**3GPP TSG CT WG3 Meeting #137 C3-245508**

**Hefei, CN, 14 - 18 October, 2024 (revision of C3-245277)**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **29.512** | **CR** | **1277** | **rev** | **1** | **Current version:** | **19.0.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Resolve the Editor’s Note for QoS monitoring capability reporting |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | TEI19\_QME |  | ***Date:*** | 2024-09-25 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | As agreed in C4-243667, the SMF will report the capability of QoS monitoring for packet delay to the PCF. Hence, the related descriptions need to be updated. |
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| ***Summary of change:*** | Update the QoS monitoring capability reporting related descriptions to indicate that the QoS monitoring capability reporting is only applicable to the packet delay. |
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| ***Consequences if not approved:*** | Different implementations of SMF and PCF will lead to interoperability issue. |
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| ***Clauses affected:*** | 4.2.3.25.1, 4.2.4.24, 5.6.2.19, 5.6.2.61, 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:*** |  |

\*\*\* 1st Change \*\*\*

##### 4.2.3.25.1 General

The QoS Monitoring control refers to the real time measurement of QoS monitoring parameters between the UE and the UPF for a QoS flow.

NOTE 1: The AF can request measurements for one or more QoS monitoring parameters, which can trigger QoS monitoring control for service data flow(s). This clause describes QoS monitoring control for packet delay, congestion, and data rate.

If the "QosMonitoring" feature is supported, the PCF may generate the authorized QoS Monitoring data decision for the service data flow for packet delay based on the QoS Monitoring request if received from the AF, or when the feature "EnSatBackhaulCatChg" is supported, based on PCF local policy or configuration as described in subclause 4.2.3.25.2.

The PCF, when the request is received from the AF, may determine whether the QoS monitoring report is sent to the AF/NEF by the SMF bypassing the PCF or by the PCF. When the feature "ExposureToEAS" is supported and the AF indication of direct notification is received, the PCF may determine whether duplicate notification by the UPF is required, i.e., whether the QoS monitoring report is directly sent to the local AF/NEF and to the PCF/SMF. When the "UPEAS" feature is supported, the PCF may generate a Data Collection Application Identifier based on the AF request or local configuration to be used in the SMF to associate the PCC rule with a QoS monitoring event exposure subscription.

The PCF shall include within the SmPolicyDecision data structure one or more QosMonitoringData instances within the "qosMonDecs" attribute if not provided yet and, if the PCF determines that the QoS monitoring report shall be sent by the PCF from the SMF, "QOS\_MONITORING" within the "policyCtrlReqTriggers" attribute, if it has not been provisioned yet.

NOTE 2: The QoS monitoring report can be sent by the SMF to the PCF as described in clause 4.2.4.24. The QoS monitoring report of the PCF to the AF/NEF is described in 3GPP TS 29.514 [17], the QoS monitoring report of the SMF to the AF/NEF bypassing the PCF is described in 3GPP TS 29.508 [12] and the QoS monitoring report to the Local NEF/AF by the UPF is described in 3GPP TS 29.564 [50].

When the feature "NscSupportedFeatures" is supported and if the NEF/AF provided information about the support of one or more QoS monitoring related features (e.g. "QoSMonitoring" feature and "EnQoSMon" feature) on Nsmf\_EventExposure service, the PCF may also include this information within the "nscSuppFeats" attribute included within the PccRule data type.

For each QosMonitoringData instance, PCF shall include:

- if the "EnQoSMon" feature is supported, the indication of the type of QoS monitoring parameter (e.g. packet delay or congestion information or data rate) within the "qosMonParamType" attribute;

- the requested QoS monitoring parameter(s) to be measured for the indicated QoS monitoring parameter types (i.e. DL/UL round trip packet delay or, if the "EnQoSMon" feature is supported, UL/DL congestion information or UL/DL data rate) within the "reqQosMonParams" attribute;

- the frequency(s) of reporting (e.g. event triggered and/or periodic) within the "repFreqs" attribute;

NOTE 3: When the "DOWNLINK\_CONGESTION" and/or "UPLINK\_CONGESTION" are included in "reqQosMonParams" attribute, only the "EVENT\_TRIGGERED" reporting frequency within the "repFreqs" attribute is applicable.

