

Statement of Compliance towards 3GPP Technical Specification 29.212 (Release 15)

Ericsson Service-Aware Policy Controller

Statement of Compliance

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1 Introduction

This document describes to what extent SAPC implementation of Policy Charging Rule Function (PCRF) role conforms with the 3GPP Technical Specification (TS) 29.212 V15.1.0 (2017-12) standard *3GPP Technical Specification Policy and Charging Control over Gx reference point, 29.212* with the exemptions or additions stated in this document.



2 General Considerations

This document is structured following the chapters of the 3GPP Technical Specification 29.212 V15.1.0 (2017-12).

The following terms explain the columns in the fill-in tables in the document:

| | |
|----------------------------|--|
| Qualifier | Defines whether the implementation of a certain entity is Mandatory (M), Optional, (Op) or Conditional (C). |
| Compliance | Defines whether the implementation of a certain entity is Compliant by the system. |
| Comment | It may contain additional information. |
| No requirement (NR) | The TS statement contains general information for the understanding of other statements not applicable to SAPC (the statements may be applicable for other nodes). |

One of the following statements (with the associated interpretation) is given to each of the requirements of the Technical Specification:

| | |
|---------------------------------|--|
| Not compliant (NC) | The TS statement is not fulfilled. |
| Compliant (C) | All of the TS statements are fulfilled. |
| Partially compliant (PC) | Not completely all of the TS statements are fulfilled, the exceptions are described. |

In this context, 'is/shall/will' statements are considered as mandatory, 'may' statements are considered as optional, and 'can' statements are considered as conditional.



3 Scope, References and Abbreviations

3.1 3GPP TS 29.212 Scope

No requirement

3.2 3GPP TS 29.212 References

No requirement

3.3 3GPP TS 29.212 Definitions and Abbreviations

3.3.1 Definitions

No requirement

3.3.2 Abbreviations

No requirementt



4 Gx Reference Point

4.1 Overview

No requirement

4.2 Gx Reference Model

No requirement

4.3 PCC Rules

4.3.1 PCC Rule Definition

Table 1 PCC Rule Type

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| - Dynamic PCC rules. Dynamically provisioned by the PCRF to the PCEF via the Gx interface. These PCC rules may be either predefined or dynamically generated in the PCRF. Dynamic PCC rules can be installed, modified and removed at any time. | M | C | |
| - Predefined PCC rules. Preconfigured in the PCEF. Predefined PCC rules can be activated or deactivated by the PCRF at any time. Predefined PCC rules within the PCEF may be grouped allowing the PCRF to dynamically activate a set of PCC rules over the Gx reference point. | M | C | |



Table 2 PCC Rule Structure

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| <p>A PCC rule consists of:</p> <ul style="list-style-type: none"> - a rule name; - service identifier; - service data flow filter(s); - application identifier; - precedence; - gate status; - QoS parameters; - indication for PS to CS session continuity; - charging key (i.e. rating group); - other charging parameters; - monitoring key; - sponsor identity; - application service provider identity; - indication of access network information reporting; - redirect; - traffic steering policy identifier(s) | M | PC | <p>Gate status is set to ENABLED for dynamic (preconfigured in the SAPC) PCC rules.</p> <p>Sponsor identity and Application service provider identity are not supported.</p> <p>Indication for PS to CS session continuity is not supported.</p> <p>Traffic steering policy identifier(s) is not supported.</p> |
| The rule name shall be used to reference a PCC rule in the communication between the PCEF and the PCRF. | M | C | |
| The service identifier shall be used to identify the service or the service component the service data flow relates to. | M | C | |
| The service data flow filter(s) or the application detection filter shall be used to select the traffic for which the rule applies. Either service data flow filter(s) or application identifier shall exist in a PCC rule. | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| It shall be possible to define wildcarded service data flow filter(s), both for the dynamic and predefined PCC rules. | M | C | |
| The application identifier shall be used to reference an application detection filter, which is predefined in the PCEF. The same application identifier value can occur in more than one PCC rule. If so, the PCRF shall ensure that there is at most one PCC rule active per application identifier value and IP CAN session at any time. NOTE 3: The application identifier can only be used for PCEF enhanced with ADC. The same application identifier value could be used for a dynamic PCC rule and a pre-defined PCC rule or for multiple pre-defined PCC rules. NOTE 4: The configuration of the application detection filter in the PCEF can include the set of information required for encrypted detection as defined in Annex X of 3GPP TS 23.203. | M | C | |
| The gate status indicates whether the service data flow may pass (gate is open) or shall be discarded (gate is closed) in uplink and/or in downlink direction. | M | C | Gate status is set to ENABLED for dynamic (preconfigured in SAPC) PCC rules. |
| The QoS information includes the QoS class identifier (authorized QoS class for the service data flow), the Allocation and Retention Priority -(ARP) and authorized bitrates for uplink and downlink. | M | C | |
| The PS to CS session continuity indicates that the service data flow may be handed over to the CS domain as defined in 3GPP TS 23.216 [40]. | M | NC | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| The charging parameters define whether online and offline charging interfaces are used, what is to be metered in offline charging, on what level the PCEF shall report the usage related to the rule, etc. | M | C | |
| For different PCC rules with overlapping service data flow filters, the precedence of the rule determines which of these rules is applicable. For PCC rules with application detection filter, the precedence of the rule is only relevant for the enforcement or charging of the detected application. When a dynamic PCC rule and a predefined PCC rule have the same precedence, the dynamic PCC rule takes precedence. For dynamic PCC rules that contain an application identifier, the precedence shall be either preconfigured at the PCEF or provided dynamically by the PCRF within the PCC Rules. NOTE 5: Whether precedence for dynamic PCC rules that contain an application identifier is preconfigured in PCEF or provided in the PCC rule from the PCRF depends on network configuration. | M | PC | Application Identifier is not supported. |
| PCC rule also includes Application Function record information for enabling charging correlation between the application and bearer layer if the AF has provided this information via the Rx interface. For IMS this includes the IMS Charging Identifier (ICID) and flow identifiers. | M | C | |
| The monitoring key for a PCC rule identifies a monitoring control instance that shall be used for usage monitoring | M | PC | The SAPC supports usage monitoring for |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|-------------------------------|
| control of the service data flows controlled by the predefined PCC rule or dynamic PCC rule. | | | predefined PCC rules at PCEF. |
| If sponsored data connectivity is supported, the sponsor identity for a PCC rule identifies the 3rd party organization (the sponsor) willing to pay for the operator's charge for connectivity required to deliver a service to the end user. | M | NC | |
| If sponsored data connectivity is supported, the application service provider identity for a PCC rule identifies the 3rd party organization (the ASP) that is delivering the service to the end user. | M | NC | |
| If Access Network Information Reporting is supported, the value of Required-Access-Info AVP for a PCC rule identifies the Access Network Information parameters requested by the AF. | M | C | |
| The redirect indicates whether the uplink part of the detected application traffic shall be redirected to a controlled address. The target redirect address may also be included. NOTE 6: The redirect is applicable when application identifier exists in the PCC rule. | M | C | |

4.3.2 Operations on PCC Rules

Table 3 Operations on PCC Rules

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| For dynamic PCC rules, the following operations are available: | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| Installation: to provision a PCC rules that has not been already provisioned. Modification: to modify a PCC rule already installed. Removal: to remove a PCC rule already installed. | | | |
| For predefined PCC rules, the following operations are available: Activation: to allow the PCC rule being active. Deactivation: to disallow the PCC rule. | M | C | |

4.3.3 4.3a IP Flow Mobility Routing Rules

Not compliant

4.3.4 4.3b Void

No requirement

4.3.5 4.3c NBIFOM Routing Rules

Not compliant

4.4 Functional Elements

4.4.1 PCRF

Table 4 PCRF

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF provides network control regarding the service data flow detection, gating, QoS and flow based charging (except credit management) towards the PCEF. | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| The PCRF receives session and media related information from the AF and informs AF of traffic plane events. | M | C | |
| The PCRF shall provision PCC Rules to the PCEF via the Gx reference point | M | C | |
| If IP flow mobility applies, the PCRF shall, based on IP flow mobility routing rules received from the PCEF, provide the authorized PCC/QoS rules to the applicable BBF. | M | NC | |
| If NBIFOM applies, the PCRF takes the decisions as described in subclause 4.5.25.1.1. | M | NC | |
| <p>The PCRF PCC Rule decisions may be based on one or more of the following:</p> <ul style="list-style-type: none"> - Information obtained from the AF via the Rx reference point, e.g. the session, media and subscriber related information. | Op | C | |
| <ul style="list-style-type: none"> - Information obtained from the PCEF via the Gx reference point, e.g. IP-CAN bearer attributes, request type, subscriber related information and, IP flow mobility routing rules (if IP flow mobility is supported) , NBIFOM routing rule and change of usability of an access (if NBIFOM is supported), detected application's traffic information, (if the PCEF supports Application Detection and Control feature) and 3GPP PS Data Off status (if the PCEF supports 3GPP PS Data Off feature). | Op | PC | <p>IP flow mobility routing rules are not supported.</p> <p>NBIFOM routing rule is not supported.</p> |
| <ul style="list-style-type: none"> - Information obtained from the SPR via the Sp reference point, e.g. subscriber and service related data. | Op | C | Service related data is stored in the SAPC. |
| <ul style="list-style-type: none"> - Information obtained from the TDF via the Sd reference point, | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| e.g. report on application's traffic detection start/stop. | | | |
| - Information obtained from the BBERF via the Gxx reference point. | Op | NC | Gxx reference point is not supported. |
| - Own PCRF pre-configured information. | Op | C | |
| If the information from the PCEF contains traffic mapping information not matching any service data flow filter known to the PCRF, and the PCRF allows the UE to request enhanced QoS for services not known to the PCRF, the PCRF shall add this traffic mapping information as service data flow filters to the corresponding authorized PCC Rule. The PCRF may wildcard missing filter parameters, e.g. missing uplink TFT address and port information in case of GPRS. | M | NC | UE Init mode for dedicated bearers is not supported. |
| The PCRF shall report events to the AF via the Rx reference point. | M | C | |
| The PCRF shall inform the PCEF through the use of PCC rules on the treatment of each service data flow that is under PCC control, in accordance with the PCRF policy decision(s). | M | C | |
| The PCRF shall be able to select the bearer control mode that will apply for the IP-CAN session and provide it to the PCEF via the Gx reference point. | M | C | |
| Upon subscription to loss of AF signalling bearer notifications by the AF, the PCRF shall request to PCEF to be notified of the loss of resources associated to the PCC Rules corresponding with AF Signalling IP Flows, if this has not been requested previously. | M | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| If permitted by the subscriber's profile configuration received from the SPR, the PCRF may invoke the application's traffic detection and control at the PCEF supporting Application Detection and Control feature, by providing the corresponding PCC Rules. | Op | C | |
| The PCRF may use one or more pieces of information defined in the clause as input for the selection of traffic steering policies used to control the steering of the subscriber's traffic to appropriate (S)Gi-LAN service functions. NOTE 2: In order to allow the PCRF to select and provision an application based traffic steering policy, the reporting of detected applications to the PCRF or any other information defined in this clause can be used. If 3GPP PS Data Off applies, the PCRF shall behave as described in subclause 4.5.29. | Op | NC | |

4.4.2 PCEF

No requirement

4.5 PCC Procedures over Gx Reference Point

4.5.1 Request for PCC Rules

Table 5 Request for PCC rules

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| If the PCRF is, due to incomplete, erroneous or missing information (for example, QoS, SGSN address, RAT type, TFT, subscriber | Op | PC | SAPC may reject the request with experimental result code |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| information) not able to provision a policy decision as response to the request for PCC rules by the PCEF, the PCRF may reject the request using a CC Answer with the Gx experimental result code DIAMETER_ERROR_INITIAL_PARAMETERS (5140). | | | DIAMETER_ERROR_INITIAL_PARAMETERS (5140) or DIAMETER_AUTHORIZATION_REJECTED (5003) |
| If the PCRF detects that the packet filters in the request for new PCC rules received from the PCEF is covered by the packet filters of outstanding PCC rules that the PCRF is provisioning to the PCEF, the PCRF may reject the request using a CC-Answer with the Gx experimental result code DIAMETER_ERROR_CONFLICTING_REQUEST (5147). | Op | NC | UE Init mode for dedicated bearers is not supported. |
| If the PCRF does not accept one or more of the traffic mapping filter provided by the PCEF in a CC Request (for example, because the PCRF does not allow the UE to request enhanced QoS for services not known to the PCRF), the PCRF shall reject the request using a CC Answer with the Gx experimental result code DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED (5144). | M | NC | |
| The PCRF shall not combine a rejection with provisioning of PCC rule operations in the same CC Answer. | M | C | |

4.5.2 Provisioning of PCC Rules

Table 6 Provisioning of PCC Rules

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF shall indicate, via the Gx reference point, PCC rules to be applied at the PCEF. | M | C | |
| PULL procedure (Provisioning solicited by the PCEF) : In response to a request for PCC rules being made by the PCEF, as described in the preceding section, the PCRF shall provision PCC rules in the CC-Answer | M | C | |
| PUSH procedure (Unsolicited provisioning) : The PCRF may decide to provision PCC rules without obtaining a request from the PCEF, for example, in response to information provided to the PCRF via the Rx reference point, or in response to an internal trigger within the PCRF. | Op | C | |
| To provision PCC rules without a request from the PCEF, the PCRF shall include these PCC rules in an RA-Request message. No CCR/CCA messages are triggered by this RA-Request. | M | C | |
| The PCRF should NOT send a new RA-Request command to the PCEF until the previous RA-Request has been acknowledged for the same IP-CAN session. | M | C | |

