30 of 3GPP TS 29.514 [17], the PCF shall update accordingly the related QoS parameters corresponding to the new QoS parameters in the related PCC rule(s).

If the AF subscribes to Service Data Flow QoS notification control, the PCF may additionally receive the Alternative Service Requirements during the initial provisioning of service information as defined in subclause 4.2.2.32 of 3GPP TS 29.514 [17].

In this case, when the PCF authorizes service information based on the indicated QoS reference parameter or individual QoS parameters, the PCF shall additionally derive alternative QoS parameter sets for the concerned PCC rule(s) based on the QoS reference parameters or individual QoS parameters provided in the Alternative Service Requirements. In order to do so, the PCF shall include one or more references to the QosData data structure within the "refAltQosParams" attribute of the concerned PCC rule(s) and a "qosDecs" attribute containing these QoS data decision(s) within the SmPolicyDecision data structure. In each QoS data decision instance, the PCF shall include the alternative QoS parameter set Id within the "qosId" attribute, the alternative packet delay budget within the "packetDelayBudget" attribute, the alternative packet error rate within the "packetErrorRate" attribute, the alternative guaranteed bandwidth in uplink within the "gbrUl" attribute and the alternative guaranteed bandwidth in downlink within the "gbrDl" attribute. The "refAltQosParams" attribute is an ordered list of alternative QoS parameter sets, where the lower the index of the array for a given entry, the higher the priority.

If the AF changes or newly provides the Alternative Service Requirements during the modification of service information as defined in subclause 4.2.3.30 of 3GPP TS 29.514 [17], the PCF shall update accordingly or provide the Alternative QoS parameter sets in the related PCC rule(s).

The PCF shall provision the related PCC rule(s) with alternative QoS parameter set(s) and enable QoS Notification Control, if it has not been enabled yet, as defined in subclause 4.2.3.30 of 3GPP TS 29.514 [17].

If the "DisableUENotification" feature is supported and if the AF indicated to the PCF that the UE does not need to be informed about changes related to Alternative QoS Profiles as as defined in subclause 4.2.2.32 or 4.2.3.30 of 3GPP TS 29.514 [17] and the PCF decides to disable the notifications to the UE when changes related to the Alternative QoS Profiles occur, the PCF shall include the "disUeNotif" attribute set to true within the corresponding the PCC rule instance.

When the SMF receives PCC rule(s) with alternative QoS parameter sets, the SMF shall enforce these PCC rule(s) and derive in addition the alternative QoS profile(s) towards the access network based on the received alternative QoS parameter set(s)

\* \* \* \* Next Change \* \* \* \*

#### 4.2.3.24 Provisioning of TSCAI input information and TSC QoS related data

The PCF may receive the TSCAI input information in the TSC assistance container and TSC traffic QoS related information from the TSN AF or TSCTSF.

If the feature "TimeSensitiveNetworking" or "TimeSensitiveCommunication" is supported by both the SMF and PCF as described in subclause 5.8, the PCF shall provide for the derived PCC rule(s):

- the 5G QoS parameters and the optional 5G QoS characteristics corresponding to a 5QI for a delay-critical GBR derived from the TSC traffic QoS information received from the TSN AF or TSCTSF encoded within a QosData type referred in the "refQosData" of the PCC rule; and

- the TSCAI input information as received from the TSN AF or TSCTSF, with the periodicity, burst arrival time and survival time encoded in the "tscaiInputUl" attribute and/or "tscaiInputDl" attribute of the PCC rule and, when the feature "TimeSensitiveCommunication" is supported, the (TSN)AF (g)PTP domain encoded in the "tscaiTimeDom" attribute.

The values of MDBV and PDB applied to the derived 5QI shall follow principles defined in subclause 5.27.3 of 3GPP TS 23.501 [2].

For IEEE TSN networks, the value of the MBR, if applicable, and the GBR are derived using the Maximum Bit Rate provided by the TSN AF. For other time sensitive communication networks, the value of the GBR may be derived using the input provided by the TSCTSF (e.g. the Minimum Bit Rate) and applying the QoS mapping procedures as specified in subclause 7.3.3 of 3GPP TS 29.513 [7].

The ARP is assigned a value preconfigured for TSC services.

As specified in subclause 4.2.3.22, when the PCF receives a QoS reference from the TSCTSF, the PCF shall derive the above QoS parameters based on pre-defined QoS parameters referenced by the QoS reference. When the PCF receives individual QoS parameters from the TSCTSF, the PCF shall set derived QoS parameters based on the received individual QoS parameters and applying the QoS mapping procedures as specified in subclause 7.3.3 of 3GPP TS 29.513 [7].