- for the case the "repFreqs" attribute includes the value "EVENT\_TRIGGERED":

a. when the "qosMonParamType" attribute is omitted or indicates packet delay:

- the delay threshold for downlink with the "repThreshDl" attribute if "reqQosMonParams" attribute includes DOWNLINK;

- the delay threshold for uplink with the "repThreshUl" attribute if "reqQosMonParams" attribute includes UPLINK; and/or

- the delay threshold for round trip with the "repThreshRp" attribute if "reqQosMonParams" attribute includes ROUND\_TRIP;

b. when the "qosMonParamType" attribute indicates data rate:

- the data rate threshold for downlink within the "repThreshDatRateDl" attribute if the "reqQosMonParams" attribute includes DOWNLINK\_DATA\_RATE; and/or

- the data rate threshold for uplink within the "repThreshDatRateUl" attribute if the "reqQosMonParams" attribute includes UPLINK\_DATA\_RATE;

c. when the "qosMonParamType" attribute indicates congestion information:

- the congestion threshold for downlink within the "repThreshConDl" attribute if the "reqQosMonParams" attribute includes DOWNLINK\_CONGESTION; and/or

- the congestion threshold for uplink within the "repThreshConUl" attribute if the "reqQosMonParams" attribute includes UPLINK\_CONGESTION; and

d. the minimum waiting time between subsequent reports within the "waitTime" attribute; and

e. if the feature "PacketDelayFailureReport" is supported, the maximum period with no QoS measurement results reported within the"repPeriod" attribute;

- for the case the "repFreqs" attribute includes "PERIODIC", the periodic time for reporting and, if the feature "PacketDelayFailureReport" is supported, the maximum period with no QoS measurement results reported within the "repPeriod" attribute;

- either the notification URI within the "notifyUri" attribute and the notification correlation id within the "notifyCorreId" attribute if the PCF determines that the notification shall be sent to the AF directly from the SMF or the notification URI within the "notifyUri" attribute, the notification correlation id within the "notifyCorreId" attribute corresponding to the Local NEF or AF and the "directNotifInd" attribute set to true if the feature "ExposureToEAS" and/or the feature "EnQoSMon" is supported and the PCF determines that the direct notification by the UPF to the Local NEF or AF is required based on the indication of direct notification received from the AF; and

NOTE 4: If the feature "ExposureToEAS" is supported and if the PCF determines to receive QoS Monitoring report while direct UPF notification is also required, the PCF can provision the "QOS\_MONITORING" policy control request trigger to the SMF together with the "directNotifInd" attribute set to true.

- the Data Collection Application Identifier within the "dataCollAppId" attribute if the "UPEAS" feature is supported and if the PCF determines that the SMF has to associate the PCC rule with a QoS monitoring event exposure subscription for that application identifier as described in 3GPP TS 29.508 [12].

If the feature "EnQoSMon" is supported, and the "qosMonParamType" attribute indicates data rate, the QosMonitoringData instance may include the averaging window within the "avrgWndw" attribute.

The PCF shall include the value(s) of QoS Monitoring Data ID of QosMonitoringData instance(s) within the "refQosMon" attribute of the corresponding PCC rule and provide the QoS monitoring data decision(s) together with the PCC rule if it has not been provisioned to the SMF. When the SMF receives the PCC rule, the SMF shall send a QoS Monitoring request to the PSA UPF via N4 as defined in 3GPP TS 29.244 [13] and NG-RAN via N2 signalling to request the QoS monitoring between PSA UPF and NG-RAN as defined in 3GPP TS 29.502 [22]. If the feature "ExposureToEAS" or the "EnQoSMon" feature is supported and if the SMF receives both the "QOS\_MONITORING" policy control request trigger and the indication of direct notifcation, the SMF shall request the UPF to perform duplicated notification as defined in 3GPP TS 29.244 [13]. If the "UPEAS" feature is supported, when the SMF receives the Data Collection Application Identifier within the "dataCollAppId" attribute as part of the QoSMonitoringData instance of the PCC rule, the SMF shall associate the PCC rule with the QoS monitoring event exposure subscription related to that application identifier as described in 3GPP TS 29.508 [12].

If the PCF receives the request from the local NEF/AF to disable the QoS monitoring for all the requested QoS monitoring parameters from the AF or the Local NEF, the PCF shall update the PCC rule with the "refQosMon" attribute set to NULL. The PCF may also remove the corresponding QoS Monitoring Data instance(s) if no PCC rule is referring to it.