Table 7 Provision of PCC-Rules

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| For each request from the PCEF or upon the unsolicited provision the PCRF shall | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| provision zero or more PCC rules. | | | |
| The PCRF may perform an operation on a single PCC rule by one of the following means: | Op | C | |
| - To activate or deactivate a PCC rule that is predefined at the PCEF, the PCRF shall provision a reference to this PCC rule within a Charging-Rule-Name AVP and indicate the required action by choosing either the Charging-Rule-Install AVP or the Charging-Rule-Remove AVP. | M | C | |
| - To install or modify a PCRF-provisioned PCC rule, the PCRF shall provision a corresponding Charging-Rule-Definition AVP within a Charging-Rule-Install AVP. | M | C | |
| - To remove a PCC rule which has previously been provisioned by the PCRF, the PCRF shall provision the name of this rule as value of a Charging-Rule-Name AVP within a Charging-Rule-Remove AVP. | M | C | |
| - If, for certain accesses, the PCRF performs the bearer binding, the PCRF may move previously installed or activated PCC rules from one IP CAN bearer to another IP CAN bearer. See Annex A (Normative): Access Specific Aspects (GPRS) on page 113 for further details. | Op | NC | The SAPC does not perform bearer binding, as UE-Init procedures (multiple IP-CAN bearers) are not supported. |
| As an alternative to providing a single PCC rule, the PCRF may provide a Charging-Rule-Base-Name AVP within a Charging-Rule-Install AVP or the Charging-Rule-Remove AVP as a reference to a group of PCC rules predefined at the PCEF. With a Charging-Rule-Install AVP, a predefined group of PCC | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| rules is activated or moved. With a Charging-Rule-Remove AVP, a predefined group of PCC rules is deactivated. | | | |
| The PCRF may combine multiple of the above PCC rule operations in a single command. | Op | C | |
| When the UE initiates a resource modification procedure, the PCRF shall provision PCC rule(s) that are only related to the UE's resource modification in the corresponding CCA command. | M | NC | |
| To activate a predefined PCC rule at the PCEF, the rule name within a Charging-Rule-Name AVP shall be supplied within a Charging-Rule-Install AVP as a reference to the predefined rule. To activate a group of predefined PCC rules within the PCEF (e.g. gold users or gaming services) the PCC rule base name within a Charging-Rule-Base-Name AVP shall be supplied within a Charging-Rule-Install AVP as a reference to the group of predefined PCC rules. | M | C | |
| To install a new or modify an already installed PCRF defined PCC rule, the Charging-Rule-Definition AVP shall be used. If a PCC rule with the same rule name, as supplied in the Charging-Rule-Name AVP within the Charging-Rule-Definition AVP, already exists at the PCEF, the new PCC rule shall update the currently installed rule. If the existing PCC rule already has attributes also included in the new PCC rule definition, the existing attributes shall be overwritten. Any attribute in the existing PCC rule not included in the new | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| PCC rule definition shall remain valid. | | | |
| When installing a new or modifying an already installed PCC rule and if the Rel11 feature is supported by both the PCEF and PCRF as described in subclause 5.4.1, the PCRF shall always include at least one uplink packet filter within a provisioned PCC rule. For PCC rules with service data flow filters for the downlink direction only, i.e. the Flow-Direction AVP set to the value DOWNLINK(1), the PCRF shall add an uplink service data flow filter to the resulting PCC rule that effectively disallows any useful packet flows in uplink direction (see subclause 15.3.3.4 in 3GPP TS 23.060 [17] for an example of such a packet filter). The Packet-Filter-Usage AVP value SEND_TO_UE (1) shall not be used for that filter. | M | NC | |
| NOTE 2: Despite that signalling with the UE in 2G/3G only allows the network to accept or reject the UE request, the PCRF is adding an extra service data flow filter in case that the packet filters in the request for new PCC rules from the PCEF only contain downlink packet filters, by that the PCRF logic is kept agnostic to the RAT used. | M | NC | |
| NOTE 3: The PCRF does not add an uplink service data flow filter to the resulting PCC rule if the PCRF detects that the service data flow filters in the PCC rule include a service data flow filter with unspecified direction information, i.e. Flow-Direction AVP set to value UNSPECIFIED (0). | M | NC | |
| NOTE 4: The PCRF does not add an uplink service data flow | M | NC | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| filter to the resulting PCC rule if the PCRF detects that the service data flow filters in the PCC rule include a downlink service data flow filter with unspecified direction information, i.e. Flow-Direction AVP set to value UNSPECIFIED (0). | | | |
| Provisioning of predefined PCC rules upon invocation/ revocation of an MPS service shall be done according to clause 5.3 in 3GPP TS 29.213. | M | C | |
| For deactivating single predefined or removing PCRF-provided PCC rules, the Charging-Rule-Name AVP shall be supplied within a Charging-Rule-Remove AVP. For deactivating a group of predefined PCC rules, the Charging-Rule-Base-Name AVP shall be supplied within a Charging-Rule-Remove AVP. | M | C | |
| The PCRF may request the PCEF to confirm that the resources associated to a PCC rule are successfully allocated. To do so the PCRF shall provide the Event-Trigger AVP with the value SUCCESSFUL_RESOURCE_ALLOCATION (22) if the event trigger is not previously set. In addition the PCRF shall install the rules that need resource allocation confirmation by including the Resource-Allocation-Notification AVP with the value ENABLE_NOTIFICATION(0) within the corresponding Charging-Rule-Install AVP | Op | C | |
| If Enh-RAN-NAS-Cause feature is supported, the PCRF may request the PCEF to report the outcome of the release of resources related to a PCC rule. | Op | NC | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| To do so the PCRF shall provide the Event-Trigger AVP with the value RESOURCE_RELEASE (53) if the event trigger is not previously set. In addition the PCRF shall provide the Resource-Release-Notification AVP with the value ENABLE_NOTIFICATION (0) with the corresponding Charging-Rule-Remove AVP. If a Charging-Rule-Remove AVP does not include the Resource-Release-Notification AVP, the outcome of the resource release shall not be notified by the PCEF. The PCRF shall maintain the PCC rules for which release confirmation is required until the PCEF notifies about the resource release outcome. | | | |

Table 8 Exception Behavior

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| If the provisioning of PCC rules fails, the PCEF informs the PCRF as described in Clause 4.5.12 PCC Rule Error Handling. Depending on the cause, the PCRF may decide if re-installation, modification, removal of PCC rules or any other action applies. | Op | PC | Reporting failure in RAA command is not handled. |
| If the PCRF is unable to create a PCC rule for the response to the CC Request by the PCEF, the PCRF may reject the request as described in subclause 4.5.1. | Op | NC | See Request for PCC Rules on page 12 |
| If the PCRF receives a request for PCC rules for an IP-CAN session from the PCEF, or a request for QoS rules for a gateway control session from the BBERF, while no suitable authorized PCC rules are configured in the PCRF or can be derived from service | M | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|----------------------------|
| information provisioned by an AF, the PCRF shall check the set of services the user is allowed to access for this APN. | | | |
| If the user is not allowed to access AF session based services, the PCRF shall check whether the user is allowed to request resources for services not known to the PCRF and whether the requested QoS and/or packet filters can be authorized. If this is the case, the PCRF shall provide a PCC rule to authorize the UE requested QoS and packet filters that were received as part of the request for PCC/QoS rules. The service data flow description shall be derived from the packet filter information. | M | NC | |
| If the user is not allowed to request resources for services not known to the PCRF, the PCRF shall reject the request. | M | C | |
| If the user is allowed to access AF session based services, the PCRF may, depending for example, on the user's subscription details or operator policy, authorise the requested QoS for a timer supervised grace period (the timer started by the PCRF either by the request from the PCEF or from the BBERF) to wait for AF service information. | Op | NC | No timer is defined. |
| If an AF session bound to the same IP CAN session is ongoing and only preliminary service information was received within this AF session, the PCRF shall base the authorization of the requested QoS on the preliminary service information | M | C | |
| If the preliminary service information is insufficient to | M | NC | TFTs are not considered by |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| construct appropriate PCC rules or no preliminary service information is available, the PCRF shall provide preliminary PCC rules to authorize the UE requested QoS and packet filters. Therefore, the preliminary PCC rules shall contain wildcarded flow description or flow description derived from possible TFTs received as part of the request for PCC/QoS rules. | | | SAPC, as only general bearer in UE-init mode is supported. |
| The PCRF may apply a dedicated charging key value to indicate to the charging subsystem that the charging key is preliminary and may be corrected later on. | Op | NC | |
| With the dedicated charging key, the PCRF instructs the charging subsystem to recalculate the applicable charge for the time when the dedicated charging key value was applied once the dedicated charging key value is replaced with some other value in a new provisioning of PCC rules. For example, if online charging applies, Session Charging with Unit Reservation (SCUR) can be used. | M | NC | |
| If the PCRF receives AF service information while the timer-supervised grace period is running, the PCRF shall stop the timer and may derive authorized PCC rules from this service information and update or replace the preliminary PCC rules that were previously provided for the UE requested QoS and packet filters, for instance by choosing service specific QoS parameters and charging keys. | M | NC | Immediate installation (no timer) is done on general bearer. |
| If the timer expires and the PCRF has not received any AF | M | NC | Immediate installation |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------------------------------------|
| service information, the PCRF should downgrade or revoke the authorization for the preliminary PCC/QoS rules (previously provided for the UE requested QoS and packet filters) in accordance with the policy for services not known to the PCRF. The PCRF should adjust the charging keys within the PCC rules and should downgrade the authorized QoS to the allowed value for the services not known to the PCRF, if required. | | | (no timer) is done on general bearer. |
| For the case where the BBERF requests QoS rules from the PCRF, the PCRF derives the QoS rules from the PCC rules and provisions the QoS rules to the BBERF according to clause 4a. 5.2. | M | NC | Gxx is not supported. |
| If the IP flow mobility is supported and the tariff depends on what access network is in use for the service data flow, then the PCRF may set the charging key of the PCC rule in accordance with the access network in use. | M | NC | |

4.5.2.1 Selecting a PCC Rule for Uplink IP Packets

No requirement

4.5.2.2 Selecting a PCC Rule and IP CAN Bearer for Downlink IP Packets

No requirement

4.5.2.3 Gate Function

Table 9 Gate Function

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|------------------------------------|
| The Gate Function represents a user plane function enabling or disabling the forwarding of | M | PC | Gate function is not supported for |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| service flow packets. A gate is described within a PCC rule. If the PCC rule contains Flow-Information AVP(s) applicable for uplink IP flows, it shall describe a gate for the corresponding uplink IP flows. If the PCC rule contains Flow-Information AVP(s) applicable for downlink IP flows, it shall describe a gate for the corresponding downlink IP flows. | | | the PCC rules preconfigured in the SAPC |
| If the PCC rule contains the application identifier, it shall describe a gate for the corresponding detected application traffic | M | NC | Gate function is not supported for the PCC rules enhanced with ADC preconfigured in the SAPC |
| The Flow Status AVP of the PCC rule shall describe if the possible uplink and possible downlink gate is opened or closed | M | C | |

4.5.2.4

Policy Enforcement for "Authorized Qos" per PCC Rule

Table 10 Policy Enforcement for "Authorized Qos" per PCC Rule

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF can provide the authorized QoS for a PCC rule to the PCEF. | C | C | |
| The Provisioning of authorized QoS per PCC Rule shall be performed using the PCC rule provisioning procedure. | M | C | |
| For a PCRF-provided PCC rule, the "Authorized QoS" shall be encoded using a QoS-Information AVP within the Charging-Rule-Definition AVP of the PCC rule. | M | C | |
| The PCRF may indicate that the PCEF may apply resource | Op | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| sharing for one or more PCC rules with a GBR QCI. | | | |

4.5.2.5

Usage Monitoring Control

Table 11 Usage Monitoring Control

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| Usage monitoring may be performed for service data flows associated with one or more PCC rules. | Op | PC | The SAPC does not perform the mapping of PCC rules and monitoring keys. |
| The provisioning of usage monitoring control per PCC rule shall be performed using the PCC rule provisioning procedure. | M | PC | The SAPC supports usage monitoring for predefined PCC rules at PCEF. |
| For a PCRF-provided PCC rule, the monitoring key shall be set using the Monitoring-Key AVP within the Charging-Rule-Definition AVP of the PCC rule | M | NC | |
| Usage monitoring shall be activated both for service data flows associated with predefined PCC rules and dynamic PCC rules, including rules with deferred activation and/or deactivation times while those rules are active. | M | PC | Usage monitoring is only supported for predefined PCC rules at PCEF. |

