**3GPP TSG WG2 Meeting #165 *S2-2411014***

**Hyderabad, India, 2024-10-14 -- 2024-10-18 (revision of S2-2410736)**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.503** | **CR** | **1329** | **rev** | **5** | **Current version:** | **19.1.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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:*** | Support of Handling of Headers | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson, Nokia, Vodafone, ETRI, ZTE, Huawei, Deutsche Telekom | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | UPEAS\_Ph2 | | | | |  | ***Date:*** | | | 2024-10-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The specification of KI#3 outcome Enhancement of UPF handling of headers according to approved WID: SP-240995 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The following changes have been introduced:  - Interactions between AF, NEF, PCF, SMF and UPF are enhanced to support Handling of Payload Headers.  - The PCC Rule is extended with Handling of Payload Headers Control information.  - Policy Control subscription information is extended with indication of whether AF influence on Handling of Payload Headers is allowed or not. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Handling of Headers Enhancements are not supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.6, 4.3.x (new), 5.3.1, 5.3.10, 6.1.3.x (new), 6.2.1.3, 6.3.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.502 CR 4877,  TS 23.501 CR 5454 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR refers from clause 4.3.6, 4.3.x (new), 5.3.1, 5.3.10, 6.1.3.x and 6.3.1 to new clause 5.6.x in TS 23.501 (CR 5454) | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* \* First change \* \* \* \*

### 4.3.6 Support for session management related network capability exposure

Support for network capability exposure enables an AF (e.g. an external ASP) to request the following session management related policy control functionality from the NEF:

- Set or change a chargeable party at AF session setup (see clause 4.15.6.4 and 4.15.6.5 of TS 23.502 [3]);

- Set up an AF session with required QoS (see clause 4.15.6.6 of TS 23.502 [3] and clause 6.1.3.22);

- Request QoS, traffic characteristics provisioning and performance monitoring for an individual UE or a group of UEs (see clause 4.15.6.14 of TS 23.502 [3]);

- Transfer of traffic characteristics of Time Sensitive Communication from the TSN AF (see clause 6.1.3.23) or from the TSCTSF (see clause 6.1.3.23a);

- Set up a time synchronization service from the TSCTSF (see clause 5.27.1.8 of TS 23.501 [2], clause 4.15.9 of TS 23.502 [3] and clause 6.1.3.23a);

- Application Function influence on traffic routing, as defined in clauses 4.3.7 and 6.1.3.14, as well as in clause 5.6.7 of TS 23.501 [2];

- Application Function influence on Service Function Chaining, as defined in clauses 4.3.7 and 6.1.3.14, as well as in clause 5.6.16 of TS 23.501 [2].

- Application Function influence on Handling of Payload Headers as defined in clauses 4.3.x and 6.1.3.x, as well as in clause 5.6.x of TS 23.501 [2].

### \* \* \* \* Next change (all new) \* \* \* \*4.3.x Handling of Payload Headers

Handling of Payload Headers refers to the capability to provide Header Handling Control information according to Application Function influence on Handling of Payload Headers as described in 5.6.x of TS 23.501 [2]. This is only supported in non-roaming and home-routed scenarios.

\* \* \* \* Next change \* \* \* \*

### 5.3.1 Interactions between PCF and AF

Npcf and Naf enable transport of application level session information and Ethernet/IP port management information from AF to PCF. Such information includes, but is not limited to:

- IP filter information or Ethernet packet filter information to identify the service data flow for policy control and/or differentiated charging;

- media/application bandwidth requirements for QoS control;

- In addition, for sponsored data connectivity:

- the sponsor's identification;

- optionally, a usage threshold and whether the PCF reports these events to the AF;

- information identifying the application service provider and application (e.g. SDFs, application identifier, etc.);

- information required to enable Application Function influence on traffic routing as defined in clause 5.6.7 of TS 23.501 [2];

- information required to enable Application Function influence on Service Function Chaining as defined in clause 5.6.16 of TS 23.501 [2];

- information required to enable Application Function influence on Handling of Payload Headers as defined in clause 5.6.x of TS 23.501 [2];

- information required to enable setting up an AF session with required QoS as defined in clause 6.1.3.22;

- information required to enable setting up an AF session with support for Time Sensitive Networking (TSN) as defined in clause 6.1.3.23.

- information required to enable setting up an AF session with support for Time Sensitive Communication as defined in clause 6.1.3.23a.

- information required to enable setting up an AF session with support for Deterministic Networking (DetNet) as defined in clause 6.1.3.23b.

- information required to enable setting up an AF session with support for eXtended Reality and Interactive Media Services (XRM) as defined in clause 6.1.3.27.

Npcf also enables the AF to request to influence Access and Mobility related policies for a UE and enables the AF to provide guidance for UE URSP rule determination. Npcf and Naf enable the AF subscription to notifications on PDU Session events, i.e. the events requested by the AF as described in clause 6.1.3.18 and the change of DNAI as defined in clause 5.6.7 of TS 23.501 [2].

The N5 reference point is defined for the interactions between PCF and AF in the reference point representation.

\* \* \* \* Next change \* \* \* \*

### 5.3.10 Interactions between NEF and PCF

Npcf and Nnef enable the negotiation of policy and charging control behaviour between PCF and NEF by supporting the following functionality:

- service specific policy and charging control;

- sponsor data connectivity including usage monitoring;

- Application Function influence on traffic routing;

- Application Function influence on Service Function Chaining;

- Application Function influence on Handling of Payload Headers;

- subscription and reporting of events for the event exposure;

- negotiations for future background data transfer;

- negotiation of planned data transfer with QoS requirements.

The N30 reference point is defined for the interactions between PCF and NEF in the reference point representation.

NOTE: For HR-SBO roaming case, there is no PCF for the PDU Session in the VPLMN.

\* \* \* \* Next change (all new) \* \* \* \*

#### 6.1.3.x Handling of Payload Headers Control

The Handling of Payload Headers is defined in clause 5.6.x in TS 23.501 [2]. When AF provides Header Handling Control information in a request, the PCF determines whether AF influence on Handling of Payload Headers is allowed considering the Handling of Payload Headers indication in the PDU Session policy control subscription information. The PCF forwards the Header Handling Control information in the PCC rule(s) related to the AF request as defined in clause 6.3.1.

The SMF instructs the UPF to perform Handling of Payload Headers according to the Header Handling Control information provided by the PCF in the PCC Rule as described in clause 5.6.x of TS 23.501 [2].

\* \* \* \* Next change \* \* \*

#### 6.2.1.3 Policy control subscription information management

The PCF may request subscription information at PDU Session establishment, PDU Session modification, during AM Policy Association Establishment procedure and during the UE Policy Association Establishment procedure.

The PCF may receive notifications on changes in the subscription information. Upon reception of a notification, the PCF shall make the policy control decisions necessary to accommodate the change in the subscription and shall update the SMF and/or the AMF if needed.

NOTE 1: How the PCF provisions/retrieves information related with policy control subscription data is defined in TS 23.501 [2].