If the PCF receives for the QoS monitoring parameter(s) the request to disable the direct event notification to the local NEF or AF by the UPF, the PCF shall determine whether the PCF or the SMF bypassing the PCF sends the QoS monitoring reports to the local AF/NEF. When no other QoS monitoring parameter is defined in the QosMonitoringData instance:

a. if the QoS monitoring reports are sent by the SMF bypassing the PCF:

- update the PCC rule with the "refQosMon" attribute referring a QosMonitoringData instance which does not include the "directNotifInd" attribute set to true and still includes the "notifyUri", and the "notifyCorreId" attributes; or

- update the corresponding QosMonitoringData instance by including the "directNotifInd" attribute set to false and still keeping the "notifyUri", and the "notifyCorreId" attributes;

b. if the QoS monitoring reports are sent by the PCF:

- update the PCC rule with the "refQosMon" attribute referring a QosMonitoringData instance which does not include the "directNotifInd", the "notifyUri", and the "notifyCorreId" attributes or update the QosMonitoringData instance by removing the "directNotifInd", the "notifyUri", and the "notifyCorreId" attributes; and

- provision the value "QOS\_MONITORING" within the "policyCtrlReqTriggers" attribute, if not previously provided.

The SMF shall request to the UPF to disable the notification to the AF/(Local)NEF via N4 for the requested QoS monitoring parameter(s) as defined in 3GPP TS 29.244 [13] and shall start sending the related notifications to PCF or to the indicated Notification URI and notification correlation Id, as applicable.

If the PCF determines that for the QoS monitoring parameter the QoS monitoring report shall be sent to the PCF from the SMF instead of sent from the SMF bypassing the PCF, the PCF shall replace the QosMonitoringData instance with an instance that does not include the "notifyUri" and the "notifyCorreId" attributes and include "QOS\_MONITORING" within the "policyCtrlReqTriggers" attribute if it has not been provisioned yet. If the PCF determines that QoS monitoring report shall be sent from the SMF bypassing the PCF instead of sent from the SMF to the PCF, the PCF shall update the QosMonitoringData instance by including the the notification URI within the "notifyUri" attribute and the notification correlation id within the "notifyCorreId" attribute, and remove the value "QOS\_MONITORING" within the "policyCtrlReqTriggers" attribute.

If the feature "QoSMonCapRepo" is supported, the PCF may include the "QOS\_MON\_CAP\_REPO" value within the "policyCtrlReqTriggers" attribute to request the SMF to report whether QoS Monitoring for packet delay is no longer or can again be performed for the PCC rules that contain a QoS monitoring policy.

Editor's Note: Whether the QoS Monitoring Capability report can be applied separately to diffent QoS Monitoring Type (i.e. packet delay, congestion information, data rate, PDV, RTT, etc.) is FFS.

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

#### 4.2.4.24 Notification about Service Data Flow QoS Monitoring

When the SMF gets the information about real-time measurements of QoS monitoring parameters for one or more SDFs from the UPF and the "QOS\_MONITORING" policy control request trigger was provisioned, then SMF shall inform the PCF for the impacted PCC rules

When the QoS monitoring applies for packet delay, the SMF shall inform the PCF when it gets information about any of the following items for one or more SDFs from the UPF:

- uplink packet delay(s);

- downlink packet delay(s); and/or

- round trip delay(s); or

- if the feature "PacketDelayFailureReport" is supported, indicator of packet delay measurement failure.

When the "EnQoSMon" feature is supported and the QoS monitoring applies for congestion information, the SMF shall inform the PCF when it gets information about any of the following items for one or more SDFs from the UPF:

- uplink congestion information; and/or

- downlink congestion information.

When the feature "EnQoSMon" is supported, and QoS monitoring applies for data rate measurements, the SMF shall inform about any of the following items for one or more SDFs from the UPF:

- uplink data rate; and/or

- downlink data rate.

The SMF shall send an HTTP POST request to the PCF with an SmPolicyUpdateContextData data structure, including the "QOS\_MONITORING" within "repPolicyCtrlReqTriggers" attribute and the "qosMonReports" attribute, and/or if the feature "EnQoSMon" is supported, the "qosMonCongReps" and/or the "qosMonDatRateReps" attribute. In each QosMonitoringReport data structure, the PCF shall include:

- affected PCC rule identifiers within the "refPccRuleIds" attribute; and

if QoS monitoring report is for packet delay, the SMF shall also include within the "qosMonReports" attribute:

- the uplink packet delays within the "ulDelays" attribute; and/or

- the downlink packet delays within the "dlDelays" attribute; and/or

- the round trip packet delays within the "rtDelays" attribute; or

- if the feature "PacketDelayFailureReport" is supported, the packet delay measurement failure indicator within "pdmf" attribute;

NOTE: The UPF reports one UL, DL and/or round-trip packet delay measurement for each periodic and/or event-triggered report as described in 3GPP TS 29.244 [13]. I.e, the SMF can include only one element within the "ulDelays", "dlDelays", and/or "rtDelays" array(s), each one with the received report from the UPF for the UL, DL and/or round trip delay(s).

and/or, if the feature "EnQoSMon" is supported and QoS monitoring report is for data rate measurements, the SMF shall also include within the "qosMonDatRateReps" attribute:

- one data rate measurement for the UL within the "ulDataRate" attribute; and/or

- one data rate measurement for the DL within the "dlDataRate" attribute.

and/or, if the feature "EnQoSMon" is supported and QoS monitoring report is for congestion measurement, the SMF shall also include within the "qosMonCongReps" attribute:

- the uplink congestion information within the "ulCongInfo" attribute; and/or

- the downlink congestion information within the "dlCongInfo" attribute.