4.5.2.6

Redirect Function

Table 12 Redirect Function

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF may provide the redirect instruction for a dynamic PCC rule to the PCEF enhanced with ADC. | Op | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The Provisioning shall be performed using the PCC rule provisioning procedure. The redirect instruction shall be encoded using a Redirect-Information AVP within the Charging-Rule-Definition AVP of the dynamic PCC rule. | M | C | |
| For a dynamic PCC rule, the redirect address may be provided as part of the dynamic PCC rule or may be preconfigured in the PCEF. | Op | C | |
| If the Redirect-Server-Address AVP is not provided and the redirection address is not preconfigured in the PCEF for this PCC rule, the PCEF shall perform PCC Rule Error Handling as specified in clause 4.5.12. | M | C | |
| When the PCRF wants to disable the redirect function for an already installed PCC Rule, the PCRF shall update the PCC rule including the Redirect-Information AVP with Redirect-Support AVP set to REDIRECTION_DISABLED. | M | C | |

4.5.2.7 Support for DSCP Marking of Downlink Packets at the TDF

Not compliant

4.5.2.8 Traffic Steering Control Support

Not compliant

4.5.3 Provisioning of Event Triggers

Table 13 Provisioning of Event Triggers

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF may provide one or several event triggers within | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| one or several Event-Trigger AVP to the PCEF using the PCC rule provision procedure. Event triggers may be used to determine which IP-CAN session modification or specific event causes the PCEF to re-request PCC rules. Although event trigger reporting from PCEF to PCRF can apply for an IP CAN session or bearer depending on the particular event, provisioning of event triggers will be done at session level. | | | |
| The Event-Trigger AVP may be provided in combination with the initial or subsequent PCC rule provisioning. | Op | C | |
| NOTE 1: There are event triggers that will only take effect when additional information is provided. The PCRF may provide the additional information together with the event trigger or in subsequent PCC rule provisioning. The PCEF will only report those event triggers when the related data is available. | Op | C | |
| The PCRF may add new event triggers or remove the already provided ones at each request from the PCEF or upon the unsolicited provision from the PCRF. In order to do so, the PCRF shall provide the new complete list of applicable event triggers including the needed provisioned Event-Trigger AVPs in the CCA or RAR commands. | Op | C | |
| The PCRF may remove all previously provided event triggers by providing the Event-Trigger AVP set to the value NO_EVENT_TRIGGERS. When an Event-Trigger AVP is provided with this value, no other Event-Trigger AVP shall | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| be provided in the CCA or RAR command. | | | |
| If no Event-Trigger AVP is included in a CCA or RAR operation, any previously provisioned event trigger will be still applicable. Unless otherwise stated for a certain event trigger, the PCRF shall be able to modify the data related to an event trigger without providing again a previously provisioned event trigger if such event trigger is still armed. | M | C | |

4.5.4 Provisioning of Charging Related Information for the IP-CAN Session

4.5.4.1 Provisioning of Charging Addresses

Table 14 OFCS and OCS Addresses

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| In combination with the initial PCC rule provisioning only, the PCRF may provide OFCS and/or OCS addresses within a Charging-Information AVP to the PCEF defining the offline and online charging system addresses respectively. | Op | C | |
| Both primary and secondary addresses for OFCS and/or OCS shall be provided simultaneously. | M | C | |
| Provisioning OFCS or OCS addresses without PCC rules for offline or online charged service data flows, respectively, shall not be considered as an error since such PCC rules may be provided in later provisioning. | M | C | |

4.5.4.2 Provisioning of Default Charging Method

Table 15 Provisioning of Default Charging Method

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| Upon the initial interaction with the PCEF, the PCRF may provide default charging method within the Online AVP or Offline AVP embedded directly within the CCA command to the PCEF. | Op | C | |

4.5.4.3 Void

4.5.4.4 Provisioning of Access Network Charging Identifier

Table 16 Provisioning of Access Network Charging Identifier

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When the Access-Network-Charging-Identifier-Gx AVP is unknown for an AF session to the PCRF, the PCRF may request the PCEF to provide the Access-Network-Charging-Identifier-Gx AVP associated to dynamic PCC rules. To do so, the PCRF shall provide the Event-Trigger AVP with the value CHARGING_CORRELATION_EXCHANGE (28) if the event trigger is not previously set and the Charging-Correlation-Indicator AVP indicating CHARGING_IDENTIFIER_REQUIRED within the Charging-Rule-Install AVP. | Op | NC | |
| The PCRF shall interpret that the Access-Network-Charging-Identifier-Gx AVP is known as follows: - For case 1, when the Access-Network-Charging-Identifier-Gx AVP is received and includes the IP-CAN-Session-Charging-Scope AVP. | M | NC | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| - For case 2a and case 2b when the Access-Network-Charging-Identifier-Gx AVP is received. | | | |
| If the Event-Trigger AVP with the value CHARGING_CORRELATION_EXCHANGE (28) has been provided to the PCEF, the PCEF shall include the access network charging identifier that the PCEF has assigned for the dynamic PCC Rules within the Access-Network-Charging-Identifier-Gx where the Charging-Correlation-Indicator AVP indicated CHARGING_IDENTIFIER_REQUIRED. | M | NC | |
| NOTE: The PCRF indicates CHARGING_IDENTIFIER_REQUIRED in the Charging-Correlation-Indicator AVP for the dynamic PCC rules related to the flows for which the AF has requested a notification about Access Network Charging Information, according to 3GPP TS 29.214 [10]. | M | NC | |

4.5.5 Provisioning and Policy Enforcement of Authorized QoS

4.5.5.0 Overview

Table 17 Overview

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF may provide authorized QoS to the PCEF. | Op | C | |
| The authorized QoS shall be provisioned within a CCA or RAR Diameter message as QoS-Information AVP. The provisioning of the authorized QoS (which is composed of QCI, ARP and bitrates) is performed from the PCRF to the PCEF. | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|-------------------------------|
| The authorized QoS can refer to a PCC rule, to an IP CAN bearer, to a QCI or to an APN. | C | PC | QoS per QCI is not supported. |
| - When the authorized QoS applies to an IP CAN bearer, it shall be provisioned outside a Charging-Rule-Definition AVP and it shall also include the Bearer-Identifier AVP to indicate what bearer it applies to. | M | C | |
| - When the authorized QoS applies to a PCC rule, it shall be provisioned within the corresponding PCC rule by including the QoS-Information AVP within the Charging-Rule-Definition AVP. The QoS-Information AVP shall not contain a Bearer-Identifier AVP. | M | C | |
| - When the authorized QoS for a PCC rule with a GBR QCI is candidate for resource sharing an instruction on the allowed sharing may be provisioned within the Charging-Rule-Definition AVP by including Sharing-Key-UL AVP and/or Sharing-Key-DL AVP. | M | NC | |
| - When the authorized QoS applies to QCI, authorised MBR per QCI is supplied. In such a case the authorized QoS shall be provisioned outside a Charging-Rule-Definition AVP at the command level. | M | NC | |
| - When the authorized QoS applies to an APN, authorised APN-Aggregate-Max-Bitrate UL/DL AVPs or Extended-APN-AMBR-UL/DL AVPs (see subclause 4.5.30) is supplied. In such a case the authorized QoS shall be provisioned outside a Charging-Rule-Definition AVP at command level. | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| - When the authorized QoS applies to the default EPS bearer it shall be provisioned within the Default-EPS-Bearer-QoS AVP. | M | C | |
| The authorized QoS provides appropriate values for the resources to be enforced. | Op | C | |
| The Provisioning of authorized QoS per PCC rule is a part of PCC rule provisioning procedure. | Op | C | |
| QoS authorization information may be dynamically provisioned by the PCRF or it can be a pre-defined PCC rule in the PCEF. | Op | C | |
| <p>Moreover, all the parameters of the authorized QoS can be changed, but no order is defined for QCI.</p> <p>NOTE 1: A change of QCIs cannot be described as an upgrade or downgrade and also no QCI can be referred to as the higher or lower. Whether the QCI is permitted to be changed or not is subject to both operator policies and normal restrictions on changing from a non-GBR QCI value to GBR QCI value on a default bearer.</p> <p>NOTE 2: All attributes of the ARP QoS parameter can be changed but only the ARP priority level represents an ordered range of values. The ARP priority level attribute represents the actual priority for the service/user with the value 1 as the highest and can thus be upgraded and downgraded.</p> | M | PC | QCI and all attributes of ARP values are handled as ordered values. |
| If the PCRF is unable to make a decision for the response to the CC-Request by the PCEF, the PCRF may reject the request as described in subclause 4.5.1. | Op | NC | See Request for PCC Rules on page 12 |

4.5.5.0a Provisioning of Authorized QoS per IP CAN Bearer

Table 18 Provisioning of authorized QoS per IP CAN bearer

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The authorized QoS per IP-CAN bearer is used if the bearer binding is performed by the PCRF (as defined in 3GPP TS 29.213 [8]). Provisioning of authorized QoS per IP-CAN bearer is access specific. See Annex A (Normative): Access Specific Aspects (GPRS) on page 113 for further details. | M | NC | |

4.5.5.1 Policy Enforcement for Authorized QoS per IP CAN Bearer

No requirement

4.5.5.2 Policy Provisioning for Authorized QoS per Service Data Flow

Table 19 Provisioning for Authorized QoS per Service Data Flow

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The Provisioning of authorized QoS per service data flow is a part of PCC rule provisioning procedure, as described in Clause 4.5.2.0 | M | C | |
| The authorized QoS per service data flow shall be provisioned within the corresponding PCC rule by including the QoS-Information AVP within the Charging-Rule-Definition AVP in the CCA or RAR commands. | M | C | |
| This QoS-Information AVP shall not contain a Bearer-Identifier AVP. | M | C | |
| If the PCRF wants to ensure that a PCC Rule is always bound to the default bearer, the policy provisioning for the related authorized QoS shall be done as described in subclause 4.5.5.13. | M | NC | |



4.5.5.3 Policy Enforcement for Authorized QoS per Service Data Flow

No requirement

4.5.5.4 Coordination of Authorized QoS Scopes in Mixed Mode

No requirement

4.5.5.5 Provisioning of Authorized QoS per QCI

Table 20 Provisioning of Authorized QoS per QCI

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When the IP-CAN type supports non-GBR bearers that have a separate MBR (i.e. 3GPP-GPRS) the PCRF may provision an authorized QoS per QCI for non-GBR bearer QCI values. | Op | NC | |
| The PCRF shall not provision an authorized QoS per QCI for GBR bearer QCI values. | M | NC | |
| The authorized QoS per QCI shall be provisioned at RAR or CCA command level using the QoS-Information AVP with the QoS-Class-Identifier AVP and the Maximum-Requested-Bandwidth-UL AVP and/or the Maximum-Requested-Bandwidth-DL AVP. The Guaranteed Bitrate values shall not be filled up. | M | NC | |
| Multiple QoS-Information AVPs can be used for assigning authorized QoS for several QCIs with one command. | Op | NC | |
| The authorized QoS per QCI may be provisioned before or in connection with the activation of the first PCC rule with a certain QCI. | Op | NC | |
| The PCRF may also provision a changed authorized QoS per QCI at any time. | Op | NC | |

4.5.5.6 Policy Enforcement for Authorized QoS per QCI

No requirement

4.5.5.7 Provisioning of Authorized QoS per APN

Table 21 Provisioning of Authorized QoS per APN

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| The PCRF may provision the authorized QoS per APN as part of the IP-CAN session establishment procedure and may modify it at any time as long as there is an IP-CAN session active for that APN. The authorized QoS per APN may be modified as part of the IP-CAN session establishment or modification of any of the IP-CAN sessions active for a UE within that APN. To do so, the PCRF shall provision the authorized QoS per APN for each IP-CAN session for that APN. | Op | C | |
| The authorized QoS per APN, if provisioned by the PCRF, shall be provisioned at RAR or CCA command level using the QoS-Information AVP via one or both of the following mechanisms: | M | PC | Conditional APN policy info not supported |
| - Unconditional APN policy info: The APN-Aggregate-Max-Bitrate-UL AVP and/or the APN-Aggregate-Max-Bitrate-DL AVP, or the Extended-APN-AMBR-UL AVP and/or the Extended-APN-AMBR-DL AVP (see subclause 4.5.30) shall be included. | M | C | |
| - Conditional APN policy info: Support of ConditionalAPNPolicyInfo feature is required. While providing conditional APN policy info one or more instances of the Conditional | M | NC | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| APN Aggregate Max-Bitrate AVP shall be included. Each instance includes APN policy related info, i.e. the APN-Aggregate-Max-Bitrate-UL AVP and/or the APN-Aggregate-Max-Bitrate-DL AVP, or the Extended-APN-AMBR-UL AVP and/or the Extended-APN-AMBR-DL AVP (see subclause 4.5.30). Additionally, a list of the applicable RAT Type and/or IP CAN Type AVP(s), defining the condition for enforcing the APN policy info, shall also be included. | | | |
| The PCRF shall provide the QoS-Information AVP excluding the Conditional APN Aggregate Max Bitrate AVP to remove the previously provisioned conditional APN policy info. | M | NC | |
| In order to provide authorized QoS per APN, the QoS-Information AVP shall not include any other AVP than the APN-Aggregate-Max-Bitrate UL AVP, the APN-Aggregate-Max-Bitrate-DL AVP, the Extended-APN-AMBR-UL AVP, the Extended-APN-AMBR-DL AVP (see subclause 4.5.30) and/or the Conditional-APN-Aggregate-Max-Bitrate AVP. | M | C | Note that the Conditional-APN-Aggregate-Max-Bitrate AVP is not supported. |
| The PCRF may provision the authorized QoS per APN, based on information obtained from the SPR or internal policies. | Op | C | |
| For the case that BBF is located at the PCEF, if the modification of the QoS per APN fails, the PCEF shall retain the existing QoS per APN without any modification and send to the PCRF a new CCR command with the Event Trigger set to APN-AMBR_MODIFICATION_FAILURE providing the retained value | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| within the APN-Aggregate-Max-Bitrate-UL AVP and/or the APN-Aggregate-Max-Bitrate-DL AVP, or the Extended-APN-AMBR-UL AVP and/or the Extended-APN-AMBR-DL AVP (see subclause 4.5.30) included in QoS-Information AVP. | | | |
| Additionally, the current RAT-Type and IP-CAN-Type of the UE shall be included if the failure corresponds to a conditional QoS per APN. For provisioning of time conditioned authorized QoS per APN, see subclause 4.5.5.12. | M | NC | |