The policy control subscription profile information provided by the UDR during the UE Policy Association Establishment procedure using Nudr service for Data Set "Policy Data" and Data Subset "UE context policy control data" is described in Table 6.2.1.3-1:

Table 6.2.1.3-1: UE context policy control subscription information

| Information name | Description | Category |
| --- | --- | --- |
| Subscriber categories | List of category identifiers associated with the subscriber | Optional |
| Tracing Requirements | Tracing requirements as defined in TS 32.421 [18] | Optional |
| PEI | The Permanent Equipment Identifier of the UE. | Optional |
| OSId | Identifies the operating system supported by UE. | Optional |
| Indication of UE support for ANDSP | Indicates the UE support for ANDSP. | Optional |
| Indication of URSP Provisioning Support in EPS | Indicates the UE support for URSP Provisioning in EPS. | Optional |
| S-NSSAI subscription information | Contains the list of subscribed S-NSSAIs, its associated subscribed DNNs. For each DNN, it includes the Allowed PDU Session types, the Allowed SSC modes, LBO roaming allowed indication and the ATSSS information (NOTE 1). | Optional |
| Subscriber spending limits control | Indicates whether the PCF must enforce UE policies based on subscriber spending limits. | Optional |
| Subscriber spending limits information | List of policy counter identifiers and statuses of these policy counters relevant for UE policy control. | Optional |
| CHF address | The address of the Charging Function and optionally the associated CHF instance ID and CHF set ID (see clause 6.3.1.0 of TS 23.501 [2]). | Optional |
| Restricted Status | Indicates that the UE has a status of Restricted, lists its accompanying reason(s) and the Time stamp of when this status was stored (NOTE 2). | Optional |
| Indication of UE capability of reporting URSP rule enforcement to network | Indicates the UE support for reporting URSP rule enforcement to network. | Optional |
| Indication of VPLMN specific URSP rule support | Indicates the UE support of VPLMN specific URSP rules. | Optional |
| NOTE 1: ATSSS information is defined in Table 5.2.3.3.1-1 of TS 23.502 [3] and Indicates whether MA PDU Session establishment is allowed.  NOTE 2: Accompanying reason is according to Exception IDs defined in Table 6.7.5.1-1 of TS 23.288 [24]. For example, Unexpected UE location. | | |

NOTE 2: S-NSSAI subscription information can be part of UE context policy control subscription information and Session Management Subscription data/Slice Selection Subscription data. UDR implementation and the provisioning system are responsible for keeping the consistency of this information when both Data Sets are stored in the same UDR. The provisioning system is responsible for keeping the consistency of this information when both Data Sets are stored in different UDRs.

The policy control subscription profile information provided by the UDR at PDU Session establishment, using Nudr service for Data Set "Policy Data" and Data Subset "PDU Session policy control data" is described in Table 6.2.1.3-2.

Table 6.2.1.3-2: PDU Session policy control subscription information

| Information name | Description | Category |
| --- | --- | --- |
| Allowed services | List of subscriber's allowed service identifiers. | Optional |
| Subscriber categories | List of category identifiers associated with the subscriber. | Optional |
| Subscribed GBR | Maximum aggregate bitrate that can be provided across all GBR QoS Flows for the DNN and S-NSSAI. | Optional |
| ADC support | Indicates whether application detection and control can be enabled for a subscriber. | Optional |
| Subscriber spending limits control | Indicates whether the PCF must enforce session management related policies based on subscriber spending limits. | Optional |
| Subscriber spending limits information | List of policy counter identifiers and statuses of the policy counters relevant for session management related policy control. | Optional |
| IP index information | Information that identifies the IP Address allocation method during PDU Session establishment. | Optional |
| Background Data Transfer Reference ID(s) | Reference ID(s) for Background Data Transfer Policies that apply to the UE. | Optional |
| Local routing indication | Indication on whether AF influence on traffic routing is allowed or not allowed. | Optional |
| Service Function Chaining influence indication | Indication on whether AF influence on Service Function Chaining is allowed or not allowed. | Optional |
| Subscribed UE-Slice-MBR(s) | List of maximum aggregated uplink and downlink MBRs to be shared across all GBR and Non-GBR QoS Flows related to the same S-NSSAI according to the subscription of the user. There is a single uplink and a single downlink value per S-NSSAI. | Conditional (NOTE 2) |
| Restricted Status | Indicates that the UE has a status of Restricted, lists its accompanying reason(s) and the Time stamp of when this status was stored (NOTE 3). | Optional |
| Handling of Payload Headers indication | Indication on whether AF influence on Handling of Payload Headers is allowed or not allowed. | Optional |
| **Charging related information** | This part defines the charging related information in the policy control subscription profile. |  |
| Default charging method | Default charging method for the PDU Session (online / offline). | Optional |
| CHF address | The address of the Charging Function and optionally the associated CHF instance ID and CHF set ID (see clause 6.3.1.0 of TS 23.501 [2]). | Optional |
| **Usage monitoring related information** | This part includes a list of usage monitoring profiles associated with the subscriber. Each usage monitoring profile is logically associated with a particular operator offer, and includes the following elements. |  |
| Monitoring key | An identifier to a usage monitoring control instance that includes one or more PCC rules. | Conditional (NOTE 1) |
| Usage monitoring level | Indicates the scope of the usage monitoring instance (PDU Session level or per Service). | Optional |
| Start date | Start date and time when the usage monitoring profile applies. | Optional |
| End date | End date and time when the usage monitoring profile applies. | Optional |
| Volume limit | Maximum allowed traffic volume. | Optional |
| Time limit | Maximum allowed resource time usage. | Optional |
| Reset period | Time period to reset the remaining allowed consumed usage for periodic usage monitoring control (postpaid subscriptions). | Optional |
| **MPS subscription data** | This part defines the MPS subscription information in the policy control subscription profile. |  |
| MPS priority | Indicates subscription to MPS priority service; priority applies to all traffic on the PDU Session. | Conditional (NOTE 1) |
| IMS signalling priority | Indicates subscription to IMS signalling priority service; priority only applies to IMS signalling traffic. | Conditional (NOTE 1) |
| MPS priority level | Relative priority level for multimedia priority services. | Conditional (NOTE 1) |
| MCS priority | Indicates subscription to MCS priority service; priority applies to all traffic on the PDU Session. | Conditional (NOTE 1) |
| MCS priority level | Relative priority level for MCS services. | Conditional (NOTE 1) |
| NOTE 1: The information is mandatory if the specific part is included in the subscription information (e.g. the monitoring key is mandatory if the usage monitoring information part is included).  NOTE 2: The information is used in PCF as described in clause 6.2.1.9 when the monitoring of the UE-Slice-MBR for an S-NSSAI is performed at the PCF. There may be a UE-Slice-MBR value for each S-NSSAI, if applicable.  NOTE 3: Accompanying reason is according to Exception IDs defined in Table 6.7.5.1-1 of TS 23.288 [24]. For example, Unexpected UE location. | | |

NOTE 3: Subscribed UE-Slice-MBR can be part of the Access and Mobility Subscription data as described in clause 5.2.3.3.1 of TS 23.502 [3] and can be part of the PDU Session policy control subscription information as described in Table 6.2.1.3-2. UDR implementation and the provisioning system are responsible for keeping the consistency of this information when both Data Sets are stored in the same UDR. The provisioning system is responsible for keeping the consistency of this information when both Data Sets are stored in different UDRs.

Table 6.2.1.3-3: Remaining allowed usage subscription information

| Information name | Description | Category |
| --- | --- | --- |
| **Remaining allowed usage related information** | *This part includes a list of Remaining allowed usage associated with the subscriber.* |  |
| Monitoring key | An identifier to a usage monitoring control included one or more PCC rules. | Conditional (NOTE 1) |
| Usage monitoring level | Indicates the scope of the usage monitoring (PDU Session level or service level). | Optional |
| Volume usage | Remaining allowed traffic volume. | Optional |
| Time usage | Remaining allowed resource time usage. | Optional |
| NOTE 1: The information is mandatory if the specific part is included in the subscription information (e.g. the monitoring key is mandatory if the usage monitoring information part is included). | | |

The *Allowed services* may comprise any number of service identifiers allowed for the subscriber in the PDU Session. The PCF maps those service identifiers into PCC rules according to local configuration and operator policies.

The *Subscriber category* may comprise any number of identifiers associated with the subscriber (e.g. gold, silver, etc.). Each identifier associates operator defined policies to the subscriber that belong to that category.

The *Usage monitoring related information* may comprise any number of usage monitoring control instances associated with the subscriber. In each usage monitoring control instance is mandatory to include the *Monitoring key*. The *Reset period* only applies to usage monitoring control instances that periodically reset the allowed usage (e.g. daily, monthly, etc.). If the Reset period is not specified, the usage monitoring control instance ends when the allowed data is consumed or when the *End date* is reached. The usage monitoring related information is used by the PCF instead of the respective information for the subscriber category.