When the feature "QoSMonCapRepo" is supported and the PCF subscribed the "QOS\_MON\_CAP\_REPO" trigger, if the SMF determines that the QoS Monitoring for packet delay is no longer or can again be performed, the SMF shall invoke the Npcf\_SMPolicyControl\_Update procedure and shall report the QoS Monitoring Capability within "qosMonCapRepos" attribute and the "QOS\_MON\_CAP\_REPO" value within "repPolicyCtrlReqTriggers" attribute. In each CapabilityReportRule data structure, the SMF shall include the indication that QoS Monitoring control is not supported or is supported again within the "capReport" attribute and affected PCC rule identifiers within the "refPccRuleIds" attribute. The PCF may notify the AF(s) as specified 3GPP TS 29.514 [17].

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

#### 5.6.2.19 Type SmPolicyUpdateContextData

Table 5.6.2.19-1: Definition of type SmPolicyUpdateContextData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| repPolicyCtrlReqTriggers | array(PolicyControlRequestTrigger) | C | 1..N | The policy control request triggers which are met. It is omitted if no triggers are met such as in clauses 4.2.4.7 and 4.2.4.15. |  |
| accNetChIds | array(AccNetChId) | O | 1..N | Indicates the access network charging identifier for the whole PDU session. For EPS interworking scenarios, it indicates the access network charging identifier for the PCC rule(s) or the whole PDU session. |  |
| accessType | AccessType | O | 0..1 | The Access Type where the served UE is camping. |  |
| ratType | RatType | O | 0..1 | The RAT Type where the served UE is camping. |  |
| addAccessInfo | AdditionalAccessInfo | O | 0..1 | Indicates the combination of added Access Type and RAT Type for MA PDU session. | ATSSS |
| relAccessInfo | AdditionalAccessInfo | O | 0..1 | Indicates the combination of released Access Type and RAT Type for MA PDU session. | ATSSS |
| servingNetwork | PlmnIdNid | O | 0..1 | The serving network (a PLMN or an SNPN) where the served UE is camping. For the SNPN the NID together with the PLMN ID identifies the SNPN. |  |
| userLocationInfo | UserLocation | O | 0..1 | The location(s) where the served UE is camping. (NOTE 4) |  |
| ueTimeZone | TimeZone | O | 0..1 | The time zone where the served UE is camping. |  |
| ipv4Address | Ipv4Addr | O | 0..1 | The IPv4 Address of the served UE. |  |
| ipDomain | string | O | 0..1 | IPv4 address domain identifier.(NOTE 2) |  |
| relIpv4Address | Ipv4Addr | O | 0..1 | Indicates the released IPv4 Address of the served UE. |  |
| ipv6AddressPrefix | Ipv6Prefix | O | 0..1 | The Ipv6 Address Prefix of the served UE. (NOTE 6) |  |
| relIpv6AddressPrefix | Ipv6Prefix | O | 0..1 | Indicates the released IPv6 Address Prefix of the served UE in multi-homing case. (NOTE 6) |  |
| relUeMac | MacAddr48 | O | 0..1 | Indicates the released MAC Address of the served UE. |  |
| ueMac | MacAddr48 | O | 0..1 | The MAC Address of the served UE. |  |
| subsSessAmbr | Ambr | O | 0..1 | UDM subscribed or DN-AAA authorized Session-AMBR. |  |
| authProfIndex | string | O | 0..1 | DN-AAA authorization profile index. | DN-Authorization |
| subsDefQos | SubscribedDefaultQos | O | 0..1 | Subscribed Default QoS Information. |  |
| vplmnQos | VplmnQos | O | 0..1 | QoS constraints in a VPLMN (NOTE 5) | VPLMN-QoS-Control |
| vplmnQosNotApp | boolean | O | 0..1 | If it is included and set to true, indicates that the QoS constraints in the VPLMN are not applicable. (NOTE 5) | VPLMN-QoS-Control |
| numOfPackFilter | integer | O | 0..1 | Contains the number of supported packet filter for signalled QoS rules.(NOTE 1) |  |
| accuUsageReports | array(AccuUsageReport) | O | 1..N | Contains the accumulated usage report(s). | UMC |
| 3gppPsDataOffStatus | boolean | O | 0..1 | If it is included and set to true, the 3GPP PS Data Off is activated by the UE. | 3GPP-PS-Data-Off  |
| appDetectionInfos | array(AppDetectionInfo) | O | 1..N | Reports the start/stop of the application traffic and detected SDF descriptions if applicable. | ADC |
| ruleReports | array(RuleReport) | O | 1..N | Used to report the PCC rule failure. |  |
| sessRuleReports | array(SessionRuleReport) | O | 1..N | Used to report the session rule failure. | SessionRuleErrorHandling |
| qncReports | array(QosNotificationControlInfo) | O | 1..N | QoS Notification Control information. |  |
| qosMonReports | array(QosMonitoringReport) | O | 1..N | QoS Monitoring reporting information with packet delay. It shall be present when the notified event is "QOS\_MONITORING" and packet delay measurements are available. | QosMonitoring |
| qosMonDatRateReps | array(QosMonitoringReport) | O | 1..N | QoS Monitoring reporting information with data rate measurements. It shall be present when the notified event is "QOS\_MONITORING" and data rate measurements are available. | EnQoSMon |