4.5.5.8 Policy Enforcement for Authorized QoS per APN

No requirement

4.5.5.9 Provisioning of Authorized QoS for the Default EPS Bearer

Table 22 Provisioning of Authorized QoS for the Default EPS Bearer

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF may provision the authorized QoS for the default EPS bearer. The authorized QoS may be obtained upon interaction with the SPR. | Op | C | |
| The default EPS bearer QoS information shall be provisioned at RAR or CCA command level using the Default-EPS-Bearer-QoS AVP including the QoS-Class-Identifier AVP and the Allocation-Retention-Priority AVP. The provided QoS-Class-Identifier AVP shall include a non-GBR corresponding value. For provisioning of time conditioned authorized EPS Bearer QoS information, see subclause 4.5.5.12. | M | C | |



4.5.5.10 Policy Enforcement for Authorized QoS of the Default EPS Bearer

Table 23 Provisioning of Authorized QoS for the Default EPS Bearer

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| If the modification of the default EPS bearer QoS information fails, the PCEF shall retain the existing default EPS bearer QoS without any modification and send the PCRF a new CCR command and include with Event Trigger set to DEFAULT-EPS-BEARER-QOS_MODIFICATION_FAILURE providing the retained values within the Allocation-Retention-PriorityAVP and QoS-Class-Identifier AVP included in Default-EPS-Bearer-QoS AVP. For provisioning of time conditioned authorized EPS Bearer QoS information, see subclause 4.5.5.12. | M | NC | |

4.5.5.11 Provisioning and Enforcement of Time Conditioned Policy Information

Not compliant

4.5.5.12 Policy Provisioning and Enforcement of Authorized QoS for Service Data Flows that Shall Be Bound to the Default Bearer

Not compliant

4.5.6 Indication of IP-CAN Bearer Termination Implications

No requirement

4.5.7 Indication of IP-CAN Session Termination

Table 24 Indication of IP-CAN Session Termination

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When the PCRF receives the CC-Request, it shall acknowledge this message by | M | C | |

| Text | Qualifier | Compliance | Comment |
|----------------------------------|-----------|------------|---------|
| sending a CC-Answer to the PCEF. | | | |

4.5.8 Request of IP-CAN Bearer Termination

Table 25 Request of IP-CAN Bearer Termination

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| The PCRF may request the removal of the PCC rules by using the PCC rule provisioning procedures in clause 4.5.2 to remove all PCRF-provisioned PCC rules and deactivate all PCC rules predefined within the PCEF. | Op | C | |
| When Enh-RAN-NAS-Cause feature is supported, the PCRF removing PCC rules using the RAR command shall maintain locally the PCC rules that were marked as requiring release confirmation until the PCEF reports RESOURCE_RELEASE (53) event trigger as described in subclause 5.3.7. NOTE: This is done to allow the PCRF to notify the AF when there is an abnormal termination of the bearer. The PCRF does not have to retry the removal of these PCC Rules. | Op | NC | |
| The PCRF may either completely remove these PCC rules from the IP CAN session or reinstall them (for example, by changing the QoS or charging information) within the IP CAN session. | Op | C | |
| If the selected Bearer Control Mode (BCM) is UE-only, and the PCRF receives a trigger for the removal of all PCC rules from the AF, the following steps apply. In order to avoid race conditions, the PCRF should | M | PC | UE-Init mode for dedicated bearers is not supported. |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| start a timer to wait for the UE-initiated resource release message. If a UE-initiated resource release is performed before timer expiry, the PCRF will receive an Indication of IP-CAN Bearer Termination Implications according to Clause 4.5.6 and shall then not perform the removal of the PCC rules. Otherwise, if the timer expires, the PCRF shall remove/deactivate the affected PCC rules that have been previously installed/activated. | | | No timer is used for general bearer. |
| If the selected BCM is UE-only, and the PCRF decides to remove one or more PCC rules due to an internal trigger or trigger from the SPR, the PCRF shall instantly remove/deactivate the affected PCC rules that have been previously installed/activated. | M | C | A RAR with PCC Rules is sent towards the PCEF |

4.5.9 Request of IP-CAN Session Termination

Table 26 Request of IP-CAN Session Termination

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--------------------------------------|
| <p>The PCRF may request the IP-CAN session termination in the following instances:</p> <ul style="list-style-type: none"> - If the PCRF decides to terminate an IP CAN session due to an internal trigger or trigger from the SPR, the PCRF shall send an RAR command including the Session-Release-Cause AVP to the PCEF. The PCEF shall acknowledge the command by sending an RAA command to the PCRF and. | M | C | |
| <ul style="list-style-type: none"> - The PCRF may also decide to terminate an IP CAN session upon receiving CCR command with a CC-Request-Type AVP | Op | NC | Session-Release-Cause only supported |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|------------------|
| set to the value "UPDATE_REQUEST" from the PCEF (e.g. when usage quota reached). In that case, the PCRF shall send a CCA command including the Session-Release-Cause AVP to the PCEF. | | | for RAR, not CCA |

4.5.10

Bearer Control Mode Selection

Table 27 Bearer Control Mode Selection

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| The PCRF derives the selected Bearer-Control-Mode AVP based on the received Network-Request-Support AVP, access network information, subscriber information and operator policy. | M | C | SAPC decides the mode selection taking into account the information received in Network-Request-Support AVP |
| If the selected bearer control mode is UE_NW, the PCRF shall decide what mode (UE or NW) shall apply for every PCC rule. | M | C | SAPC decides that NW is applied for the whole IP-CAN session. |
| For operator-controlled services, the UE and the PCRF may be provisioned with information indicating which mode is to be used. | Op | NC | |
| When applicable for the IP-CAN type, at IP-CAN session establishment, if the PCEF provided the Network-Request-Support AVP, the selected bearer control mode shall be provided within the Bearer-Control-Mode AVP to the PCEF using the PCC Rules provision procedure. At IP-CAN session modification, if the PCEF provided the Network-Request-Support AVP, the PCRF shall | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| also provide the Bearer-Control-Mode AVP with the new value if the selected bearer control mode has changed. The selected value will be applicable for the whole IP-CAN session. | | | |

4.5.11 Provisioning of Event Report Indication

Not compliant

4.5.12 PCC Rule Error Handling

Table 28 PCC Rule Error Handling

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| If the RuleVersioning feature is supported and the PCRF included a Content-Version AVP as part of the Charging-Rule-Definition AVP when installing or modifying a PCC rule for both the PULL and PUSH modes, then if the resource allocation for the corresponding PCC rule was unsuccessful, the PCEF shall include the Content-Version AVP as part of the Charging-Rule-Report AVP. Depending on the value of the Rule-Failure-Code AVP, and when applicable, depending also on the value of the Content-Version AVP, for PULL and PUSH mode, the PCRF may decide whether retaining of the old PCC rule, re-installation, modification, removal of the PCC rule or any other action applies. | Op | NC | |
| NOTE: When the PCRF receives PCC-Rule-Status set to INACTIVE, the PCRF does not need request the PCEF to remove the inactive PCC rule. | Op | C | |

4.5.13 Time of the Day Procedures

Table 29 Time of the Day Procedures

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| PCEF shall be able to perform PCC rule request as instructed by the PCRF. To do so, the PCRF shall provide the Event-Trigger AVP with the value REVALIDATION_TIMEOUT (17) if the event trigger is not previously set, and in addition the Revalidation-Time AVP when set by the PCRF. | M | C | |
| PCRF shall be able to provide a new value for the revalidation timeout by including Revalidation-Time in CCA or RAR. The PCRF may provide the Revalidation-Time AVP together with the event trigger REVALIDATION_TIMEOUT or in a subsequent PCC rule provisioning. | M | C | |
| PCRF shall be able to stop the revalidation timer by disabling the REVALIDATION_TIMEOUT event trigger. | M | C | |
| The PCRF may control at what time the status of a PCC rule changes. | Op | C | The SAPC sends Rule-Activation-Time together with Rule-Deactivation-Time and never sets a date or time in the past. The SAPC does not set a Rule-DeActivation-time that occurs before the Rule-Activation-Time. |
| The 3GPP-MS-TimeZone AVP, if available, may be used for the | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| PCRF to derive the Rule-Activation-Time and Rule-Deactivation-Time. | | | |
| The PCC rules including Rule-Activation-Time and Rule-Deactivation-Time shall not be applied for changes of the QoS or service data flow filter information. | M | C | It is done by configuration of policies in the SAPC. |
| The PCRF may modify a currently installed PCC rule, including setting, modifying or clearing its deferred activation and/or deactivation time. | Op | C | |
| When modifying a dynamic PCC rule with a prior and/or new deferred activation and/or deactivation time, the PCRF shall provide all attributes of that rule in the Charging-Rule-Definition AVP, including attributes that have not changed. | M | C | |

4.5.14 Trace activation/deactivation

Not compliant

Trace activation/deactivation is not supported in the SAPC because no Gxc interface towards BBERF is supported.

4.5.15 IMS Emergency Session Support

4.5.15.1 Functional Entities

Table 30 IMS Emergency Session Support - Functional Entities

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF shall store a configurable list of Emergency APNs that are valid for the operator to which the PCRF belongs to. | M | C | |
| For emergency APNs, the IMSI may not be present. The PCRF | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| shall support request for PCC Rules that do not include an IMSI. | | | |

4.5.15.2 PCC Procedures for Emergency Services over Gx Reference Point

4.5.15.2.1 Request for PCC Rules for Emergency Services

Table 31 Request for PCC Rules for Emergency Services

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| Any PCEF-initiated requests for PCC Rules for an IMS Emergency service that include the "RESOURCE_MODIFICATION_REQUEST" Event-Trigger AVP shall be rejected by the PCRF with the error DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED | M | NC | Event-trigger RESOURCE_MODIFICATION_REQUEST is not supported by SAPC |
| If the PCRF detects that the initial or subsequent CCR command shall be rejected, it shall execute the procedure for the type of Gx experimental result code described in subclause 4.5.1 | M | C | |

4.5.15.2.2 Provisioning of PCC Rules for Emergency Services

4.5.15.2.2.1 Provisioning of PCC Rules at Gx Session Establishment

Table 32 Provisioning of PCC Rules at Gx Session Establishment

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF shall detect that a Gx session is restricted to IMS Emergency services when a CCR command is received with a CC-Request-Type AVP set to value "INITIAL_REQUEST" and the Called-Station-Id AVP includes a PDN identifier that matches one of the Emergency APNs from the configurable list. | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------------------------|
| The PCRF shall provision PCC Rules restricting the access to Emergency Services (e.g. P-CSCF(s), DHCP(s) and DNS (s) and SUPL(s) addresses) as required by local operator policies in a CCA command according to the procedures described in clause 4.5.2 | M | C | |
| The PCRF may provision the authorized QoS that applies to the default EPS bearer within the Default-EPS-Bearer-QoS AVP in a CCA command according to the procedures described in clause 4.5.5.10 except for obtaining the authorized QoS upon interaction with the SPR. The value for the Priority-Level AVP shall be assigned as required by local operator policies (e.g. if an IMS Emergency call is prioritized the Priority-Level AVP may contain a value that is reserved for an operator domain use of IMS Emergency calls). If the IP-CAN-Type AVP is assigned to "3GPP-EPS" or "3GPP-GPRS" the values for Pre-emption-Capability AVP and the Pre-emption-Vulnerability AVP shall be assigned as required by local operator policies | Op | C | |
| The PCRF may provision the authorized QoS that applies to an APN within the APN-Aggregate-Max-Bitrate UL/DL in a CCA command according to the procedures described in subclause 4.5.5.7 | Op | C | |
| The PCRF shall always assign NW mode to the PCC Rules that are bound to an IP-CAN session restricted to Emergency services | M | C | |
| When the PCEF detects that the provisioning of PCC Rules failed, | M | C | In this case SAPC returns |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| it shall execute the procedure for the type of Gx experimental result code described in subclause 4.5.2 | | | experimental result code DIAMETER_ERROR_INITIAL_PARAMETERS (5140) |