If the PCF receives Alternative Service Requirements that contain QoS references from the TSCTSF, the PCF shall derive the alternative QoS parameter set(s) based on the pre-defined QoS parameters referenced by the received Alternative Service Requirements as defined in subclause 4.2.3.22. If the PCF receives Alternative Service Requirements that contain individual QoS parameters from the TSCTSF, the PCF shall set the alternative QoS parameter set(s) based on the individual QoS parameters contained in the received Alternative Service Requirements as defined in subclause 4.2.3.22.

The SMF shall convert the received TSCAI input information from the external GM into the 5G GM based on the time offset and cumulative rateRatio (when available) between external time and 5GS time as measured and reported by the UPF and, forward the derived TSCAI parameters per QoS Flow basis to the AN-RAN as follows:

- For the traffic in downlink direction, the SMF shall correct the value of the "burstArrivalTime" attribute of the "tscaiInputDl" attribute based on the latest received time offset measurement from the UPF and set the downlink TSCAI Burst Arrival Time as the sum of the corrected value and the CN PDB as described in subclause 5.7.3.4 of 3GPP TS 23.501 [2], representing the latest possible time when the first packet of the data burts arrives at the AN.

- For the traffic in uplink direction, the SMF shall correct the value of "burstArrivalTime" attribute of the "tscaiInputUl" attribute based on the latest received time offset measurement from the UPF and set the uplink TSCAI Burst Arrival Time as the sum of corrected value and the UE-DS-TT Residence Time representing the latest possible time when the first packet of the data burst arrives at the egress of the UE.

- The SMF shall correct the value of "periodicity" attribute of the "tscaiInputUl" and/or "tscaiInputDl" using the cumulative rateRatio if the cumulative rateRation measurement was previously received from the UPF and set the TSCAI Periodicity as the corrected value. Otherwise, the SMF shall set the periodicity in the TSCAI Periodicity without any correction.

- If the "TimeSensitiveCommunication" feature is supported and the TSCAI Survival Time Information is received:

- when the "surTimeInNumMsg" attribute is received, the SMF shall convert the value of "surTimeInNumMsg" attribute of the "tscaiInputUl" and/or "tscaiInputDl" attributes into time units by multiplying its value by the corrected uplink TSCAI Periodicity and/or downlink TSCAI Periodicity respectively, and set the TSCAI Survival Time to the calculated value; or

- when the "surTimeInTime" is received, the SMF shall correct the value of "surTimeInTime" attribute of the "tscaiInputUl" and/or "tscaiInputDl" attributes using the cumulative rateRatio if the cumulative rateRatio measurement was previously received from the UPF and set the TSCAI Survival Time to the corrected value. Otherwise, the SMF shall set the TSCAI Survival Time without correction.

If the "TimeSensitiveCommunication" feature is supported and if the Time Domain information is included in the "tscaiTimeDom" attribute of the PCC rule, then the SMF may determine the time offset and cumulative rateRatio (when available) based on received Time Domain and adjust the TSCAI information as described above. If Time Domain information is not provided or the SMF does not have synchronization information available for a requested Time Domain, then the SMF will not adjust the TSCAI information.

The provisioning of TSCAI input information and TSC traffic QoS configuration per PCC Rule shall be performed using the PCC rule provisioning procedure as defined in subclause 4.2.6.2.1.

\* \* \* \* Next Change \* \* \* \*

## 5.8 Feature negotiation

The optional features in table 5.8-1 are defined for the Npcf\_SMPolicyControl API. They shall be negotiated using the extensibility mechanism defined in subclause 6.6 of 3GPP TS 29.500 [4].