The policy subscription profile may be extended with operator-specific information. Operator-specific extensions may be added both to any specific part of the policy control subscription information (e.g. to the subscriber category part), or as a new optional information block.

Handling of operator specific policy data by the PCF is out of scope of this specification in this release.

The latest list of PSIs and list of PSIs for the VPLMN ID(s) and its content delivered to the UE provided by the UDR during the UE Policy Association Establishment procedure using Nudr service for Data Set "Policy Data" and Data Subset "Policy Set Entry" is described in Table 6.2.1.3-4.

Table 6.2.1.3-4: Policy Set Entry

| Information name | Description | Category |
| --- | --- | --- |
| Policy Set Entry | List of PSIs and content for each PSI. Content may be Access Network Discovery & Selection Policy Information or UE Route Selection Policy information or both.  The list of tuples (PLMN ID, list of PSIs associated with the PLMN ID) may also be included. | Optional |

The network slice specific policy control information is per S-NSSAI information stored by the UDR and updated by the PCF during PDU Session Establishment or Modification procedure using Nudr service for Data Set "Policy Data" and Data Subset "Network Slice Specific Control Data" is described in Table 6.2.1.3-5:

Table 6.2.1.3-5: Network slice specific policy control information

| Information name | Description | Category |
| --- | --- | --- |
| Maximum Slice Data Rate for UL (per S-NSSAI) | The maximum uplink data rate for the specific network slice. | Optional  (NOTE 2) |
| Maximum Slice Data Rate for DL (per S-NSSAI) | The maximum downlink data rate for the specific network slice. | Optional  (NOTE 2) |
| Remaining Maximum Slice Data Rate for UL (per S-NSSAI) | The remaining maximum uplink data rate for the specific network slice (NOTE 1). | Optional  (NOTE 3) |
| Remaining Maximum Slice Data Rate for DL (per S-NSSAI) | The remaining maximum downlink data rate limited for the specific network slice (NOTE 1). | Optional  (NOTE 3) |
| NOTE 1: The initial value is set to the Maximum Slice Data Rate for UL/DL value.  NOTE 2: The information is only used for limitation of data rate per network slice with assistance of the NWDAF.  NOTE 3: The information is only used for limitation of data rate per network slice with PCF based monitoring. | | |

The policy control subscription profile information is per SUPI information, provided by the UDR using Nudr service for Data Set "Policy Data" and Data Subset " Access and Mobility policy control data" is described in Table 6.2.1.3-6:

Table 6.2.1.3-6: Access and Mobility policy control subscription information

| Information name | Description | Category |
| --- | --- | --- |
| Subscriber spending limits control | Indicates whether the PCF must enforce Access and Mobility management related policies based on subscriber spending limits. | Optional |
| Subscriber spending limits information | List of policy counter identifiers and statuses of these policy counters relevant for access and mobility related policy control. | Optional |
| CHF address | The address of the Charging Function and optionally the associated CHF instance ID and CHF set ID (see clause 6.3.1.0 of TS 23.501 [2]). | Optional |
| Restricted Status | Indicates that the UE has a status of Restricted, lists its accompanying reason(s) and the Time stamp of when this status was stored (NOTE 1). | Optional |
| NOTE 1: Accompanying reason is according to Exception IDs defined in Table 6.7.5.1-1 of TS 23.288 [24]. For example, Unexpected UE location. | | |

The 5G VN group specific policy control information is per group information stored by the UDR and updated by the PCF during PDU Session Establishment or Modification procedure using Nudr service for Data Set "Policy Data" and Data Subset "5G VN Group Specific Control Data" is described in Table 6.2.1.3-7:

Table 6.2.1.3-7: 5G VN Group specific policy control information

| Information name | Description | Category |
| --- | --- | --- |
| Maximum Group Data Rate for UL | The maximum uplink data rate for the specific 5G VN group (see clause 6.1.5). (NOTE 1) | Optional |
| Maximum Group Data Rate for DL | The maximum downlink data rate for the specific 5G VN group (see clause 6.1.5). (NOTE 1) | Optional |
| Remaining Maximum Group Data Rate for UL | The remaining maximum uplink data rate for the specific 5G VN group (NOTE 1). | Optional |
| Remaining Maximum Group Data Rate for DL | The remaining maximum downlink data rate for the specific 5G VN group (NOTE 1). | Optional |
| NOTE 1: The initial value is set to the Maximum Group Data Rate for UL/DL value (as part of the 5G VN group data stored at the UDR subscription data) as described in clause 6.1.5 and/or operator policies. | | |

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

### 6.3.1 General

The Policy and charging control rule (PCC rule) comprises the information that is required to enable the user plane detection of, the policy control and proper charging for a service data flow. The packets detected by applying the service data flow template of a PCC rule form a service data flow.

Two different types of PCC rules exist: Dynamic rules and predefined rules. The dynamic PCC rules are provisioned by the PCF to the SMF, while the predefined PCC rules are configured into the SMF, as described in TS 23.501 [2], and only referenced by the PCF.

NOTE 1: The procedure for provisioning predefined PCC rules is out of scope for this specification.

The operator defines the PCC rules.

Table 6.3.1 lists the information contained in a PCC rule, including the information name, the description and whether the PCF may modify this information in a dynamic PCC rule which is active in the SMF. The Category field indicates if a certain piece of information is mandatory or not for the construction of a PCC rule, i.e. if it is possible to construct a PCC rule without it.

The differences with table 6.3 in TS 23.203 [4] are shown, either "none" means that the IE applies in 5GS or "removed" meaning that the IE does not apply in 5GS, this is due to the lack of support in the 5GS for this feature or "modified" meaning that the IE applies with some modifications defined in the IE.