4.5.15.2.2.2 Provisioning of PCC Rules for Emergency Services

Table 33 Provisioning of PCC Rules for Emergency Services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| When the PCRF receives IMS service information from the AF for an Emergency service and derives authorized PCC Rules from the service information, the Priority-Level AVP in the QoS information within the PCC Rule shall be assigned a priority as required by local operator policies (e.g. if an IMS Emergency call is prioritized the Priority-Level AVP may contain a value that is reserved for an operator domain use of IMS Emergency calls). | M | C | |
| If the IP-CAN Type AVP is assigned to "3GPP-EPS" or "3GPP-GPRS" the values of the Pre-emption-Capability AVP and Pre-emption-Vulnerability AVP shall also be assigned as required by local operator policies | M | C | |
| The PCRF shall immediately initiate a PUSH procedure as described in subclause 4.5.2 to provision PCC Rules and the procedures described in subclause 4.5.5.2 to provision the authorized QoS per service data flow. | M | C | |
| Any PCEF-initiated request for PCC Rules for an IMS Emergency service triggered by Event-Trigger AVP assigned to "RESOURCE_MODIFICATION_ | M | NC | Event-trigger RESOURCE_MODIFICATION_REQUEST is |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| REQUEST" (i.e. UE-initiated resource reservation) shall be rejected by the PCRF with the error DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED | | | not supported by SAPC |
| If the Bearer Control Mode is assigned to "UE_ONLY" and the PCRF receives a request for PCC Rules that are associated with an Emergency service, it shall provision PCC Rules as described in subclause 4.5.2 and the authorized QoS per service data flow as described in subclause 4.5.2.2. | M | NC | UE_ONLY bearer control mode is not supported for dedicated bearers |
| The PCEF shall execute the procedures described in subclause 4.5.2 and subclause 4.5.5.3 to ensure that a new IP-CAN bearer is established for the Emergency service | M | C | |
| When the PCEF detects that the provisioning of PCC Rules failed, it shall execute the procedure for the type of Gx experimental result code described in subclause 4.5.12 | M | C | |

4.5.15.2.3 Removal of PCC Rules for Emergency Services

Table 34 Removal of PCC Rules for Emergency Services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The reception of a request to terminate an AF session for an IMS Emergency service by the PCRF triggers the removal of PCC Rules assigned to the terminated IMS Emergency Service from the PCEF by using a RAR command with Charging-Rule-Remove AVP including the removed PCC Rules | M | C | |
| At reception of a RAR that removes one or several PCC Rules from an IP-CAN Session | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| restricted to emergency services the PCEF shall: | | | |
| when all PCC Rules bound to an IP-CAN bearer are removed, initiate an IP-CAN bearer termination procedure as defined in subclause 4.5.8. | M | C | |
| when not all PCC Rule bound an IP-CAN bearer are removed, initiate an IP-CAN bearer modification procedure as defined in subclause 4.5.2 and subclause 4.5.5.1 | M | C | |

4.5.15.2.4 Removal of PCC Rules at Gx Session Termination

Table 35 Removal of PCC Rules at Gx Session Termination

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The reception of a request to terminate the IP-CAN session restricted to IMS Emergency session shall trigger the termination of the Gx session for IMS Emergency session as defined in subclause 4.5.7 | M | C | |

4.5.16 Requesting Usage Monitoring Control

The SAPC supports usage monitoring control for all the traffic applicable at IP-CAN Session, but not for PCC rule level.

Table 36 Requesting Usage Monitoring Control

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|-------------------------------------|
| The PCRF may indicate, via the Gx reference point, the need to apply monitoring control for the accumulated usage of network resources on an IP-CAN session basis. Usage is defined as volume or time of user plane traffic | Op | C | |
| Monitoring for traffic volume and traffic time can be performed in parallel. | M | NC | Time Usage Monitoring not supported |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|-------------------------------------|
| The data collection for usage monitoring control shall be performed per monitoring key, which may apply for a single Service Data Flow, a set of Service Data Flows or for all the traffic in an IP-CAN session. | M | C | |
| If the usage monitoring of an IP-CAN session level is enabled, the PCRF may request the PCEF to exclude a single service data flow or a set of service data flows from the usage monitoring of IP-CAN session level. | Op | NC | |
| If the PCRF requests usage monitoring control and if at this time, the PCRF is not subscribed to the "USAGE_REPORT" Event-Trigger, the PCRF shall include the Event-Trigger AVP, set to the value "USAGE_REPORT", in a CC-Answer or RA-Request | M | C | |
| The PCRF shall not remove the "USAGE_REPORT" Event-Trigger AVP while usage monitoring is still active in the PCEF. | M | C | |
| At IP-CAN session establishment and modification, the PCRF may provide the applicable thresholds, volume threshold, time threshold or both volume threshold and time threshold, for usage monitoring control to the PCEF, together with the respective monitoring keys. To provide the initial threshold for one or more monitoring key(s), the PCRF may include the threshold in both RA-Request or in the response of a CC-Request initiated by the PCEF. | Op | PC | Time Usage Monitoring not supported |
| During the IP-CAN session establishment, the PCRF may receive information about total | Op | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|-------------------------------------|
| allowed usage per PDN and per UE from the SPR, that is, the overall amount of allowed traffic volume that are to be monitored per PDN and UE and/or total allowed usage for Monitoring key(s) per PDN and UE. | | | |
| In order to provide the applicable threshold for usage monitoring control, the PCRF shall include a Usage-Monitoring-Information AVP per monitoring key. | M | C | |
| The threshold level shall be provided in its Granted-Service-Unit AVP. Threshold levels may be defined for: - the total volume only; or - the uplink volume only; or - the downlink volume only; or - the uplink and downlink volume; or - the time. | M | PC | Time Usage Monitoring not supported |
| The PCRF shall provide the applicable volume threshold(s) in the CC-Total-Octets, CC-Input-Octets or CC-Output-Octets AVPs and/or time threshold in the CC-Time AVP of the Granted-Service-Unit AVP. | M | PC | Time Usage Monitoring not supported |
| The monitoring key shall be provided in the Monitoring-Key AVP | M | C | |
| The PCRF may provide multiple usage monitoring control instances. | Op | C | |
| The PCRF shall indicate if the usage monitoring instance applies to the IP-CAN session or to one or more PCC rules. For this purpose, the Usage-Monitoring-Level AVP may be provided with a value respectively set to | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| SESSION_LEVEL or PCC_RULE_LEVEL | | | |
| The PCRF may provide one usage monitoring control instance applicable at IP-CAN session level and one or more usage monitoring instances applicable at PCC Rule level. | Op | C | |
| If the IP-CAN level usage monitoring is enabled and if the service data flow(s) need to be excluded from IP-CAN session level usage monitoring, the PCRF shall provide an indication of exclusion from session level monitoring associated with the respective PCC rule(s) by including the Monitoring-Flags AVP with the bit 0 set in the corresponding Charging-Rule-Install AVP when the PCRF installs or updates the PCC rule(s). If the exclusion is enabled, the PCRF may disable the exclusion again by including the Monitoring-Flags AVP with the bit 0 not set in the corresponding Charging-Rule-Install AVP. | M | NC | |
| The PCRF may provide a Monitoring-Time AVP to the PCEF for the monitoring keys(s) in order to receive reports for the accumulated usage before and after the monitoring time occurs within the report triggered by the events defined in 4.5.17.1-4.5.17.5. In such a case, there may be two instances of Granted-Service-Unit AVP within Usage-Monitoring-Information AVP per monitoring key. One of them indicates the threshold levels before the monitoring time occurs, and the other one, which includes Monitoring-Time AVP, indicates the subsequent threshold levels after the | Op | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| monitoring time occurs. The detailed functionality in such a case is defined by 4.5.17.6. | | | |
| If the PCRF wishes to modify the threshold level for one or more monitoring keys, the PCRF shall provide the thresholds for all the different levels applicable to the corresponding monitoring key(s). | M | C | |
| If the PCRF wishes to modify the monitoring key for the session level usage monitoring instance, it shall disable the existing session level monitoring usage instance following the procedures defined in 4.5.17.3 and shall provide a new session level usage monitoring instance following the procedures defined in this clause. | M | C | |
| The PCRF may enable the new session level usage monitoring instance and disable the existing session level usage monitoring instance in the same command. | Op | NC | |
| <p>When the accumulated usage is reported in a CCR command, the PCRF shall indicate to the PCEF if usage monitoring shall continue for that IP-CAN session, usage monitoring key, or both as follows:</p> <ul style="list-style-type: none"> - If monitoring shall continue for specific level(s), the PCRF shall provide the new thresholds for the level(s) in the CC-Answer using the same AVP as before (CC-Total-Octets, CC-Input-Octets CC-Output-Octets or CC-Time AVP AVP within the Granted-Service-Unit AVP); - otherwise, if the PCRF wishes to stop monitoring for specific level(s) the PCRF shall not include an updated threshold in | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| the CCA command for the stopped level(s) , that is, the corresponding CC-Total-Octets, CC-Input-Octets, CC-Output-Octets or CC-Time AVPs shall not be included within Granted-Service-Units AVP. | | | |
| When usage monitoring is enabled, the PCRF may request the PCEF to report accumulated usage for one or more enabled monitoring keys regardless if a usage threshold has been reached by sending to the PCEF within the Usage-Monitoring-Information AVP the Usage-Monitoring-Report AVP set to the value USAGE_MONITORING_REPORT_REQUIRED. | Op | C | |
| The PCRF shall only require PCEF to report accumulated usage for one or more monitoring keys in a CC-Answer when the PCEF has not provided accumulated usage in the CC-Request for the same monitoring key(s). | M | C | |
| To specify the usage monitoring key for which usage is requested the PCRF shall include the usage monitoring key within the Monitoring-Key AVP within the Usage-Monitoring-Information AVP. | M | C | |
| To request usage be reported for all enabled usage monitoring keys the PCRF shall omit the Monitoring-Key. | M | NC | |
| The PCRF shall process the usage reports and shall perform the actions as appropriate for each report. | M | C | |

4.5.17 Reporting Accumulated Usage

Table 37 Reporting Accumulated Usage

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| When the time based usage monitoring is supported, the PCRF may optionally indicate to the TDF, along with other usage monitoring information provided, the Inactivity Detection Time within the Quota-Consumption-Time AVP. | Op | NC | Usage monitoring not supported in TDF interactions |
| Upon receiving the reported usage from the PCEF, the PCRF shall deduct the value of the usage report from the total allowed usage for that IP-CAN session, usage monitoring key, or both as applicable, | M | C | |
| and the PCRF may also derive the PCC rules based on the remaining allowed usage or reported usage and provision them to the PCEF | Op | C | |

4.5.17.1 Usage Threshold Reached

No requirement

4.5.17.2 PCC Rule Removal

No requirement

4.5.17.3 Usage Monitoring Disabled

Table 38 Usage Monitoring Disabled

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| Once enabled, the PCRF may explicitly disable usage monitoring as a result of receiving a CCR from the PCEF which is not related to reporting usage, other external triggers (for example, receiving an AF request, subscriber profile | Op | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| update), or a PCRF internal trigger. | | | |
| To disable usage monitoring for a monitoring key, the PCRF shall send the Usage-Monitoring-Information AVP including only the applicable monitoring key within the Monitoring-Key AVP and the Usage-Monitoring-Support AVP set to USAGE_MONITORING_DISABLED. | M | C | |

4.5.17.4 IP-CAN Session Termination

Table 39 IP-CAN Session Termination

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| If all IP-CAN sessions of a user to the same APN are terminated, the PCRF may store the remaining allowed usage, i.e. the information about the remaining overall amount of resources, in the SPR. | Op | C | |

4.5.17.5 PCRF Requested Usage Report

No requirement

4.5.17.6 Report in case of Monitoring Time Provided

Not compliant

4.5.18 IMS Restoration Support

Table 40 IMS Restoration Support

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| In order to support IMS Restoration procedures (refer to 3GPP TS 23.380 [33]), PCRF needs to convey the AF address to the PCEF. In order to do so, in | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| case AF provisions information about the AF signalling flows between the UE and the AF, as defined in 3GPP TS 29.214 [10] Section 4.4.5a, the PCRF shall install the corresponding dynamic PCC rules (if not installed before) by triggering a RAR message | | | |
| The PCRF shall provide the Charging-Rule-Install AVP including the Charging-Rule-Definition AVP(s). The Charging-Rule-Definition AVP shall include in the Flow-Information AVP the signalling flows between UE and the AF. The Charging-Rule-Definition AVP shall also include the AF-Signalling-Protocol AVP set to the value corresponding to the signalling protocol used between the UE and the AF. | M | C | |
| In case AF de-provisions information about the AF signalling flows between the UE and the AF, as defined in 3GPP TS 29.214 [10] Section 4.4.5a, the PCRF shall remove the corresponding dynamic PCC rules by triggering a RAR message. The PCRF shall provide the Charging-Rule-Remove AVP including the corresponding Charging-Rule-Name AVP(s). | M | C | |