| qosMonCongReps | array(QosMonitoringReport) | O | 1..N | QoS Monitoring reporting information with congestion measurements. It shall be present when the notified event is "QOS\_MONITORING" and data rate measurements are available. | EnQoSMon |
| userLocationInfoTime | DateTime | O | 0..1 | Contains the NTP time at which the UE was last known to be in the location. (NOTE 3) |  |
| repPraInfos | map(PresenceInfo) | O | 1..N | Reports the changes of presence reporting area. The "praId" attribute within the PresenceInfo data type shall also be the key of the map. The "presenceState" attribute within the PresenceInfo data type shall be supplied. The "additionalPraId" attribute within the PresenceInfo data type shall not be supplied. | PRA |
| ueInitResReq | UeInitiatedResourceRequest | O | 0..1 | Indicates a UE requests specific QoS handling for selected SDF. |  |
| refQosIndication | boolean | O | 0..1 | If it is included and set to true, the reflective QoS is supported by the UE. If it is included and set to false, the reflective QoS is revoked by the UE. |  |
| qosFlowUsage | QosFlowUsage | O | 0..1 | Indicates the required usage for default QoS flow. |  |
| creditManageStatus | CreditManagementStatus | O | 0..1 | Indicates the reason of the credit management session failure. |  |
| servNfId | ServingNfIdentity | O | 0..1 | Contains the serving network function identity. |  |
| traceReq | TraceData | C | 0..1 | It shall be included if trace is required to be activated, modified or deactivated (see 3GPP TS 32.422 [24]). For trace modification, it shall contain a complete replacement of trace data.For trace deactivation, it shall contain the Null value. |  |
| addIpv6AddrPrefixes | Ipv6Prefix | O | 0..1 | An additional Ipv6 Address Prefix of the served UE. (NOTE 6) | MultiIpv6AddrPrefix |
| addRelIpv6AddrPrefixes | Ipv6Prefix | O | 0..1 | Indicates an additional released IPv6 Address Prefix of the served UE. (NOTE 6) | MultiIpv6AddrPrefix |
| multiIpv6Prefixes | array(Ipv6Prefix) | O | 1..N | The Ipv6 Address Prefixes of the served UE. (NOTE 6) | UnlimitedMultiIpv6Prefix |
| multiRelIpv6Prefixes | array(Ipv6Prefix) | O | 1..N | Indicates the released IPv6 Address Prefixes of the served UE. (NOTE 6) | UnlimitedMultiIpv6Prefix |
| tsnBridgeInfo | TsnBridgeInfo | O | 0..1 | Transports TSC user plane node information. | TimeSensitiveNetworking |
| tsnBridgeManCont | BridgeManagementContainer | O | 0..1 | Transports TSC user plane node management information. | TimeSensitiveNetworking |
| tsnPortManContDstt | PortManagementContainer | O | 0..1 | When DS-TT functionality is used, transports TSN port management information for the DS-TT port. | TimeSensitiveNetworking |
| tsnPortManContNwtts | array(PortManagementContainer) | O | 1..N | When NW-TT functionality is used, transports TSN port management information for one or more NW-TT ports. | TimeSensitiveNetworking |
| tscNotifUri | Uri | O | 0..1 | For PMIC/UMIC UPF event notification target address of the TSCTSF or TSN AF receiving the TSC management information. | ExposureToTSC |
| tscNotifCorreId | string | O | 0..1 | Correlation identifier for TSC management information notifications. | ExposureToTSC |
| maPduInd | MaPduIndication | O | 0..1 | Contains the MA PDU session indication, i.e., MA PDU Request or MA PDU Network-Upgrade Allowed. (NOTE 1) | ATSSS |
| atsssCapab | AtsssCapability | O | 0..1 | Contains the ATSSS capability supported for the MA PDU session. (NOTE 1) | ATSSS |
| mulAddrInfos | array(IpMulticastAddressInfo) | O | 1..N | Contains the IP multicast address information. | WWC |
| policyDecFailureReports | array(PolicyDecisionFailureCode) | O | 1..N | Indicates the type(s) of the failed policy decision and/or condition data. | PolicyDecisionErrorHandling |
| invalidPolicyDecs | array(InvalidParam) | O | 1..N | Indicates the invalid parameters for the reported type(s) of the failed policy decision and/or condition data. | ExtPolicyDecisionErrorHandling |
| trafficDescriptors | array(DddTrafficDescriptor) | O | 1..N | Contains the traffic descriptor(s) | DDNEventPolicyControl |
| typesOfNotif | array(DlDataDeliveryStatus) | O | 1..N | Contains the type of notification of DDD Status. | DDNEventPolicyControl |
| pccRuleId | string | O | 0..1 | Contains the identifier of the PCC rule which is used for traffic detection of event (e.g. DDN failure). | DDNEventPolicyControl2 |
| interGrpIds | array(GroupId) | O | 1..N | Internal Group Identifier(s) of the served UE. | GroupIdListChange |