Table 6.3.1: The PCC rule information in 5GC

| Information name | Description | Category | PCF permitted to modify for a dynamic PCC rule in the SMF | Differences compared with table 6.3. in TS 23.203 [4] |
| --- | --- | --- | --- | --- |
| Rule identifier | Uniquely identifies the PCC rule, within a PDU Session.  It is used between PCF and SMF for referencing PCC rules. | Mandatory | No | None |
| **Service data flow detection** | *This part defines the method for detecting packets belonging to a service data flow.* |  |  |  |
| Precedence | Determines the order, in which the service data flow templates are applied at service data flow detection, enforcement and charging. (NOTE 1). | Conditional (NOTE 2) | Yes | None |
| Service data flow template | For IP PDU traffic: Either a list of service data flow filters or an application identifier that references the corresponding application detection filter for the detection of the service data flow.  For Ethernet PDU traffic: Combination of traffic patterns of the Ethernet PDU traffic.  It is defined in clause 5.7.6.3 of TS 23.501 [2]. | Mandatory (NOTE 3) | Conditional  (NOTE 4) | Modified  (packet filters for Ethernet PDU traffic added) |
| Mute for notification | Defines whether application's start or stop notification is to be muted. | Conditional (NOTE 5) | No | None |
| **Charging** | *This part defines identities and instructions for charging and accounting that is required for an access point where flow based charging is configured* |  |  |  |
| Charging key  (NOTE 22) | The charging system (CHF) uses the charging key to determine the tariff to apply to the service data flow. |  | Yes | None |
| Service identifier | The identity of the service or service component the service data flow in a rule relates to. |  | Yes | None |
| Sponsor Identifier | An identifier, provided from the AF which identifies the Sponsor, used for sponsored flows to correlate measurements from different users for accounting purposes. | Conditional  (NOTE 6) | Yes | None |
| Application Service Provider Identifier | An identifier, provided from the AF which identifies the Application Service Provider, used for sponsored flows to correlate measurements from different users for accounting purposes. | Conditional  (NOTE 6) | Yes | None |
| Charging method | Indicates the required charging method for the PCC rule.  Values: online or offline or neither. | Conditional (NOTE 7) | No | None |
| Service Data flow handling while requesting credit | Indicates whether the service data flow is allowed to start while the SMF is waiting for the response to the credit request.  Only applicable for charging method online.  Values: blocking or non-blocking |  | No | New |
| Measurement method | Indicates whether the service data flow data volume, duration, combined volume/duration or event shall be measured.  This is applicable to reporting, if the charging method is online or offline.  Note: Event based charging is only applicable to predefined PCC rules and PCC rules used for application detection filter (i.e. with an application identifier). |  | Yes | None |
| Application Function Record Information | An identifier, provided from the AF, correlating the measurement for the Charging key/Service identifier values in this PCC rule with application level reports. |  | No | None |
| Service Identifier Level Reporting | Indicates that separate usage reports shall be generated for this Service Identifier.  Values: mandated or not required |  | Yes | None |
| **Policy control** | *This part defines how to apply policy control for the service data flow.* |  |  |  |
| Gate status | The gate status indicates whether the service data flow, detected by the service data flow template, may pass (Gate is open) or shall be discarded (Gate is closed). |  | Yes | None |
| 5G QoS Identifier (5QI) | The 5QI authorized for the service data flow. | Conditional (NOTE 10) | Yes | Modified  (corresponds to QCI in TS 23.203 [4]) |
| QoS Notification Control (QNC) | Indicates whether notifications are requested from 3GPP RAN when the GFBR can no longer (or can again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. | Conditional (NOTE 15) | Yes | Added |
| Reflective QoS Control | Indicates to apply reflective QoS for the SDF. |  | Yes | Added |
| UL-maximum bitrate | The uplink maximum bitrate authorized for the service data flow |  | Yes | None |
| DL-maximum bitrate | The downlink maximum bitrate authorized for the service data flow |  | Yes | None |
| UL-guaranteed bitrate | The uplink guaranteed bitrate authorized for the service data flow |  | Yes | None |
| DL-guaranteed bitrate | The downlink guaranteed bitrate authorized for the service data flow |  | Yes | None |
| UL sharing indication | Indicates resource sharing in uplink direction with service data flows having the same value in their PCC rule |  | No | None |
| DL sharing indication | Indicates resource sharing in downlink direction with service data flows having the same value in their PCC rule |  | No | None |
| Redirect | Redirect state of the service data flow (enabled/disabled) | Conditional (NOTE 8) | Yes | None |
| Redirect Destination | Controlled Address to which the service data flow is redirected when redirect is enabled | Conditional  (NOTE 9) | Yes | None |
| ARP | The Allocation and Retention Priority for the service data flow consisting of the priority level, the pre-emption capability and the pre-emption vulnerability | Conditional (NOTE 10) | Yes | None |
| Bind to QoS Flow associated with the default QoS rule | Indicates that the dynamic PCC rule shall always have its binding with the QoS Flow associated with the default QoS rule (NOTE 11). |  | Yes | Modified (corresponds to bind to the default bearer in TS 23.203 [4]) |
| Bind to QoS Flow associated with the default QoS rule and apply PCC rule parameters | Indicates that the dynamic PCC rule shall always have its binding with the QoS Flow associated with the default QoS rule.  It also indicates that the that the QoS related attributes of the PCC rule shall be applied to derive the QoS parameters of the QoS Flow associated with the default QoS rule instead of the PDU Session related parameters Authorized default 5QI/ARP. | Conditional (NOTE 17) | Yes | Added |
| PS to CS session continuity | Indicates whether the service data flow is a candidate for vSRVCC. |  |  | Removed |
| Priority Level | Indicates a priority in scheduling resources among QoS Flows (NOTE 14). |  | Yes | Added |
| Averaging Window | Represents the duration over which the guaranteed and maximum bitrate shall be calculated (NOTE 14). |  | Yes | Added |
| Maximum Data Burst Volume (MDBV) | Denotes the largest amount of data that is required to be transferred within a period of 5G-AN PDB (NOTE 14). |  | Yes | Added |
| Disable UE notifications at changes related to Alternative QoS Profiles | Indicates to disable QoS Flow parameters signalling to the UE when the SMF is notified by the NG-RAN of changes in the fulfilled QoS situation. The fulfilled situation is either the QoS profile or an Alternative QoS Profile. | Conditional  (NOTE 25) | Yes | Added |
| Precedence for TFT packet filter allocation | Determines the order of TFT packet filter allocation for PCC rules | Conditional (NOTE 28) | Yes | Added |
| ECN marking for L4S  (NOTE 32) | The ECN marking for L4S indicates the UL and/or DL of the service data flow, detected by the service data flow template, supports ECN marking for L4S and to enable ECN marking for L4S for the service data flow. | Conditional | Yes | Added |
| **Access Network Information Reporting** | *This part describes access network information to be reported for the PCC rule when the corresponding QoS Flow is established, modified or terminated.* |  |  |  |
| User Location Report | The serving cell of the UE is to be reported. When the corresponding QoS Flow is deactivated, and if available, information on when the UE was last known to be in that location is also to be reported. |  | Yes | None |
| UE Timezone Report | The time zone of the UE is to be reported. |  | Yes | None |
| **Usage Monitoring Control** | *This part describes identities required for Usage Monitoring Control.* |  |  | None |
| Monitoring key  (NOTE 23) | The PCF uses the monitoring key to group services that share a common allowed usage. |  | Yes | None |
| Indication of exclusion from session level monitoring | Indicates that the service data flow shall be excluded from PDU Session usage monitoring |  | Yes | None |
| **N6-LAN Traffic Steering Enforcement Control (NOTE 18)** | *This part describes information required for N6-LAN Traffic Steering.* |  |  |  |
| Traffic steering policy identifier(s) | Reference to a pre-configured traffic steering policy at the SMF  (NOTE 12). |  | Yes | None |
| Metadata | Data provided by AF and included by UPF when forwarding traffic to N6-LAN. |  | Yes | Added |
| **Application Function influence on traffic routing Enforcement Control (NOTE 18)** | *This part describes information required for Application Function influence on traffic routing.* |  |  |  |
| Data Network Access Identifier | Identifier(s) of the target Data Network Access (DNAI). It is defined in clause 5.6.7 of TS 23.501 [2]. |  | Yes | Added |
| Per DNAI: Traffic steering policy identifier | Reference to a pre-configured traffic steering policy at the SMF  (NOTE 19). |  | Yes | Added |
| Per DNAI: N6 traffic routing information | Describes the information necessary for traffic steering to the DNAI. It is described in clause 5.6.7 of TS 23.501 [2] (NOTE 19). |  | Yes | Added |
| Information on AF subscription to UP change events | Indicates whether notifications in the case of change of UP path are requested and optionally indicates whether acknowledgment to the notifications shall be expected (as defined in clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| Indication of UE IP address preservation | Indicates UE IP address should be preserved. It is defined in clause 5.6.7 of TS 23.501 [2]. |  | Yes | Added |
| Indication of traffic correlation  (NOTE 29) | Indicates that the target PDU Sessions should be correlated via a common DNAI in the user plane. It is described in clause 5.6.7 of TS 23.501 [2]. |  | Yes | Added |
| Information on User Plane Latency requirements | Indicates the user plane latency requirements. It is defined in clause 6.3.6 of TS 23.548 [33]. |  | Yes | Added |
| Indication for Simultaneous Connectivity at Edge Relocation | Indicates request for simultaneous connectivity over source and target PSA from the AF (see clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| Information for EAS IP Replacement in 5GC | Indicates the Source EAS identifier and Target EAS identifier, (i.e. IP addresses and port numbers of the source and target EAS). (see clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| EAS Correlation indication | Indicates selecting a common EAS for the application identified by Service data flow template accessed by the UEs with the same Traffic Correlation ID. |  | Yes | Added |
| Traffic Correlation ID | Identification of a set of UEs accessing the application identified by the Service data flow template (see clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| Common EAS IP address | IP address of the common EAS for the application identified by the Traffic Description for the UEs the AF request aims at (as defined in clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| Common DNAI | Common DNAI applicable to the set of UEs identified by a traffic correlation ID. |  | Yes | Added |