4.5.19 Multimedia Priority Support

4.5.19.1 Provisioning of PCC Rules for Multimedia Priority Services

Table 41 Provisioning of PCC Rules for Multimedia Priority Services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| When the PCRF derives PCC Rules corresponding to MPS | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| service, the ARP and QCI shall be set as appropriate for the prioritized service, e.g. an IMS Multimedia Priority Service. | | | |
| When the PCRF derives PCC Rules corresponding to non-MPS service, the PCRF shall generate the PCC Rules as per normal procedures. At the time the Priority EPS Service is invoked (i.e.MPS EPS Priority and MPS Priority Level are set), the PCRF shall upgrade the ARP and/or QCI also for the PCC Rules corresponding to non-MPS service. The PCRF shall change the ARP and/or QCI modified for the Priority EPS Bearer service to an appropriate value according to PCRF decision. | M | C | |
| When the PCRF receives a CCR command with CC-Request-Type AVP set to value "INITIAL_REQUEST", the PCRF shall check whether any of these parameters is stored in the SPR: MPS EPS Priority, MPS Priority Level and/or IMS Signalling Priority. | M | C | |
| The PCRF shall derive the applicable PCC rules and default bearer QoS based on that information. | M | C | |
| If the IMS Signalling Priority is set and the Called-Station-Id AVP corresponds to an APN dedicated for IMS, the PCRF shall assign an ARP corresponding to MPS for the default bearer and for the PCC Rules corresponding to the IMS signalling bearer. | M | C | |
| If the Called-Station-Id AVP does not correspond to an APN dedicated for IMS, the ARP shall be derived without considering IMS Signalling Priority. | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| Once the PCRF receives a notification of a change in MPS EPS Priority, MPS Priority Level and/or IMS Signalling Priority from the SPR, the PCRF shall make the corresponding policy decisions (i.e. ARP and/or QCI change) and, if applicable, shall initiate a RAR command to provision the modified data. | M | C | |
| NOTE 3: The MPS Priority Level is one among other input data such as operator policy for the PCRF to set the ARP. | M | C | |
| <p>Whenever one or more AF sessions of an MPS service are active within the same PDN connection, the PCRF shall ensure that the ARP priority level of the default bearer is at least as high as the highest ARP priority level used by any authorized PCC rules belonging to an MPS service. If the ARP pre-emption capability is enabled for any of the authorized PCC rules belonging to an MPS service, the PCRF shall also enable the ARP pre-emption capability for the default bearer.</p> <p>NOTE 4: This ensures that services using dedicated bearers are not terminated because of a default bearer with a lower ARP priority level or disabled ARP pre-emption capability being dropped during mobility events.</p> <p>NOTE 5: This PCRF capability does not cover interactions with services other than MPS services.</p> | M | C | |



4.5.19.2

Invocation/Revocation of Priority EPS Bearer Services

Table 42 Invocation/Revocation of Priority EPS Bearer Services

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When a Priority EPS Bearer Service is invoked, the PCRF shall: - Derive the corresponding PCC Rules with the ARP and QCI set as appropriate for a prioritized service. | M | C | |
| - Set the ARP of the default bearer as appropriate for a Priority EPS Bearer Service under the consideration of the requirements described in clause 4.5.19.1.1. | M | C | |
| - Set the QCI of the default bearer as appropriate for the Priority EPS Bearer Service. | M | C | |
| - Set the ARP of PCC Rules installed before the activation of the Priority EPS Bearer Service to the ARP as appropriate for the Priority EPS Bearer Service under the consideration of the requirements described in clause 4.5.19.1.1. | M | C | |
| - Set the QCI of the PCC Rules installed before the activation of the Priority EPS Bearer Service to the QCI as appropriate for the Priority EPS Bearer Service if modification of the QCI of the PCC Rules is required. | M | C | |
| When a Priority EPS Bearer Service is revoked, the PCRF shall: - Delete the PCC Rules corresponding to the Priority EPS Bearer Service if they were previously provided. | M | C | |
| - Set the ARP of the default bearer to the normal ARP under | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| the consideration of the requirements described in clause 4.5.19.1.1. | | | |
| - Set the QCI of the default bearer as appropriate for PCRF decision. | M | C | |
| - Set the ARP of all active PCC Rules as appropriate for the PCRF under the consideration of the requirements described in clause 4.5.19.1.1. | M | C | |
| - Set the QCI to an appropriate value according to PCRF decision if modification of the QCI of PCC Rules is required. | M | C | |
| NOTE: The activation/deactivation of a Priority EPS Bearer Service requires explicit invocation/revocation via SPR MPS user profile (MPS EPS Priority, MPS Priority Level). An AF for MPS Priority Service can also be used to provide Priority EPS Bearer Services using network-initiated resource allocation procedures (via interaction with PCC) for originating accesses. | M | C | |
| The PCRF shall provision the PCEF with the applicable PCC Rules upon Priority EPS Bearer Service activation and deactivation as described in clause 4.5.2 | M | C | |
| The provision of the QoS information applicable for the PCC Rules shall be performed as described in clause 4.5.5.2. | M | C | |
| The provision of QoS information for the default bearer shall be performed as described in clause 4.5.5.9. | M | C | |



4.5.19.3

Invocation/Revocation of IMS Multimedia Priority Services

Table 43 Invocation/Revocation of IMS Multimedia Priority Services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| <p>If the PCRF receives service information including an MPS session indication and the service priority level from the P-CSCF or at reception of the indication that IMS Signalling Priority is active for the IP-CAN session, the PCRF shall under consideration of the requirements described in clause 4.5.19.1.1:</p> <ul style="list-style-type: none"> - set the ARP of the default bearer as appropriate for the prioritized service; | M | C | |
| <ul style="list-style-type: none"> - if required, set the ARP of all PCC rules assigned to the IMS signalling bearer as appropriate for IMS Multimedia Priority Services; | M | C | |
| <ul style="list-style-type: none"> - derive the PCC Rules corresponding to the IMS Multimedia Priority Service and set the ARP of these PCC Rules based on the information received over Rx. | M | C | |
| <p>If the PCRF detects that the P-CSCF released all the MPS session and the IMS Signalling Priority has been deactivated for the IP-CAN session the PCRF shall under consideration of the requirements described in clause 4.5.19.1.1:</p> <ul style="list-style-type: none"> - delete the PCC Rules corresponding to the IMS Multimedia Priority Service; | M | C | |
| <ul style="list-style-type: none"> - set the ARP of the default bearer as appropriate for the IMS Multimedia Priority set to inactive; | M | C | |
| <ul style="list-style-type: none"> - replace the ARP of all PCC Rules assigned to the IMS | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| signalling bearer as appropriate when the IMS Multimedia Priority is inactive. | | | |
| The PCRF shall provision the PCEF with the applicable PCC Rules upon MPS session initiation and release as described in clause 4.5.2.0 | M | C | |
| The provision of the QoS information applicable for the PCC Rules shall be performed as described in clause 4.5.5.2. | M | C | |
| The provision of QoS information for the default bearer shall be performed as described in clause 4.5.5.9. | M | C | |

4.5.20 Sponsored Data Connectivity

Not compliant

4.5.21 PCRF Failure and Restoration

No requirement

4.5.22 Reporting Access Network Information

Table 44 Reporting Access Network Information

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| When the NetLoc feature is supported, if the AF requests the PCRF to report the access network information and if the PCRF cannot determine that access network information cannot be provided as described in subclause 4.4.6.7 of 3GPP TS 29.214 [10], the PCRF shall provide the requested access network information indication (e.g. user location and/or user timezone information) to the PCEF as follows: | M | C | The SAPC does not check either the IP-CAN type or RAT-Type values to determine if the access network supports or not the access network information reporting. |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| <p>—If the PCRF is installing or modifying a PCC rule, the PCRF shall include the Required-Access-Info AVP within the Charging-Rule-Definition AVP of an appropriate installed or modified PCC rule;</p> <p>—Otherwise, if the PCRF is removing PCC rules based on the AF requests, the PCRF shall include the Required-Access-Info AVP within the Charging-Rule-Remove AVP associated with the corresponding PCC rules being removed.</p> | | | |
| The PCRF shall also provide the ACCESS_NETWORK_INFO_REPORT event trigger within Event-Trigger AVP (if this event trigger is not yet set). | M | C | |
| For the QoS Rule(s) based on preliminary service information as described in 3GPP TS 29.214 [10] the PCRF may assign the QCI and ARP of the default bearer to avoid signalling to the UE. These QoS Rules shall not include the Packet-Filter-Usage AVP within the Flow-Information AVP included in the QoS-Rule-Definition AVP. These QoS rule(s) may be provisioned by the PCRF without corresponding PCC rule(s). | M | NC | |
| If the ACCESS_NETWORK_INFO_REPORT event trigger is set, upon installation, modification and removal of any PCC rule(s) with the Required-Access-Info AVP in a Gx RAR command, and if the PCEF determines that the access network does not support the access network information reporting based on the currently used IP-CAN type | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| <p>or the RAT type and the value of AN-Trusted AVP, the PCEF shall immediately inform the PCRF by including the NetLoc-Access-Support AVP with the value of 0 (NETLOC_ACCESS_NOT_SUPPORTED) in the RAA command. Otherwise, the PCEF shall apply appropriate IP CAN specific procedures to obtain this information. When the PCEF then receives access network information through those IP CAN specific procedures, the PCEF shall provide the required access network information to the PCRF as follows:</p> <ul style="list-style-type: none"> - If the user location information was requested by the PCRF and was provided to the PCEF, the PCEF shall provide the user location information within the 3GPP-User-Location-Info AVP and the time when it was last known within User-Location-Info-Time AVP (if available). - If the user location information was requested by the PCRF and was not provided to the PCEF, the PCEF shall provide the serving PLMN identifier within the 3GPP-SGSN-MCC-MNC AVP. - If the time zone was requested by the PCRF, the PCEF shall provide it within the 3GPP-MS-TimeZone AVP. | | | |
| In addition, the PCEF shall provide the ACCESS_NETWORK_INFO_REPORT event trigger within Event-Trigger AVP. | M | C | |
| During bearer deactivation, when the NetLoc feature is supported, the PCEF shall provide the access network information to the PCRF by | M | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| including the user location information within the 3GPP-User-Location-Info AVP (if requested by the PCRF and if provided to the PCEF), the information on when the UE was last known to be in that location within User-Location-Info-Time AVP (if user location information was requested by the PCRF and if the corresponding information was provided to the PCEF), the PLMN identifier within the 3GPP-SGSN-MCC-MNC AVP (if the user location information was requested by the PCRF but it is not provided to the PCEF) and the timezone information within the 3GPP-MS-TimeZone AVP (if requested by the PCRF). | | | |
| During IP-CAN session termination procedure, the PCEF shall, if ACCESS_NETWORK_INFO_REPORT event trigger is set, provide the access network information to the PCRF by including the user location information within the 3GPP-User-Location-Info AVP (if it was provided to the PCEF), the information on when the UE was last known to be in that location within User-Location-Info-Time AVP (if it was provided to the PCEF), the PLMN identifier within the 3GPP-SGSN-MCC-MNC AVP (if the user location information was not provided to the PCEF) and the timezone information within the 3GPP-MS-TimeZone AVP. | M | C | |

4.5.23 Application Detection Information

Table 45 Application Detection Information

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF may instruct the PCEF to detect application (s) by providing the Charging-Rule-Install AVP (s) with the corresponding parameters as follows: the application to be detected is identified by the TDF-Application-Identifier AVP, which is either provided under Charging-Rule-Definition AVP for dynamic PCC Rules or pre-provisioned for the corresponding predefined PCC Rule, and in such a case only Charging-Rule-Name/Charging-Rule-Base-Name is provided. | Op | C | |
| If the PCRF requires to be reported about when the application start/stop is detected, it shall also subscribe to the APPLICATION_START and APPLICATION_STOP Event-Triggers. | M | C | |
| The PCRF may also mute such a notification about a specific detected application by providing Mute-Notification AVP within the PCC Rule. | Op | C | |
| The corresponding TDF-Application-Identifier AVP shall be included under Application-Detection-Information AVP. | M | C | |
| When the Event trigger indicates APPLICATION_START, the Flow-Information AVP for the detected application may be included under Application-Detection-Information AVP, if deducible. The Flow-Information AVP, if present, | Op | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--------------------------------------|
| shall contain the Flow-Description AVP and Flow-Direction AVP. The TDF-Application-Instance-Identifier, which is dynamically assigned by the PCEF in order to allow correlation of APPLICATION_START and APPLICATION_STOP Event-Triggers to the specific Flow-Information AVP, if service data flow descriptions are deducible, shall also be provided when the Flow-Information AVP is included. Also, the corresponding Event-Trigger (APPLICATION_START or APPLICATION_STOP) shall be provided to PCRF. When the TDF-Application-Instance-Identifier is provided along with the APPLICATION_START, it shall also be provided along with the corresponding APPLICATION_STOP. | | | |
| The PCRF then may make policy decisions based on the information received and send the corresponding updated PCC rules to the PCEF, and corresponding QoS rules to the BBERF, if applicable. | Op | PC | BBERF interactions are not supported |

4.5.24 Group Communication Service Support

Not compliant

4.5.25 NBIFOM Support

Not compliant

4.5.26 Detection and Handling of Late Arriving Requests

Not compliant

4.5.27 Resource Reservation for Services Sharing Priority

Not compliant

4.5.28 Support for PCC Rule Versioning

Not compliant

4.5.29 3GPP PS Data Off Support

Not compliant

4.5.30 Extended bandwidth support for EPC supporting Dual Connectivity (E-UTRAN and 5G NR)

Table 46 Extended bandwidth support for EPC supporting Dual Connectivity (E-UTRAN and 5G NR)

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| When the Extended-BW-NR feature is supported, extended bandwidth AVPs representing bitrates in kbps shall be used to support bandwidth values higher than $2^{32}-1$ bps instead of the bandwidth AVPs representing bitrates in bps. | Op | C | |
| Extended-Max-Requested-BW-DL/UL AVPs shall be used instead of Max-Requested-Bandwidth-DL/UL AVPs. | Op | C | |
| Extended-GBR-DL/UL AVPs shall be used instead of Guaranteed-Bitrate-DL/UL AVPs. | Op | C | |
| Extended-APN AMBR DL/UL AVPs shall be used instead of APN-Aggregate-Max-Bitrate-UL/DL AVPs. | Op | C | |
| For values lower or equal to $2^{32}-1$ bps AVPs representing bitrates in bps shall be used. | Op | C | |