| satBackhaulCategory | SatelliteBackhaulCategory | O | 0..1 | Indicates the satellite backhaul category or non-satellite backhaul used for the PDU session.If the "EnSatBackhaulCatChg" feature is supported, the dynamic satellite backhaul categories may also be provided. | SatBackhaulCategoryChg |
| pcfUeInfo | PcfUeCallbackInfo | O | 0..1 | PCF for the UE callback URI and SBA binding information. | AMInfluence |
| nwdafDatas | array(NwdafData) | O | 1..N | List of NWDAF Instance IDs and their associated Analytics IDs consumed by the NF service consumer. | EneNA |
| anGwStatus | boolean | O | 1..N | When it is included and set to "true", it indicates that the AN-Gateway has failed and that the PCF should refrain from sending policy decisions to the SMF until it is informed that the AN-Gateway has been recovered. (NOTE 1) | SGWRest |
| uePolCont | UePolicyContainer | C | 0..1 | Indicates a UE policy container received from the UE. (NOTE 1) (NOTE 7) | EpsUrsp |
| uePolFailReport | UePolicyTransferFailureCause | C | 0..1 | Indicates a failure delivery result for UE policy container. (NOTE 1) (NOTE 7) | EpsUrsp |
| urspEnfInfo | UrspEnforcementInfo | O | 0..1 | Contains the reporting of URSP rule enforcement information from the UE. | URSPEnforcement |
| sscMode | SscMode | O | 0..1 | SSC Mode of the PDU session.It may be present when the "urspEnfInfo" attribute is present. | URSPEnforcement |
| ueReqDnn | Dnn | O | 0..1 | UE requested DNN.It may be present when the "urspEnfInfo" attribute is present. | URSPEnforcement |
| ueReqPduSessionType | PduSessionType | O | 0..1 | UE requested PDU session Type.It may be present when the "urspEnfInfo" attribute is present. | URSPEnforcement |
| l4sReports | array(L4sSupportInfo) | O | 1..N | ECN marking for L4S support report information. | L4S |
| altSliceInfo | Snssai | O | 0..1 | Contains the Alternative S-NSSAI. | NetSliceRepl |
| batOffsetInfo | BatOffsetInfoPcc | O | 0..1 | Contains the BAT offset and the optionally adjusted periodicity for the indicated PCC rule(s). | EnTSCAC |
| hrsboInd | boolean | O | 0..1 | HR-SBO support indication. If present and set to "true", it indicates that the HR-SBO is supported. If present and set to "false", it indicates that the HR-SBO is not supported.  | HR-SBO |
| ueReachStatus | UeReachabilityStatus | O | 0..1 | Contains the UE reachability Status.This attribute shall be present only when the notified event is "UE\_REACH\_STATUS\_CH". | UEUnreachable |
| retryAfter | Uinteger | O | 0..1 | Contains the estimated time duration (expressed in units of seconds) during which the UE is unreachable.This attribute may be present only when the "ueReachStatus" attribute is present and set to "UNREACHABLE". | UEUnreachable |
| qosMonCapRepos | array(CapabilityReportRule) | O | 1..N | QoS monitoring notification for packet delay is supported again or not for the indicated PCC rule(s).This attribute shall be present only when the notified event is "QOS\_MON\_CAP\_REPO". | QoSMonCapRepo |
| NOTE 1: This attribute is only applicable to the 5GS and EPC/E-UTRAN interworking scenario as defined in Annex B.NOTE 2: The value provided in this attribute is implementation specific. The only constraint is that the NF service consumer shall supply a different identifier for each overlapping address domain (e.g. the SMF NF instance identifier).NOTE 3: The age of UE location included within the "userLocationInfoTime" attribute is the age of the 3GPP access UE location received from the AMF and shall be included only when the reported "userLocationInfo" attribute includes the UE location in the 3GPP access.NOTE 4: The SMF may encode both 3GPP and non-3GPP access UE location in the "userLocationInfo" attribute.NOTE 5: Only one of "vplmnQos" or "vplmnQosNotApp" attributes may be present.NOTE 6: When the "WWC" feature is supported, according to 3GPP TS 23.316 [42], clause 8.3.1 and 4.6.2, more than one IPv6 prefix shorter than /64 or more than one full IPv6 addres with a /128 prefix may be allocated to the RG. When feature MultiIpv6AddrPrefix is supported, additional IPv6 prefix shorter than /64 or full IPv6 address with a /128 prefix may be reported encoded as the "addIpv6AddrPrefixes" and the "addRelIpv6AddrPrefixes" attributes, , if the "MultiIpv6AddrPrefix" feature is supported, or as the "multiIpv6Prefixes" and the "multiRelIpv6Prefixes" attributes, if the "UnlimitedMultiIpv6Prefix" feature is supported. If the attribute "multiIpv6Prefixes" is provided, then attributes "ipv6AddressPrefix" and "addIpv6AddrPrefixes" shall be both absent. If the attribute "multiRelIpv6Prefixes" is provided, then attributes "relIpv6AddressPrefix" and "addRelIpv6AddrPrefixes" shall be both absent.NOTE 7: When the "EpsUrsp" feature is supported, the "uePolCont" attribute and "uePolFailReport" attribute are mutually exclusive. |