| FQDN(s) | FQDN(s) for the application indicated in the PCC rule (see clause 5.6.7 of TS 23.501 [2]). |  | Yes | Added |
| NEF information | Notification Endpoint of NEF subscription to be notified with information related to UE members of the set of UEs identified by traffic correlation ID. |  | Yes | Added |
| **Handling of Payload Headers Control (NOTE 18)** | *This part describes information required for* *Handling of Payload Headers Control.* |  |  |  |
| Header Handling Control information | Information required for Handling of Payload Headers (see 5.6.x in TS 23.501 [2]) |  | Yes | Added |
| **NBIFOM related control Information** | *This part describes PCC rule information related with NBIFOM.* |  |  |  |
| Allowed Access Type | The access to be used for traffic identified by the PCC rule. |  |  | Removed |
| **RAN support information** | *This part defines information supporting the RAN for e.g. handover threshold decision.* |  |  |  |
| UL Maximum Packet Loss Rate | The maximum rate for lost packets that can be tolerated in the uplink direction for the service data flow. It is defined in clause 5.7.2.8 of TS 23.501 [2]. | Conditional (NOTE 13) | Yes | None |
| DL Maximum Packet Loss Rate | The maximum rate for lost packets that can be tolerated in the downlink direction for the service data flow. It is defined in clause 5.7.2.8 of TS 23.501 [2]. | Conditional (NOTE 13) | Yes | None |
| **MA PDU Session Control**  **(NOTE 20)** | *This part defines information supporting control of MA PDU Sessions* |  | Yes | New |
| Application descriptors | Identifies the application traffic for which MA PDU Session control is required based on the Steering Functionality, the Steering Mode, Steering Mode Indicator and Threshold Values. It is described in clause 5.32.8 of TS 23.501 [2]. | Conditional (NOTE 27) | Yes | New |
| Steering Functionality | Indicates the applicable traffic steering functionality. | Conditional (NOTE 21, NOTE 31) | Yes | New |
| Steering Mode | Indicates the rule for distributing traffic between accesses together with associated steering parameters (if any). | Conditional (NOTE 21, NOTE 31) | Yes | New |
| Steering Mode Indicator | Indicates either autonomous load-balance operation or UE-assistance operation, if the Steering Mode is set to "Load Balancing", as defined in TS 23.501 [2]. |  | Yes | New |
| Threshold Values  (NOTE 30) | A Maximum RTT or a Maximum Packet Loss Rate or both. |  | Yes | New |
| Transport Mode  (NOTE 33) | Indicates the transport mode that should be used for the matching traffic, as defined in TS 23.501 [2]. |  | Yes | New |
| Charging key for Non-3GPP access  (NOTE 22) | Indicates the Charging key used for charging packets carried via Non-3GPP access for a MA PDU Session. |  | Yes | New |
| Monitoring key for Non-3GPP access  (NOTE 23) | Indicates the Monitoring key used to monitor usage of the packets carried via Non-3GPP access for a MA PDU Session. |  | Yes | New |
| **QoS Monitoring** | *This part describes PCC rule information related with QoS Monitoring.* |  |  |  |
| QoS Monitoring parameter(s) | Indicates the QoS Monitoring parameter(s) for which QoS Monitoring can be enabled as defined in clause 5.45 of TS 23.501 [2]. |  | Yes | Added |
| Reporting frequency | Defines the frequency for the reporting, such as event triggered, periodic. |  | Yes | Added |
| Target of reporting | Defines the target of the QoS Monitoring reports, it can be the NEF, the AF or the Local NEF. |  | Yes | Added |
| Indication of direct event notification | Indicates that the QoS Monitoring event shall be reported by the UPF directly to the NF indicated by the Target of reporting. |  | Yes | Added |
| **DataCollection\_ApplicationIdentifier** | Identifier used in SMF to decide whether this PCC Rule corresponds to an event exposure subscription (see clause 4.15.4.5.1 of TS 23.502 [3]). |  | No | Added |
| **Alternative QoS Parameter Sets**  **(NOTE 24)**  **(NOTE 26)** | *This part defines Alternative QoS Parameter Sets for the service data flow.* |  |  |  |
| Packet Delay Budget | The Packet Delay Budget in this Alternative QoS Parameter Set. |  | Yes | Added |
| Packet Error Rate | The Packet Error Rate in this Alternative QoS Parameter Set. |  | Yes | Added |
| UL-guaranteed bitrate | The uplink guaranteed bitrate in this Alternative QoS Parameter Set. |  | Yes | Added |
| DL-guaranteed bitrate | The downlink guaranteed bitrate in this Alternative QoS Parameter Set. |  | Yes | Added |
| Maximum Data Burst Volume (MDBV) | The Maximum Data Burst Volume (MDBV) in this Alternative QoS Parameter Set. |  | Yes | Added |
| **TSC Assistance Container** | *This part defines parameters provided by TSN AF or TSCTSF. The parameters are defined in clause 5.27.2 of TS 23.501 [2].* |  | No | Added |
| **Traffic Parameter Information** | *This part describes PCC rule information related with Traffic Parameter Information* *for power saving as specified in clause 5.37.8 of TS 23.501 [2].* |  |  |  |
| Periodicity | Indicates the time period between start of two data bursts in UL and/or DL direction. |  | Yes | Added |
| **Traffic Parameter Measurement** | *This part describes PCC rule information related with Traffic Parameter Measurement for power saving as specified in clause 5.37.8 of TS 23.501 [2].* |  |  |  |
| Traffic Parameter to be measured | Indicates to measure the N6 jitter range associated with DL Periodicity and optionally, the UL/DL periodicity. |  | Yes | Added |
| Reporting condition | Defines the condition for the reporting, such as event triggered or periodic, frequency. |  | Yes | Added |
| **Downlink Data Notification Control** | *This part describes information required for controlling the sending of Downlink data delivery status event and DDN Failure event notifications as specified in clause 4.15.3 of TS 23.502 [3].* |  |  |  |
| Notification control for DDD status | Indicates that notifications of downlink data delivery status are required and the requested type of such notifications. |  | Yes | Added |
| Notification Control for DDN Failure | Indicates that notifications of DDN Failure are required. |  | Yes | Added |
| **PDU Set Control Information** | Information needed to support the delivery of PDU Sets of a service data flow. |  |  |  |
| PDU Set QoS Parameters (UL/DL) | See clause 5.7.7 of TS 23.501 [2]. |  | Yes | Added |
| **Data Burst Handling Information** | *This part describes Data Burst Handling Information* |  |  |  |
| End of Data Burst Marking Indication | Indicates to detect last PDU of the data burst and to mark End of Data Burst Indication (See clause 5.37.8 of TS 23.501 [2]) on the last PDU. |  | Yes | Added |
| **Protocol Description Information** | Information needed to support identifying PDU Set Information for packets and/or last packet of a Data Burst. |  |  |  |
| Protocol Description (UL/DL) | Indicates the protocol, e.g. which is used to detect PDU Set Information of packets and/or last packet of the Data Burst.  (See TS 23.501 [2] clause 5.37.5, clause 5.37.8 and TS 26.522 [40]). |  | No | Added |
| NOTE 1: For PCC rules based on an application detection filter, the precedence is only relevant for the enforcement, i.e. when multiple PCC rules overlap, only the enforcement, reporting of application starts and stops, monitoring, and charging actions of the PCC rule with the highest precedence shall be applied.  NOTE 2: The Precedence is mandatory for PCC rules with SDF template containing SDF filter(s). For dynamic PCC rules with SDF template containing an application identifier, the precedence is either preconfigured in SMF or provided in the PCC rule from PCF.  NOTE 3: Either service data flow filter(s) or application identifier shall be defined per each rule.  NOTE 4: YES, if the service data flow template consists of a set of service data flow filters. NO if the service data flow template consists of an application identifier  NOTE 5: Optional and applicable only if application identifier exists within the rule.  NOTE 6: Applicable to sponsored data connectivity.  NOTE 7: Mandatory if there is no default charging method for the PDU Session.  NOTE 8: Optional and applicable only if application identifier exists within the rule.  NOTE 9: If Redirect is enabled.  NOTE 10: Mandatory when Bind to QoS Flow associated with the default QoS rule is not present.  NOTE 11: The presence of this attribute causes the 5QI/ARP/QNC/Priority Level/Averaging Window/Maximum Data Burst Volume of the rule to be ignored for the QoS Flow binding.  NOTE 12: The Traffic steering policy identifier can be different for uplink and downlink direction. If two Traffic steering policy identifiers are provided, then one is for uplink direction, while the other one is for downlink direction.  NOTE 13: Optional and applicable only for voice service data flow in this release.  NOTE 14: Optional and applicable only when a value different from the standardized value for this 5QI in Table 5.7.4-1 TS 23.501 [2] is required.  NOTE 15: Optional and applicable only for GBR service data flow.  NOTE 16: Usage of the charging information in described in TS 32.255 [21].  NOTE 17: Only one PCC rule can contain this attribute and this PCC rule shall not contain the attribute Bind to QoS Flow associated with the default QoS rule.  NOTE 18: None, one, multiple or all of these control information may be present in a PCC rule.  NOTE 19: Per DNAI, a Traffic steering policy identifier and/or N6 traffic routing information can be provided. If the pre-configured traffic steering policy (that is referenced by the Traffic steering policy identifier) contains information that is overlapping with the N6 traffic routing information, the N6 traffic routing information shall take precedence.  NOTE 20: Only applicable to a PCC Rules provided to a MA PDU Session.  NOTE 21: Mandatory when MA PDU Session Control information is provided.  NOTE 22: When a Charging key for Non-3GPP access is provided, the parameters in the Charging Section (other than the Charging key) apply to both accesses and the Charging key (in the Charging Section) shall be used for charging packets carried via the 3GPP access.  NOTE 23: When a Monitoring key for Non-3GPP access is provided, the Monitoring key (in the Usage Monitoring Control Section) shall be used to monitor usage of the packets carried via the 3GPP access.  NOTE 24: Optional and applicable only for GBR service data flow with QoS Notification Control enabled.  NOTE 25: Optional and applicable only for GBR service data flow for which Alternative QoS Parameter Set(s) are provided.  NOTE 26: One or more Alternative QoS Parameter Sets can be provided in a prioritized order starting with the Alternative QoS Parameter Set that has the highest priority.  NOTE 27: Mandatory in MA PDU Session Control information only when there is application identifier in the service data flow template.  NOTE 28: If this parameter is used, it has to be present in every PCC rule of the PDU Session.  NOTE 29: The use of traffic correlation is defined in TS 23.501 [2], clauses 5.6.7.1 and 5.29.  NOTE 30: If Steering Mode is set to "Redundant", either a Maximum RTT or a Maximum Packet Loss Rate may be provided, but not both.  NOTE 31: The Steering functionality "ATSSS-LL" shall not be provided together with Steering Mode "Redundant".  NOTE 32: This parameter is only provided when the PCF is configured to provide an explicit indicator to the SMF to enable ECN marking for L4S for the traffic identified by the SDF template.  NOTE 33: The Transport Mode may be included when the Steering Functionality is the MPQUIC functionality. | | | | |