Table 5.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | TSC | This feature indicates support for traffic steering control in the (S)Gi-LAN, steering the 5G-LAN type of services or routing of the user traffic to a local Data Network identified by the DNAI per AF request. If the NF service consumer supports this feature, the PCF shall behave as described in subclause 4.2.6.2.6. |
| 2 | ResShare | This feature indicates the support of service data flows that share resources. If the NF service consumer supports this feature, the PCF shall behave as described in subclause 4.2.6.2.8. |
| 3 | 3GPP-PS-Data-Off | This feature indicates the support of 3GPP PS Data off status change reporting. |
| 4 | ADC | This feature indicates the support of application detection and control. |
| 5 | UMC | Indicates that the usage monitoring control is supported. |
| 6 | NetLoc | This feature indicates the support of the Access Network Information Reporting for 5GS. |
| 7 | RAN-NAS-Cause | This feature indicates the support for the detailed release cause code information from the access network.  (NOTE) |
| 8 | ProvAFsignalFlow | This feature indicates support for the feature of IMS Restoration as described in subclause 4.2.3.17. If NF service consumer supports this feature the PCF may provision AF signalling IP flow information. |
| 9 | PCSCF-Restoration-Enhancement | This feature indicates support of P-CSCF Restoration Enhancement. It is used for the NF service consumer to indicate if it supports P-CSCF Restoration Enhancement. |
| 10 | PRA | This feature indicates the support of presence reporting area change reporting. The support of the update of a UE Dedicated Presence Reporting Area is unspecified. |
| 11 | RuleVersioning | This feature indicates the support of PCC rule versioning as defined in subclause 4.2.6.7. |
| 12 | SponsoredConnectivity | This feature indicates support for sponsored data connectivity feature. If the NF service consumer supports this feature, the PCF may authorize sponsored data connectivity to the subscriber. |
| 13 | RAN-Support-Info | This feature indicates the support of maximum packet loss rate value(s) for uplink and/or downlink voice service data flow(s). |
| 14 | PolicyUpdateWhenUESuspends | This feature indicates the support of report when the UE is suspended and then resumed from suspend state. Only applicable to the interworking scenario as defined in Annex B. |
| 15 | AccessTypeCondition | This feature indicates the support of access type conditioned authorized Session-AMBR as defined in subclause 4.2.6.3.2.4. |
| 16 | MultiIpv6AddrPrefix | This feature indicates the support of multiple Ipv6 address prefixes reporting. |
| 17 | SessionRuleErrorHandling | This feature indicates the support of session rule error handling. |
| 18 | AF\_Charging\_Identifier | This feature indicates the support of long character strings as charging identifiers. |
| 19 | ATSSS | This feature indicates the support of the access traffic switching, steering and splitting functionality as defined in subclauses 4.2.6.2.17 and 4.2.6.3.4. |
| 20 | PendingTransaction | This feature indicates support for the race condition handling as defined in 3GPP TS 29.513 [7]. |
| 21 | URLLC | This feature indicates support of Ultra-Reliable Low-Latency Communication (URLLC) requirements, i.e. AF application relocation acknowledgement requirement and UE address(es) preservation. The TSC feature shall be supported in order to support this feature. |
| 22 | MacAddressRange | Indicates the support of a set of MAC addresses with a specific range in the traffic filter. |
| 23 | WWC | Indicates support of wireless and wireline convergence access as defined in annex C. |
| 24 | QosMonitoring | Indicates support of QoS monitoring as defined in subclause 4.2.3.25 and 4.2.4.24. |
| 25 | AuthorizationWithRequiredQoS | Indicates support of policy authorization for the AF session with required QoS as defined in subclause 4.2.3.22. |
| 26 | EnhancedBackgroundDataTransfer | Indicates the support of applying the Background Data Transfer Policy to a future PDU session. |
| 27 | DN-Authorization | This feature indicates the support of DN-AAA authorization data for policy control. |
| 28 | PDUSessionRelCause | Indicates the support of "PS\_TO\_CS\_HO" PDU session release cause. |
| 29 | SamePcf | This feature indicates the support of same PCF selection for the parameter's combination. |
| 30 | ADCmultiRedirection | This feature indicates support for multiple redirection information in application detection and control. It requires the support of ADC feature. |
| 31 | RespBasedSessionRel | Indicates support of handling PDU session termination functionality as defined in subclause 4.2.4.22. |
| 32 | TimeSensitiveNetworking | Indicates that the 5G System is integrated within the external network as a TSN bridge. |
| 33 | EMDBV | This feature indicates the support of the ExtMaxDataBurstVol data type defined in 3GPP TS 29.571 [11]. The use of this data type is specified in subclause 4.2.2.1. |
| 34 | DNNSelectionMode | This feature indicates the support of DNN selection mode. |
| 35 | EPSFallbackReport | This feature indicates the support of the report of EPS Fallback as defined in subclauses B.3.3.2 and B.3.4.6. |
| 36 | PolicyDecisionErrorHandling | This feature indicates the support of the error report of the policy decision and/or condition data which is not referred by any PCC rule or session rule as defined in subclause 4.2.3.26 and 4.2.4.26. |
| 37 | DDNEventPolicyControl | This feature indicates the support for policy control in the case of DDN Failure and Delivery Status events as defined in subclause 4.2.4.27. |
| 38 | ReallocationOfCredit | This feature indicates the support of notifications of reallocation of credit. |