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

#### 5.6.2.61 Type CapabilityReportRule

Table 5.6.2.61-1: Definition of type CapabilityReportRule

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| refPccRuleIds | array(string) | M | 1..N | Contains the identifier of the PCC rule(s) which are affected of QoS Monitoring Capability Report. |  |
| capReport | NotifCap | M | 1 | Indicates whether the capability for the indicated PCC rule(s) is not supported or is supported again. |  |

Editor's Note: Whether the QoS Monitoring Capability report can be applied separately to diffent QoS Monitoring Type(i.e. packetdelay, pdv, rtt, etc.) is FFS.

\*\*\* 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 clause 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 clause 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 clause 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 clause 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 clause 4.2.6.2.14. |
| 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 clause 4.2.6.3.2.4. |
| 16 | MultiIpv6AddrPrefix | This feature indicates the support of additional new/removed (up to two) 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 clauses 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 clause 4.2.3.25 and 4.2.4.24. Reporting of monitoring data applies to packet delay information when only this feature is supported. |
| 25 | AuthorizationWithRequiredQoS | Indicates support of policy authorization for the AF session with required QoS as defined in clause 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 clause 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 clause 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 clauses 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 clause 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 clause 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 clause 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 clause 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 clauses 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 clause 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 featute is also supported. |
| 46 | OfflineChOnly | This feature enables the PCF to signal the "PDU Session with offline charging only" indication as defined in clause 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 clause 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 clause 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 clause 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 clause 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 clause 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. |
| 69 | AccNetChargId\_String | This feature indicates the support of long character strings as access network charging identifier. |
| 70 | WLAN\_Location | This feature indicates the support of the report of the WLAN location information received from the ePDG/EPC, if available. It is only applicable to EPS interworking scenarios as specified in Annex B. |
| 71 | PackFiltAllocPrecedence | This feature indicates the support of the control of the maximum number of packet filters in the EPS network in the EPS interworking scenarios as described in Annex B. |
| 72 | SatBackhaulCategoryChg\_v2 | This feature indicates the support of the indication of satellite backhaul categories, or the indication of non-satellite backhaul during the response to the update notify request. |
| 73 | PacketDelayFailureReport | Indicates the support of packet delay failure report as part of QoS Monitoring procedures. This feature requires that QosMonitoring feature is supported. |
| 74 | AltQoSProfilesSupportReport | This feature indicates the support of the report of whether Alternative QoS parameters are supported by NG-RAN. This feature requires that AuthorizationWithRequiredQoS feature is also supported. |
| 75 | Ext2PolicyDecisionErrorHandling | 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 when no PCC rules and no session rules are provided and the handling of partial errors.It requires the support of ExtPolicyDecisionErrorHandling feature. |
| 76 | UEUnreachable | This feature indicates the support for the reporting of UE temporarily unavailable. |
| 77 | EnTSCAC | Indicates the support of extensions to TSCAC and the RAN feedback for BAT offset and adjusted periodicity.This feature requires that TimeSensitiveCommunication feature is also supported. |
| 78 | MTU\_Size | This feature indicates the support of the report of the MTU size of the device side port. This feature requires that the TimeSensitiveCommunication feature is also supported. |