The Rule identifier shall be unique for a PCC rule within a PDU Session. A dynamically provided PCC rule that has the same Rule identifier value as a predefined PCC rule shall replace the predefined rule within the same PDU Session.

The Precedence defines in what order the activated PCC rules within the same PDU Session shall be applied at the UPF for service data flow detection. When a dynamic PCC rule and a predefined PCC rule have the same precedence, the dynamic PCC rule takes precedence.

NOTE 2: The operator shall ensure that overlap between the predefined PCC rules can be resolved based on precedence of each predefined PCC rule in the SMF. The PCF shall ensure that overlap between the dynamically allocated PCC rules can be resolved based on precedence of each dynamically allocated PCC rule.

For downlink packets all the service data flow templates, activated for the PDU Session shall be applied for service data flow detection and for the mapping to the correct QoS Flow. For uplink packets the service data flow templates activated on their QoS Flow shall be applied for service data flow detection (further details are provided in clause 6.2.2.2).

The *Service data flow template* may comprise any number of *Service data flow filters* or an *application identifier* as is defined in table 6.3.1.

NOTE 3: Predefined PCC rules may include service data flow templates, which support extended capabilities, including enhanced capabilities to identify events associated with application protocols.

A Service data flow filter contains information for matching user plane packets for IP PDU traffic or Ethernet PDU traffic. All Service data flow filters of a Service data flow template shall be of the same type, i.e. either Packet Filters for IP or Ethernet PDU traffic (defined in clause 5.7.6 of TS 23.501 [2]). The Service data flow template information within an activated PCC rule is applied by the SMF to instruct the UPF to identify the packets belonging to a particular service data flow.

For the IP PDU Session type only, the Service data flow template may consist of an application identifier that references an application detection filter that is used for matching user plane packets. The application identifier is also identifying the application, for which the rule applies. The same application identifier value can occur in a dynamic PCC rule and one or multiple predefined PCC rules. If so, the PCF shall ensure that there is at most one PCC rule active per application identifier value at any time.

The *Mute for notification* defines whether notification to the PCF of application's starts or stops shall be muted. Absence of this parameter means that start/stop notifications shall be sent.

The *Charging key* is the reference to the tariff for the service data flow. Any number of PCC Rules may share the same charging key value. The Charging key values for each service shall be operator configurable.

NOTE 4: Assigning the same Charging key for several service data flows implies that the charging does not require the credit management to be handled separately.

The *Service identifier* identifies the service. PCC Rules may share the same service identifier value. The service identifier provides the most detailed identification, specified for flow-based charging, of a service data flow.

NOTE 5: The PCC rule service identifier need not have any relationship to service identifiers used on the AF level, i.e. is an operator policy option.

The *Sponsor Identifier* indicates the (3rd) party organization willing to pay for the operator's charge for connectivity required to deliver a service to the end user.

The *Application Service Provider Identifier* indicates the (3rd) party organization delivering a service to the end user.

The *Charging method* indicates whether online charging or offline charging is required, or the service data flow is not subject to any end user charging. If the charging method identifies that the service data flow is not subject to any end user charging, a Charging key shall not be included in the PCC rule for that service data flow, along with other charging related parameters. If the charging method is omitted the SMF shall apply the default charging method provided within the PDU Session related policy information (see clause 6.4). The Charging method is mandatory if there is no default charging method for the PDU Session.

NOTE 6: With converged charging architecture for 5GC, online charging method also includes usage reporting from the SMF to the CHF. Hence, setting the charging method to online will also result in usage reports and thus allow for offline charging being performed by the CHF.

The *Service Data Flow handling while requesting credit* indicates either "blocking" if a credit for the Charging Key needs to be granted as a condition for the PCC Rule to be active or "non-blocking" if a credit for the Charging Key has been requested as a condition for the PCC Rule to be active.

The *Measurement method* indicates what measurements apply to charging for a PCC rule.

The *Service Identifier Level Reporting* indicates whether the SMF shall generate reports per Service Identifier. The SMF shall accumulate the measurements from all PCC rules with the same combination of Charging key/Service Identifier values in a single report.

The *Application Function Record Information* identifies an instance of service usage. A subsequently generated usage report (i.e. CDR), generated as a result of the PCC rule by the SMF, may include the Application Function Record Information, if available. The Application Function Record Information may contain the AF Charging Identifier and/or the Flow identifiers. If exclusive charging information related to the Application function record information is required, the PCF shall provide a service identifier, not used by any other PCC rule of the PDU Session at this point in time, for the AF session.

NOTE 7: For example, the PCF may be configured to maintain a range of service identifier values for each service which require exclusive per instance charging information. Whenever a separate counting or credit management for an AF session is required, the PCF shall select a value, which is not used at this point in time, within that range. The uniqueness of the service identifier in the SMF ensures a separate accounting/credit management while the AF record information identifies the instance of the service.

The *Gate* indicates whether the SMF shall instruct the UPF to let a packet identified by the PCC rule pass through (gate is open) to discard the packet (gate is closed).

NOTE 8: A packet, matching a PCC Rule with an open gate, may be discarded due to credit management reasons.