4.6 Void

4.7 4a Gxx Reference Points

Not compliant

4.8 4b Sd Reference Point

4.8.1 4b1 Overview

No requirement

4.8.2 4b2 Sd Reference Model

No requirement

4.8.3 4b3 Application Detection and Control Rules

4.8.3.1 4b3.1 Functional Entities

Table 47 Functional Entities

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF may provide ADC Rules to the TDF by using Sd interface. | Op | C | |
| Once the start or stop of the application's traffic, matching one of those ADC Rules, is detected, if PCRF has previously subscribed to the APPLICATION_START/ APPLICATION_STOP Event-Triggers, unless a request to mute such a notification (Mute-Notification AVP) is part of the corresponding ADC Rule, the TDF shall report the information regarding the detected application's traffic to the PCRF and apply the enforcement actions, if defined within the corresponding ADC Rule. | NR | | |

4.8.3.2

4b.3.2 Application Detection and Control Rule Definition

Table 48 Application Detection and Control Rule Definition

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| - Dynamic ADC rules. The PCRF can however provide and modify some parameters via the Sd reference point, respectively. These ADC rules can be installed, modified and removed at any time. The dynamic ADC rules are applicable only in case of solicited application reporting. | C | NC | Only predefined ADC rules are supported. |
| - Predefined ADC rules. Preconfigured in the TDF. In the case of solicited reporting, the Predefined ADC rules can be activated or deactivated by the PCRF at any time. Predefined ADC rules within the TDF may be grouped allowing the PCRF to dynamically activate a set of ADC rules. | M | C | . |

Table 49 ADC Rule Structure

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| <p>An ADC rule consists of:</p> <ul style="list-style-type: none"> - a rule identifier; - TDF application identifier; - service data flow filter(s); - precedence; - charging key (i.e. rating group); - other charging parameters; - monitoring key; - gate status; - UL maximum bit rate; - DL maximum bit rate; - redirect; | M | PC | Only rule identifier supported in predefined ADC rules. |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| - DL DSCP value; - Traffic steering policy identifier(s). | | | |
| The rule identifier shall be used to reference an ADC rule in the communication between the TDF and the PCRF. | M | C | |
| NOTE 1: The PCRF has to ensure that there is no dynamically provided ADC rule that has the same rule identifier value as any of the predefined ADC rules. | M | NC | Only predefined ADC rules are supported. |
| The TDF application identifier shall be used to reference the corresponding application, for which the rule applies during reporting to the PCRF. The same application identifier value can occur in more than one ADC rule. If so, the PCRF shall ensure that there is at most one ADC rule active per application identifier value at any time. Instead of TDF Application identifier, the service data flow filter(s) list may be provided which comprises one or more service data flow filters and is used by the TDF to identify the packets belonging to a detected traffic. The service data flow filter(s) or the TDF application identifier shall be used to select the traffic for which the rule applies. Either service data flow filter(s) or TDF application identifier shall exist in an ADC rule. | M | NC | Only predefined ADC rules are supported |
| NOTE 2: The same application identifier value could be used for a dynamic ADC rule and a pre-defined ADC rule or for multiple pre-defined ADC rules. | M | PC | Only predefined ADC rules supported. |
| NOTE 3: The configuration of the application detection filter in the TDF can include the set of information required for | NR | | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| encrypted detection as defined in Annex X of 3GPP TS 23.203 [7]. | | | |
| The precedence defines, if multiple ADC rules overlap in the application traffic detection, the ADC Rule with the highest precedence will be applied for the purpose of enforcement, reporting of application starts and stops, usage monitoring, and charging. When a dynamic ADC rule and a predefined ADC rule have the same precedence, the dynamic ADC rule takes precedence. For dynamic ADC rules, the Precedence will be either preconfigured at the TDF or provided dynamically by the PCRF within the ADC Rules. | M | NC | |
| NOTE 4: The operator ensures that overlap between the predefined ADC rules can be resolved based on precedence of each predefined ADC rule in the TDF. For dynamic ADC rules, if precedence is not preconfigured in the TDF, the PCRF ensures that overlap between the dynamic ADC rules can be resolved based on precedence of each dynamic ADC rule. NOTE 5: Whether precedence for dynamic ADC rules that contain an application identifier is preconfigured in TDF or provided in the ADC rule from the PCRF depends on network configuration. | M | NC | |
| The charging parameters define whether online and offline charging interfaces are used, what is to be metered in offline charging, on what level the TDF shall report the usage related to the rule, etc. | M | NC | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The monitoring key for an ADC rule identifies a monitoring control instance that shall be used for usage monitoring control of a particular application or a group of applications (as identified by the predefined or dynamic ADC rule(s)) or all detected traffic belonging to a specific TDF session. | M | NC | |
| <p>If sponsored data connectivity is supported, the sponsor identity for a ADC rule identifies the 3rd party organization (the sponsor) willing to pay for the operator's charge for connectivity required to deliver a service to the end user.</p> <p>If sponsored data connectivity is supported, the application service provider identity for a ADC rule identifies the 3rd party organization (the ASP) that is delivering the service to the end user.</p> | M | NC | |
| The gate status indicates whether the application, identified by the TDF application identifier, may pass (gate is open) or shall be blocked (gate is closed) in uplink and/or in downlink direction. | M | NC | |
| The UL maximum bitrate indicates the authorized maximum bitrate for the uplink component of the detected application traffic. | M | NC | |
| The DL maximum bitrate indicates the authorized maximum bitrate for the downlink component of the detected application traffic. | M | NC | |
| NOTE 6: In order to support services that generate media with variable bitrate (e.g. | C | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| video) , the policing function could need to measure the enforced MBR with a sliding window that averages over a suitable time period. For example, for MTSI media, 3GPP TS 26.114 [57] recommends a default period of 2 seconds and provides further considerations regarding suitable time periods for speech and video. | | | |
| The Redirect indicates whether the uplink part of the detected application traffic should be redirected to another controlled address. The target redirect address may also be included. | M | NC | |
| The DL DSCP value indicates the DSCP value for marking of downlink packets of the detected application traffic. | M | NC | |
| The traffic steering policy identifier(s) is a reference to a pre-configured traffic steering policy at the TDF as defined in subclause 4b.4.2. | M | NC | |
| One or more of the following parameters can be modified for a dynamic ADC rule: <ul style="list-style-type: none"> - precedence; - charging key (i.e. rating group); - other charging parameters (with the exemption of charging method); - monitoring key; - gate status; - UL maximum bit rate; - DL maximum bit rate; - redirect; - DL DSCP value; - Traffic steering policy identifier(s). | C | NC | |



4.8.3.3

4b.3.3 Operations on ADC Rules

Table 50 Operations on ADC Rules

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| <p>For dynamic ADC rules, the following operations are available</p> <ul style="list-style-type: none"> - Installation: to provision an ADC rules that has not been already provisioned. - Modification: to modify an ADC rule already installed. - Removal: to remove an ADC rule already installed. | M | NC | |
| <p>For predefined ADC rules, the following operations are available:</p> <ul style="list-style-type: none"> - Activation: to allow the ADC rule being active. - Deactivation: to disallow the ADC rule. | M | C | |

4.8.4

4b.4 Functional Elements

4.8.4.1

4b.4.1 PCRF

Table 51 PCRF

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| The PCRF (Policy Control and Charging Rules Function) is a functional element that encompasses policy control decision. The PCRF provides network control regarding the application detection, gating, bandwidth limitation, redirection and application based charging (except credit management) towards the TDF. | M | PC | Only application detection and control interactions with TDF supported |
| The PCRF may provision ADC Rules to the TDF via the Sd reference point. | C | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| <p>The PCRF ADC Rule decisions may be based on one or more of the following:</p> <ul style="list-style-type: none"> - Information obtained from the PCEF via the Gx reference point, e.g. request type, subscriber/ device related information, location information. | C | C | |
| <ul style="list-style-type: none"> - Information obtained from the SPR via the Sp reference point, e.g. subscriber related data. The subscription information may include user profile configuration indicating whether application detection and control should be enabled. <p>NOTE: The details associated with the Sp reference point are not specified in this Release. The SPR's relation to existing subscriber databases is not specified in this Release.</p> | C | C | |
| <ul style="list-style-type: none"> - Information obtained from the TDF via the Sd reference point, e.g. detected application, usage monitoring report. | C | PC | Only application detection and control interactions with TDF supported |
| <ul style="list-style-type: none"> - Information obtained from the BBERF via the Gxx reference point. | C | NC | BBERF interactions are not supported |
| <ul style="list-style-type: none"> - Information obtained from the AF via the Rx reference point, e.g. an AF application identifier. | C | C | |
| <ul style="list-style-type: none"> - Own PCRF pre-configured information. | C | C | |
| <p>The PCRF shall inform the TDF through the use of ADC rules, if applicable, on the treatment of applications, in accordance with the PCRF policy decisions.</p> | M | PC | ADC rules supported only for application detection and control |
| <p>It is PCRF's responsibility to coordinate the PCC rules and QoS rules, if applicable, with</p> | M | PC | BBERF interactions |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|-------------------|
| ADC rules in order to ensure consistent service delivery. | | | are not supported |
| The PCRF may use one or more pieces of information defined in the subclause as input for the selection of traffic steering policies used to control the steering of the subscriber's traffic to appropriate (S)Gi-LAN service functions. | C | NC | |

4.8.4.2

4b.4.2 TDF

No requirement

4.8.5

4b.5 ADC Procedures over Sd Reference Point for Solicited Application Reporting

4.8.5.1

4b.5.1 Provision of ADC Rules

4.8.5.1.1

4b.5.1.1 General

Table 52 General

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| If PCRF decides, based on subscriber's profile configuration, that the TDF session should be established with the TDF per corresponding IP-CAN session, during the IP-CAN session establishment or at any point of time when the PCRF decides that the session with TDF is to be established (e.g. subscriber profile changes), the PCRF shall indicate via the Sd reference point, the ADC rules to be applied at the TDF. The TDF-Information AVP shall be either received over Gx within initial CC-Request received from PCEF or pre-provisioned at PCRF. Each ADC rule shall include TDF-Application-Identifier AVP | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| which references the corresponding application for which the rule applies. | | | |
| When establishing the session with the TDF, the PCRF shall send a TS-Request with the PDN information, if available, within the Called-Station-Id AVP, the UE Ipv4 address within the Framed-IP-Address and/or the UE Ipv6 prefix within the Framed-Ipv6-Prefix AVP. These parameters shall uniquely identify the session between the PCRF and the TDF. | M | C | |
| Additionally, if available (i.e. received from the PCEF or the BBERF), the PCRF may include the following information: the user identification within the Subscription-Id AVP, the type of IP-CAN within the IP-CAN-Type AVP, the type of the radio access technology within the RAT-Type AVP if applicable and AN-Trusted AVP if applicable, the device information within User-Equipment-Info AVP, the SGSN address within either 3GPP-SGSN-Address AVP or 3GPP-SGSN-Ipv6-Address AVP, the user location information within 3GPP-User-Location-Info or within 3GPP2-BSID, the Routing Area Identity within RAI AVP, the Ipv4 and/ or Ipv6 address(es) of the access node gateway (SGW for 3GPP and AGW for non-3GPP networks) in the AN-GW-Address AVPs, the MCC and the MNC of the SGSN/S-GW in the 3GPP-SGSN-MCC-MNC AVP, the UE time zone information within 3GPP-MS-TimeZone AVP, the presence reporting area identifier within the Presence-Reporting-Area-Information AVP, the charging | C | PC | The SAPC only supports Subscription-Id and User-Equipment-Info AVPs |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| <p>characteristics within 3GPP-Charging-Characteristics AVP, control plane P-GW address(es) within 3GPP-GGSN-Address AVP and/or 3GPP-GGSN-Ipv6-Address AVP, 3GPP-Selection-Mode AVP indicating how the APN was selected, Dynamic-Address-Flag AVP and Dynamic-Address-Flag-Extension AVP defining whether IP address(es) were statically or dynamically allocated and PDN-Connection-Charging-ID AVP containing the charging identifier to identify different records belonging to the same PDN connection. For xDSL IP-CAN Type, the Logical-Access-ID AVP and the Physical-Access-ID AVP may be provided.</p> | | | |
| <p>NOTE: For PDN type Ipv4v6, in case the UE Ipv4 address is not available in the PCRF, the PCRF initiates the TDF session establishment providing the UE Ipv6 prefix, and will subsequently provide UE Ipv4 address to the TDF using Event-Report-Indication AVP (as specified in clause 4b.5.8) to the TDF.</p> | M | NC | |
| <p>The ADC rules may be transferred to the TDF by using one of the following procedures:</p> <ul style="list-style-type: none"> - PUSH procedure (Unsolicited provisioning): The PCRF may decide to provision ADC rules at TDF session establishment within TS-Request or at any point of time within active TDF session by using RA-Request. To provision ADC rules, the PCRF shall include those ADC rules in either TS-Request or RA-Request message; or | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--------------------------------------|
| - PULL procedure (Provisioning solicited by the TDF): In response to a request for ADC | | | |
| For each request from the TDF or upon the unsolicited provision, the PCRF shall provision zero or more ADC rules. | M | C | |
| <p>The PCRF may perform an operation on a single ADC rule by one of the following means:</p> <ul style="list-style-type: none"> - To activate or deactivate an ADC rule that is predefined at the TDF, the PCRF shall provision a reference to this ADC rule within an ADC-Rule-Name AVP and indicate the required action by choosing either the ADC-Rule-Install AVP or the ADC-Rule-Remove AVP. - To install or modify a PCRF-provisioned ADC rule, the PCRF shall provision a corresponding ADC-Rule-Definition AVP within an ADC-Rule-Install AVP. - To remove an ADC rule which has previously been provisioned by the PCRF, the PCRF shall provision the name of this ADC rule as value of an ADC-Rule-Name AVP within an ADC-Rule-Remove AVP | C | PC | Only predefined ADC rules supported. |
| As an alternative to providing a single ADC rule, the PCRF may provide an ADC-Rule-Base-Name AVP within an ADC-Rule-Install AVP or the ADC-Rule-Remove AVP as a reference to a group of ADC rules predefined at the TDF. With an ADC-Rule-Install AVP, a predefined group of ADC rules is activated. With an ADC-Rule-Remove AVP, a predefined group of ADC rules is deactivated. | C | C | |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--------------------------------------|
| The PCRF may combine multiple of the above ADC rule operations in a single command. | C | C | |
| To activate a predefined ADC rule at the TDF, the rule name within an ADC-Rule-Name AVP shall be supplied within an ADC-Rule-Install AVP as a reference to the predefined rule. To activate a group of predefined ADC rules within the TDF, an ADC-Rule-Base-Name AVP shall be supplied within an ADC-Rule-Install AVP as a reference to the group of predefined ADC rules. | M | C | |
| To install a new or modify an already installed PCRF defined ADC rule, the ADC-Rule-Definition AVP shall be used. If an ADC rule with the same rule name, as supplied in the ADC-Rule-Name AVP within the ADC-Rule-Definition AVP, already exists at the TDF, the new ADC rule shall update the currently installed rule. If the existing ADC rule already has attributes also included in the new ADC rule definition, the existing attributes shall be overwritten. Any attribute in the existing ADC rule not included in the new ADC rule definition shall remain valid. | M | NC | |
| For deactivating single predefined or removing PCRF-provided ADC rules, the ADC-Rule-Name AVP shall be supplied within an ADC-Rule-Remove AVP. For deactivating a group of predefined ADC rules, the ADC-Rule-Base-Name AVP shall be supplied within an ADC-Rule-Remove AVP. | M | PC | Only predefined ADC rules supported. |
| The TDF shall apply the ADC rules to the user plane traffic with the IP address(es) | NR | | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| matching the UE Ipv4 address within the Framed-IP-Address and/or the UE Ipv6 prefix within the Framed-Ipv6-Prefix AVP received over Sd interface and report the detected application information via the corresponding TDF session. | | | |
| If the provisioning of ADC rules fails, the TDF informs the PCRF as described in clause 4b.5.5 ADC Rule Error Handling. Depending on the cause, the PCRF may decide if re-installation, modification, removal of ADC rules or any other action applies. | C | NC | |