| 39 | BDTPolicyRenegotiation | This feature indicates the support of the BDT policy re-negotiation. |
| 40 | ExtPolicyDecisionErrorHandling | This feature indicates the support of the error report of a faulty SM policy decision parameter as defined in subclause 4.2.3.26 and 4.2.4.26. It requires the support of PolicyDecisionErrorHandling feature. |
| 41 | ImmediateTermination | This feature indicates the support of the termination the PDU session when the NF service consumer cannot ensure the UE, RAN, AMF, or UPF can revert to the status before the PDU session modification occurred, as defined in subclause 4.2.4.21. |
| 42 | AggregatedUELocChanges | This feature indicates the support of notifications of serving area (i.e. tracking area) and/or serving cell changes. |
| 43 | ES3XX | Extended Support for 3xx redirections. This feature indicates the support of redirection for any service operation, according to Stateless NF procedures as specified in subclauses 6.5.3.2 and 6.5.3.3 of 3GPP TS 29.500 [4] and according to HTTP redirection principles for indirect communication, as specified in subclause 6.10.9 of 3GPP TS 29.500 [4]. |
| 44 | GroupIdListChange | This feature indicates the support for the notification of changes in the list of internal group identifiers. |
| 45 | DisableUENotification | Indicates the support of disabling QoS flow parameters signalling to the UE when the SMF is notified by the NG-RAN of changes in the fulfilled QoS situation. This feature requires that the AuthorizationWithRequiredQoS or TimeSensitiveCommunication featute is also supported. |
| 46 | OfflineChOnly | This feature enables the PCF to signal the "PDU Session with offline charging only" indication as defined in subclause 4.2.2.3.3. |
| 47 | Dual-Connectivity-redundant-UP-paths | Indicates the support of policy authorization of end to end redundant user plane path using dual connectivity as described in subclause 4.2.2.20. |
| 48 | DDNEventPolicyControl2 | This feature indicates the support for the policy control removal in the case of DDN Failure and/or Delivery Status event(s) is cancelled as defined in subclause 4.2.4.27. The DDNEventPolicyControl feature shall be supported in order to support this feature. |
| 49 | VPLMN-QoS-Control | Indicates the support of QoS constraints from the VPLMN for the derivation of the authorized Session-AMBR and authorized default QoS. |
| 50 | 2G3GIWK | This feature indicates the support of GERAN and UTRAN access over N7 interface. |
| 51 | TimeSensitiveCommunication | Indicates that the 5G System is integrated within the external network as a TSC user plane node to enable the Time Sensitive Communications and Time Synchronization. This feature requires that the TimeSensitiveNetworking feature is also supported. |
| 52 | AF\_latency | This feature indicates the support of Edge relocation considering user plane latency. This feature requires that the TSC feature is also supported. |
| 53 | SatBackhaulCategoryChg | This feature indicates the support of notification of a change between different satellite backhaul categories, or between satellite backhaul and non-satellite backhaul. |
| 54 | CHFsetSupport | Indicates the support of CHF redundancy and failover mechanisms based on CHF instance availability within a CHF Set, as described in subclause 4.2.2.3.1. |
| 55 | EnATSSS | Indicates the support of ATSSS enhancement. It requires the support of ATSSS feature. |
| 56 | MPSforDTS | Indicates support of the MPSfor DTS feature as described in subclause 4.2.6.2.12.4. |
| 57 | RoutingInfoRemoval | Indicates the support of the removal of the "routeToLocs" attribute from the TrafficControlData instance. |
| 58 | ePRA | This feature indicates the support of presence reporting area change reporting. It additionally supports the update of the elements of a UE Dedicated Presence Reporting Area by the full replacement of the previously provided one comparing with the PRA feature. |
| 59 | AMInfluence | Indicates the support of the delivery of the PCF for the UE request to be notified by the PCF for the PDU session about PDU session established/terminated events. |
| 60 | PvsSupport | This feature indicates the support of SNPN UE Remote Provisioning via User Plane as described in subclause 4.2.2.21. |
| 61 | EneNA | This feature indicates the support of NWDAF data reporting. |
| 62 | BIUMR | This feature bit indicates whether the NF Service Consumer (e.g. SMF) and PCF supports Binding Indication Update for multiple resource contexts specified in clauses 6.12.1 and 5.2.3.2.6 of 3GPP TS 29.500 [4]. |
| 63 | EASIPreplacement | This feature indicates the support of EAS IP replacement. This feature requires that the TSC feature is also supported. |
| 64 | ExposureToEAS | This feature indicates the support of exposure of QoS monitoring results to local AF. This feature requires that QosMonitoring feature is also supported. |
| 65 | SimultConnectivity | This feature indicates the support of temporary simultaneously connectivity at edge relocation. This feature requires that the TSC feature is also supported. |
| 66 | SGWRest | This feature indicates the support of SGW Restoration procedures. Only applicable to the interworking scenario as defined in Annex B. |
| 67 | ReleaseToReactivate | This feature indicates that the PCF can request the SMF for reactivation of a PDU session based on an SM Policy Association release cause. |
| 68 | EASDiscovery | This feature indicates the support of EAS (re)discovery. |
| NOTE: 5GS and EPS release cause code information is supported. The EPS release cause code information from the access network is only applicable to EPS interworking scenarios as specified in Annex B. | | |

\* \* \* \* End of change \* \* \* \*