The *5G QoS Identifier*, 5QI, represents the QoS parameters for the service data flow. The 5G QoS identifier is scalar and accommodates the need for differentiating QoS in both 3GPP and non-3GPP access type.

The bitrates indicate the authorized bitrates at the IP packet level of the SDF, i.e. the bitrates of the IP packets before any access specific compression or encapsulation.

The *UL maximum-bitrate* indicates the authorized maximum bitrate for the uplink component of the service data flow.

The *DL maximum-bitrate* indicates the authorized maximum bitrate for the downlink component of the service data flow.

The *UL guaranteed-bitrate* indicates the authorized guaranteed bitrate for the uplink component of the service data flow.

The *DL guaranteed-bitrate* indicates the authorized guaranteed bitrate for the downlink component of the service data flow.

The 'Maximum bitrate' is used for enforcement of the maximum bit rate that the SDF may consume, while the 'Guaranteed bitrate' is used by the SMF to determine resource allocation demands.

The *UL sharing indication* indicates that resource sharing in uplink direction for service data flows with the same value in their PCC rule shall be applied by the SMF as described in clause 6.2.2.4.

The *DL sharing indication* indicates that resource sharing in downlink direction for service data flows with the same value in their PCC rule shall be applied by the SMF as described in clause 6.2.2.4.

The *Allocation and Retention Priority* indicates the allocation, retention and priority of the service data flow. The ARP contains information about the priority level, the pre-emption capability and the pre-emption vulnerability. The Allocation and Retention Priority resolves conflicts of demands for network resources.

The *Priority Level* is signalled together with the 5QI to the (R)AN and UPF, only when a value different from the standardized value in the QoS characteristics Table 5.7.4-1 in TS 23.501 [2] is required.

The *Averaging Window* is signalled together with the 5QI to the (R)AN and UPF, only when a value different from the standardized value in the QoS characteristics Table 5.7.4-1 in TS 23.501 [2] is required.

The *Maximum Data Burst Volume*, MDBV, is signalled together with the 5QI to the (R)AN, only when a value different from the standardized value in the QoS characteristics Table 5.7.4-1 in TS 23.501 [2] is required.

The *Bind to QoS Flow associated with the default QoS rule* indicates that the SDF shall be bound to the QoS Flow associated with the default QoS rule. The presence of this parameter attribute causes the 5QI/ARP of the rule to be ignored by the SMF during the QoS Flow binding.

The *Bind to QoS Flow associated with the default QoS rule and apply PCC rule parameters* indicates that the SDF shall be bound to the QoS Flow associated with the default QoS rule and that the QoS related attributes of the PCC rule shall be applied by the SMF to derive the QoS parameters of the QoS Flow associated with the default QoS rule instead of the PDU Session related information Authorized default 5QI/ARP.

NOTE 9: The Bind to QoS Flow associated with the default QoS rule and apply PCC rule parameters Indication has to be used whenever the PDU Session related information Authorized default 5QI/ARP (as described in clause 6.3.1) cannot be directly used as the QoS parameters of the QoS Flow associated with the default QoS rule, for example when a GBR 5QI is used or the 5QI priority level has to be changed.

The *QoS Notification Control,* QNC*,* indicates whether notifications are requested from the access network (i.e. 3GPP RAN) when the GFBR can no longer (or can again) be guaranteed for a QoS Flow during the lifetime of the QoS Flow. If it is set and the GFBR can no longer (or can again) be guaranteed, the access network (i.e. 3GPP RAN) sends a notification towards the SMF, which then notifies the PCF.

The *Disable UE notifications at changes related to Alternative QoS Profiles* parameter indicates to disable QoS Flow parameters signalling to the UE when the SMF is notified by the NG-RAN of changes in the fulfilled QoS situation. The fulfilled situation is either the QoS profile or an Alternative QoS Profile.

The *Precedence for TFT packet filter allocation* parameter determines the order in which TFT packet filters are allocated for PCC rules. The PCF may include this parameter if there is a possibility to run into a restriction regarding the number of TFT packet filters that can be allocated for the PDU Session and interworking with EPS with N26 deployment is supported (see also clause 4.11.1 of TS 23.502 [3]).

NOTE 10: PCF can know that interworking with EPS with N26 is supported based on DNN and S-NSSAI of the PDU Session.

The *Reflective QoS Control* indicates to apply reflective QoS for the service data flow. The indication is used to control the RQI marking in the DL packets of the service data flow and may trigger the sending of the RQA parameter for the QoS Flow the service data flow is bound to. Reflective QoS is defined in clause 5.7.5 of TS 23.501 [2].

NOTE 11: While the UE applies a standardized value for the precedence of all UE derived QoS rules, PCC rules require different precedence values and PCF configuration has to ensure that there is a large enough value range for the precedence of PCC rules corresponding to UE derived QoS rules. To avoid that the precedence of network provided QoS rules need to be changed when Reflective QoS is activated and filters are overlapping, the PCF will take the standardized value for the precedence of UE derived QoS rules into account when setting the precedence value of PCC rules subject to Reflective QoS.

The *Reflective QoS Control* parameter shall not be used for the PCC rule with match-all SDF template. If PCC rule with match-all SDF template is present, the *Reflective QoS Control* parameter shall not be used for PCC rules which contain the *Bind to QoS Flow of the default QoS rule* parameter, either.

The *N6-LAN Traffic Steering Enforcement Control* contains *Traffic steering policy identifier(s)* for steering traffic onto N6-LAN to the appropriate N6 service functions deployed by the operator or a third party, and optional Metadata if received from AF due to Application Function influence on Service Function Chaining as described in clause 5.6.16 of TS 23.501 [2].

The content of the *Header Handling Control information* is defined in clause 5.6.X of TS 23.501 [2].

The *ECN marking for L4S* indicates that the service data flow supports ECN marking for L4S to be performed.

The access network information reporting parameters (*User Location Report*, *UE Timezone Report*) instruct the SMF about what information to forward to the PCF when the PCC rule is activated, modified or removed.

The *Monitoring Key* is the reference to a resource threshold. Any number of PCC Rules may share the same monitoring key value. The monitoring key values for each service shall be operator configurable.

The *Indication of exclusion from session level monitoring* indicates that the service data flow shall be excluded from the PDU Session usage monitoring.

The *Application Function influence on traffic routing Enforcement Control* may contain:

*- a set of DNAI(s)* (i.e. a reference to the DNAI(s) the SMF needs to consider for UPF selection/reselection), an optional Indication of traffic correlation and, per DNAI, a corresponding Traffic steering policy identifier (i.e. a reference to a pre-configured traffic steering policy at the SMF), and/or a corresponding N6 traffic routing information (when the N6 traffic routing information is provided explicitly as part of the AF request, as described in clause 5.6.7 of TS 23.501 [2]), or;

- an *AF subscription to UP change events* parameter which contains subscription information defined in clause 5.2.8.3 of TS 23.502 [3] for the change of UP path Event Id i.e. an *Indication of early and/or late notification* and information on where to provide the corresponding notifications (Notification Target Address + Notification Correlation ID as specified in clause 4.15.1 of TS 23.502 [3]) and optionally an indication of "AF acknowledgment to be expected" to the corresponding notifications as described in clause 5.6.7 of TS 23.501 [2].

- a *user plane latency requirements* parameter which contains AF requested information on the requirements for user plane latency defined in TS 23.548 [33].

- an *indication for Simultaneous Connectivity at Edge Relocation*, which includes *Keep existing PSA* indication to provide guidance to the network on whether to provide simultaneous connectivity over source and target PSA at edge relocation; also, optionally a related *Keep existing PSA timer* that indicates the minimum time interval to be considered for inactivity for the traffic described before the connectivity over the source PSA may be removed, as defined in TS 23.548 [33].

- an *EAS Correlation indication*, which indicates selecting a common EAS for a set of UEs identified by Traffic Correlation ID and accessing the application identified by Service data flow template or FQDN(s).