| 79 | EnSatBackhaulCatChg | This feature indicates the support of notification of dynamic satellite backhaul categories.It requires the support of SatBackhaulCategoryChg and SatBackhaulCategoryChg\_v2 features. |
| 80 | SFC | This feature indicates support for application function influence on service function chaining(s).It requires the support of TSC feature. |
| 81 | EpsUrsp | This feature indicates the support of URSP provisioning in EPS. Only applicable to the interworking scenario as defined in Annex B. |
| 82 | CommonEASDNAI | This feature controls the support of the common EAS/DNAI selection. It requires the support of TSC feature. |
| 83 | UnlimitedMultiIpv6Prefix | This feature indicates the support of multiple Ipv6 address prefixes reporting. |
| 84 | NscSupportedFeatures | This feature indicates the support of provisioning of the Network Function Service Consumer features supported in Nsmf\_EventExposure service as described in 3GPP TS 29.508 [12]. |
| 85 | URSPEnforcement | This feature indicates the support of awareness of URSP rule enforcement |
| 86 | VBCforIMS | This feature indicates the support of provisioning of the caller and callee informations in volume based charging for IMS as defined in clause A.16 of 3GPP TS 29.214 [18] (replacing PCRF with PCF). |
| 87 | ExposureToTSC | This feature indicates the support of the direct event notification of TSC management information from the UPF to the TSCTSF or TSN AF in 5GC.This feature requires that TimeSensitiveCommunication feature is also supported. |
| 88 | NetSliceRepl | This feature indicates the support of the network slice replacement functionality introduced in this specification as part of the end-to-end network slicing functionality.The following functionalities are supported:- Support the reporting of the network slice replacement information to the PCF. |
| 89 | SessQoSModEnforcementFailure | This feature indicates the support of the report PDU session modification failure because the enforcement of the default QoS modification or session-AMBR modification of the active session rule failed. |
| 90 | HR-SBO | This feature indicates the support of VPLMN specific Offloading policy in Home Routed deployments with Session Breakout (HR-SBO). |
| 91 | EnATSSS\_v2 | Indicates the support of ATSSS enhancements which includes REDUNDANT steering mode, MPQUIC steering functionality and MA PDU session interworking enhancements. It requires the support of the EnATSSS features. |
| 92 | NetSliceUsageCtrl | This feature indicates the support of the network slice usage control functionality introduced in this specification as part of the end-to-end network slicing functionality.The following functionalities are supported:- Support the provisioning by the PCF of the network slice usage control information (e.g., slice PDU session inactivity timer value). |
| 93 | VPLMN-5QIPrioLevel | Indicates the support of the indication of the VPLMN supported 5QI priority level when the required 5QI Priority Level is different from the standardized Default Priority Level value in the QoS characteristics Table 5.7.4-1 in 3GPP TS 23.501 [2].This feature requires that VPLMN-QoS-Control feature is also supported. |
| 94 | PDUSetHandling | This feature indicates the support of PDU Set handling. This feature may be used for eXtended Reality (XR) and interactive media services. |
| 95 | EnQoSMon | This feature indicates the support of enhanced QoS monitoring functionality, i.e. the report of the congestion information, and/or, the data rate information monitoring.This feature requires that QosMonitoring feature is supported. |
| 96 | PowerSaving | This feature indicates the PCC support for UE Power Saving management.The following functionalities are supported:- Policy provisioning of Periodicity and N6 Traffic Parameters to be measured.- End of Data Burst Handling. |
| 97 | L4S | This feature indicates the support of the PCF indication of ECN marking for L4S support. |
| 98 | UPEAS | This feature indicates the support of UPF enhancements for exposure related to the identification of QoS monitoring event exposure subscription. |
| 99 | QoSMonCapRepo | This feature indicates the support of QoS Monitoring for packet delay Capability Report.This feature requires that QosMonitoring feature is supported. |
| 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. |

Editor's Note: Whether the QoSMonCapRepo feature can be applied or depended separately to/on QosMonitoring or Rel-18 QoS Monitoring functinaly(e.g. EnQoSMon) is FFS.

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