- a *Traffic Correlation ID*, identifying a set of UEs accessing the application identified by the Service data flow template or FQDN(s). See more in clause 5.6.7 of TS 23.501 [2].

- a *Common EAS IP address*, IP address of the common EAS accessed by the UEs with the same Traffic Correlation ID, for the application identified by the Service data flow template.

- *FQDN(s)*, FQDN(s) for the application traffic identified by the Service data flow template, and used for influencing EASDF-based DNS query procedure as defined in TS 23.548 [33].

- NEF Information, Notification Endpoint of the NEF responsible of the set of UEs associated with the Traffic correlation ID.

The *Traffic Steering Enforcement Control* may contain Indication of UE IP address preservation. The SMF takes this indication into account when determining whether to reselect PSA UPF, as specified in clause 5.6.7 of TS 23.501 [2].

The *Redirect* indicates whether the uplink part of the service data flow should be redirected to a controlled address.

The *Redirect Destination* indicates the target redirect address when *Redirect* is enabled.

The *UL Maximum Packet Loss Rate* indicates the maximum rate for lost packets that can be tolerated in the uplink direction.

The *DL Maximum Packet Loss Rate* indicates the maximum rate for lost packets that can be tolerated in the downlink direction.

The *Application descriptors* provides one or several instances of the OSId and OSAppId combination. It is used by the UE to identify the application traffic for which steering is required based on the Steering Functionality, the Steering Mode, the Steering Mode Indicator and the Threshold Values.

The *Steering Functionality* indicates the method for how traffic matching the SDF template in the UPF or a Traffic descriptor in the UE is sent over the MA PDU Session. The method ATSSS\_LL indicates that the traffic matching the SDF template is sent over the MA PDU Session without additional tunnelling, e.g. with IP flow switching. The method MPTCP indicates that the traffic matching the SDF template is sent over the MA PDU Session using MPTCP. The method MPQUIC indicates that traffic matching the SDF template is sent over the MA PDU Session using MPQUIC.

The *Steering Mode* indicates the rule for distributing downlink SDFs in the UPF or uplink traffic in the UE between accesses, together with the associated steering parameters. The PCF may indicate separate values for uplink and downlink directions. The available Steering Modes are defined in TS 23.501 [2].

The *Steering Mode Indicator* indicates that the UE or the UPF or both may change the steering parameters provided in the Steering Mode and may adjust the traffic steering based on their own decisions, as further defined in TS 23.501 [2]. When the PCF selects the Load-Balancing Steering Mode for both the uplink and the downlink, and the PCF provides a *Steering Mode Indicator* for the uplink equal to UE-assistance operation, then the PCF shall provide the same *Steering Mode Indicator* for the downlink.

The *Threshold Values* indicate the authorized RTT or Packet Loss Rate for a SDF. Depending on the Steering Mode value, the PCF may include, per SDF, one threshold value for RTT or one threshold value for Packet Loss Rate, or both. The PCF may indicate separate values for uplink and downlink directions. The Steering Modes that may use the threshold values and how the UE and UPF enforces them are defined in TS 23.501 [2].

The *Transport Mode* indicates one of the Transport Modes as defined in TS 23.501 [2] that should be applied for transmitting a UDP flow between UE and UPF. The Transport Mode may be included when the MPQUIC functionality is selected as the Steering Functionality.

The *Charging key for Non-3GPP access* indicates the Charging key that shall be used for charging the detected service data flow traffic carried via Non-3GPP access. The other charging related parameters apply for both accesses.

The *Monitoring key for Non-3GPP access* indicates the Monitoring key that shall be used for monitoring the usage of the detected service data flow traffic carried via Non-3GPP access.

The *QoS Monitoring parameter(s)* indicates the QoS Monitoring parameter(s) for which QoS Monitoring can be enabled for a service data flow as defined in clause 5.45 of TS 23.501 [2], e.g. the UL packet delay, DL packet delay or round trip packet delay between the UE and the UPF.

The *Reporting frequency* indicates the frequency for the reporting, such as event triggered, periodic. The following applies:

- If the *Reporting frequency* indicates "periodic", the *reporting period* shall also be included in the PCC rule.

- The *reporting period* shall also be used for reporting measurement failure in any of the *Reporting frequency* modes "periodic" or "event triggered".

NOTE 12: The indication of a measurement failure is not possible or not supported for some *QoS Monitoring parameter(s)* (as described in the respective clauses of clause 5.45 of TS 23.501 [2]).

- If the *Reporting frequency* indicates "event triggered", the *reporting period*, *Reporting threshold(s)* and the *minimum waiting time* shall also be included in the PCC rule. The *Reporting threshold(s)* indicates the measurement threshold for each of the included *QoS Monitoring parameter(s)*. The *minimum waiting time* indicates the minimum time interval between subsequent reports.

The *Target of reporting* indicates the target for the QoS Monitoring reports sent as notifications. It can be either the NEF, the AF or the Local NEF, indicated as Notification Target Address + Notification Correlation ID.

The *Indication of direct event notification* indicates that the QoS Monitoring reports shall be sent by the UPF directly to the NF indicated by the Target of reporting (i.e. to the Local NEF or the AF as described in clause 5.8.2.18 of TS 23.501 [2]).

The *DataCollection\_ApplicationIdentifier* is provided to assist the SMF when it needs to decide whether this PCC Rule corresponds to an event exposure subscription (see clause 4.15.4.5.1 of TS 23.502 [3]).

The *Alternative QoS Parameter Set(s)* define alternative set(s) of QoS parameters for the service data flow. Every set consists of a PER, a PDB, as well as an UL and a DL guaranteed bitrate QoS parameter. For delay-critical service data flow, every Alternative QoS Parameter Set may also include a Maximum Data Burst Volume (MDBV).

The content of the *TSC Assistance Container* is defined in clause 5.27.2 of TS 23.501 [2].

The *Traffic Parameter Information* applies to the UE power saving as specified in clause 5.37.8 of TS 23.501 [2]. The following parameters are included:

- *Periodicity*:

- indicates the time period between start of two data bursts in UL and/or DL direction.

- this parameter is only included when PCF receives the periodicity information from AF.

The *Traffic Parameter Measurement* applies to the UE power saving as specified in clause 5.37.8 of TS 23.501 [2]. The following parameters are included:

- *Traffic Parameter to be measured*:

- UL and/or DL periodicity. This parameter is only included when PCF does not receive the periodicity information from AF.

- N6 jitter range associated with DL Periodicity.

- *reporting condition* can be optionally included to define the condition for the reporting, such as event triggered or periodic, frequency.

The *Downlink Data Notification Control* applies to the control of subscription to Downlink Data Delivery status event notifications and DDN Failure event notifications as specified in clause 4.15.3 of TS 23.502 [3]. The following parameters are included:

- The *Notification control for DDD status* applies as described in clause 4.15.3.2.8 of TS 23.502 [3] and contains the following parameters:

- indication that notifications of Downlink Data Delivery status are required; and

- the requested type of such notifications (notifications about downlink packets being buffered, and/or discarded).

- The *Notification Control for DDN Failure* applies as described in clause 4.15.3.2.9 of TS 23.502 [3] and contains the following parameters:

- indication that notifications of DDN Failure are required.

NOTE 12: Downlink Data Notification Control information is provided to assist the SMF in the generation/update of N4 information. The PCF will not be notified about the Downlink data delivery status events or the DDN Failure events.

The *PDU Set Control Information* is needed to support the delivery of PDU Sets for a service data flow. The parameter values for UL and DL may be different (see clause 5.7.7 of TS 23.501 [2]).

The *Protocol Description Information* needed to support identifying PDU Set Information for DL/UL packets and/or last packet of a DL Data Burst. The Protocol Descriptions for UL and DL may be different (see clause 5.37.5 of TS 23.501 [2]).

The *Data Burst Handling Information* is needed to support detecting last PDU of the Data Burst and marking End of Data Burst Indication on the last packet of the Data Burst (see clause 5.37.8 of TS 23.501 [2]).

\* \* \* \* End of changes \* \* \* \*