- 4.8.5.1.2 4b.5.1.2 Gate Function
Not compliant
- 4.8.5.1.3 4b.5.1.3 Bandwidth Limitation Function
Not compliant
- 4.8.5.1.4 4b.5.1.4 Redirect Function
Not compliant
- 4.8.5.1.5 4b.5.1.5 Usage Monitoring Control
Not compliant
- 4.8.5.1.6 4b.5.1.6 Marking of Downlink Packets
Not compliant
- 4.8.5.2 **4b.5.2 Request for ADC Rules**
Not compliant



4.8.5.3

4b.5.3 Provision of Event Triggers

Table 53 Provision of Event Triggers

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| The PCRF may provide one or several event triggers within one or several Event-Trigger AVP to the TDF using the ADC rule provision procedure. Event triggers may be used to determine which event causes the TDF to inform PCRF once occur. Provisioning of event triggers from the PCRF to the TDF shall be done at TDF session level. The Event-Trigger AVP may be provided in combination with the initial or subsequent ADC rule provisioning in TSR, RAR or CCA message. | C | PC | The SAPC provides only APPLICATION_START and APPLICATION_STOP event triggers in TSR message. |
| The PCRF may add new event triggers or remove the already provided ones. In order to do so, the PCRF shall provide the new complete list of applicable event triggers including the needed provisioned Event-Trigger AVPs in the CCA or RAR commands. | C | NC | |
| The PCRF may remove all previously provided event triggers by providing the Event-Trigger AVP set to the value NO_EVENT_TRIGGERS. When an Event-Trigger AVP is provided with this value, no other Event-Trigger AVP shall be provided in the CCA or RAR command. Upon reception of an Event-Trigger AVP with this value, the TDF shall not inform PCRF of any event. | C | NC | |
| If no Event-Trigger AVP is included in a CCA or RAR operation, any previously provisioned event trigger shall still be applicable. | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| There are event triggers that are required to be unconditionally reported from the TDF to the PCRF as specified in clause 5.3.7 even though the PCRF has not provisioned them to the TDF. | NR | | |

4.8.5.4

4b.5.4 Request of TDF Session Termination

Table 54 Request of TDF Session Termination

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| When the corresponding IP-CAN session is terminated or at any point of time when the PCRF decides that the session with TDF is to be terminated (e.g. subscriber profile changes), the PCRF shall send a RAR command including the Session-Release-Cause AVP to the TDF. The TDF shall acknowledge the command by sending a RAA command to the PCRF and instantly remove/deactivate all the ADC rules that have been previously installed or activated on that TDF session. | M | PC | TDF session termination is only requested when IP-CAN session is finished. |
| The TDF shall send a CC-Request with CC-Request-Type AVP set to the value "TERMINATION_REQUEST" to PCRF to terminate the TDF session. | NR | | |
| When the PCRF receives the CC-Request, it shall acknowledge this message by sending a CC-Answer to the TDF. NOTE 1: According to DCC procedures, the Diameter Credit Control session is being terminated with this message exchange, as specified in IETF RFC 4006 [9]. | M | C | |



- 4.8.5.5 4b.5.5 ADC Rule Error Handling**
Not compliant
- 4.8.5.6 4b.5.6 Requesting Usage Monitoring Control**
Not compliant
- 4.8.5.7 4b.5.7 Reporting Accumulated Usage**
Not compliant
- 4.8.5.8 4b.5.8 Provision of Event Report Indication**
Not compliant
- 4.8.5.9 4b.5.9 Application Detection Information**

Table 55 Application Detection Information

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--------------------------------------|
| For the solicited application reporting, the PCRF may instruct the TDF to detect application (s) by providing the ADC-Rule-Install AVP (s) with the corresponding parameters as follows: the application to be detected is identified by the TDF-Application-Identifier AVP, which is either provided under ADC-Rule-Definition AVP for dynamic ADC Rules or pre-provisioned for the corresponding predefined ADC Rule, and in such a case only ADC-Rule-Name/ADC-Rule-Base-Name is provided . | C | PC | Only predefined ADC rules supported. |
| If the PCRF requires to be reported about when the application start/stop is detected, it shall also subscribe to the APPLICATION_START and APPLICATION_STOP Event-Triggers. | M | C | |
| The PCRF may also mute such a notification about a specific detected application by | C | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| providing Mute-Notification within the corresponding ADC-Rule-Definition AVP. | | | |
| When the start or stop of the application's traffic, identified by TDF-Application-Identifier, is detected, if PCRF has previously subscribed to the APPLICATION_START/ APPLICATION_STOP Event-Triggers, unless a request to mute such a notification (Mute-Notification AVP) is part of the corresponding ADC-Rule-Definition AVP, the TDF shall report the information regarding the detected application's traffic in the Application-Detection-Information AVP in the CCR command even if the application traffic is discarded due to enforcement actions of the ADC rule. | NR | | |
| The corresponding TDF-Application-Identifier AVP shall be included under Application-Detection-Information AVP. When the Event trigger indicates APPLICATION_START, the Flow-Information AVP for the detected application may be included under Application-Detection-Information AVP, if deducible. The Flow-Information AVP, if present, shall contain the Flow-Description AVP and Flow-Direction AVP. The TDF-Application-Instance-Identifier, which is dynamically assigned by the TDF in order to allow correlation of APPLICATION_START and APPLICATION_STOP Event-Triggers to the specific Flow-Information AVP, if service data flow descriptions are deducible, shall also be provided. Also, the | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------------------------------------|
| corresponding Event-Trigger (APPLICATION_START or APPLICATION_STOP) shall be provided to PCRF. | | | |
| When the TDF-Application-Instance-Identifier is provided along with the APPLICATION_START, it shall also be provided along with the corresponding APPLICATION_STOP. | M | C | |
| The PCRF then may make the policy decision based on the information received and send the updated PCC rules to the PCEF, updated QoS rules to the BBERF, if applicable, and the updated ADC rules to the TDF. | C | PC | BBERF interactions are not supported. |

4.8.5.10 4b.5.10 Time of the Day Procedures

Not compliant

4.8.5.11 4b.5.11 PCRF Failure Restoration

No requirement

4.8.5.12 4b.5.12 Bandwidth Limitation Function

Not compliant

4.8.5.13 4b.5.13 Provision of Charging Related Information for the TDF Session

Not compliant

4.8.5.14 4b.5.14 Downlink Packet Marking by the TDF

Not compliant

4.8.5.15 4b.5.15 Traffic Steering Control Support

Not compliant

4.8.5.16 4b.5.16 Sponsored Data Connectivity

Not compliant



| | | |
|----------|---|---------------|
| 4.8.5.17 | 4b.5.17 Extended bandwidth support for EPC supporting Dual Connectivity (E-UTRAN and 5G NR) | Not compliant |
| 4.8.6 | 4b.5a ADC Procedures over Sd Reference Point for Unsolicited Application Reporting | Not compliant |
| 4.9 | 4c St Reference Point | Not compliant |



5 Gx Protocol

5.1 Protocol Support

Table 56 Protocol Support

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The Gx application is defined as a vendor specific Diameter application, where the vendor is 3GPP and the Application-ID for the Gx Application in the present release is 16777238. | M | C | |
| The vendor identifier assigned by IANA to 3GPP (http://www.iana.org/assignments/enterprise-numbers) is 10415. | M | C | |
| The Gx application identification shall be included in the Auth-Application-Id AVP. | M | C | |
| With regard to the Diameter protocol defined over the Gx interface, the PCRF acts as a Diameter server, in the sense that it is the network element that handles PCC Rule requests for a particular realm. | M | C | |

5.2 Initialization, Maintenance and Termination of Connection and Session

Table 57 Initialization, Maintenance and Termination of Connection and Session

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| After establishing the transport connection, the PCRF and the PCEF shall advertise the support of the Gx specific Application by including the value of the application | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| identifier in the Auth-Application-Id AVP and the value of the 3GPP (10415) in the Vendor-Id AVP of the Vendor-Specific-Application-Id AVP contained in the Capabilities Exchange-Request and Capabilities-Exchange-Answer commands. | | | |
| The termination of the Diameter session on Gx can be initiated either by the PCEF or PCRF, as specified in subclauses 4.5.7 and 4.5.9, respectively. | M | C | |

5.3 Gx Specific AVPs

Table 58 Gx Specific Diameter AVPs

| Attribute Name | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|---------|
| 3GPP-PS-Data-Off-Status | M | NC | |
| Access-Availability-Change-Reason | M | NC | |
| Access-Network-Charging-Identifier-Gx | M | NC | |
| Allocation-Retention-Priority | M | C | |
| AN-GW-Address | M | C | |
| AN-GW-Status | M | NC | |
| APN-Aggregate-Max-Bitrate-DL | M | C | |
| APN-Aggregate-Max-Bitrate-UL | M | C | |
| Application-Detection-Information | M | C | |
| Bearer-Control-Mode | M | C | |
| Bearer-Identifier | M | C | |
| Bearer-Operation | M | C | |
| Bearer-Usage | M | C | |



| Attribute Name | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|--|
| Charging-Rule-Install | M | C | |
| Charging-Rule-Remove | M | C | |
| Charging-Rule-Definition | M | C | |
| Charging-Rule-Base-Name | M | C | |
| Charging-Rule-Name | M | C | |
| Charging-Rule-Report | M | C | |
| Charging-Correlation-Indicator | M | NC | |
| CoA-IP-Address | M | NC | |
| CoA-Information | M | NC | |
| Conditional-APN-Aggregate-Max-Bitrate | M | NC | |
| Conditional-Policy-Information | M | NC | |
| Credit-Management-Status | M | NC | |
| CSG-Information-Reporting | M | NC | |
| Default-Access | M | NC | |
| Default-Bearer-Indication | M | NC | |
| Default-EPS-Bearer-QoS | M | C | |
| Default-QoS-Information | M | NC | |
| Default-QoS-Name | M | NC | |
| Event-Report-Indication | M | NC | |
| Event-Trigger | M | PC | Refer to Gx Interface Description for supported values |
| Execution-Time | M | NC | |
| Extended-APN-AMBR-DL | M | C | |
| Extended-APN-AMBR-UL | M | C | |
| Extended-GBR-DL | M | C | |
| Extended-GBR-UL | M | C | |



| Attribute Name | Qualifier | Compliance | Comment |
|-------------------------------|-----------|------------|---------|
| Flow-Direction | M | C | |
| Flow-Information | M | C | |
| Flow-Label | M | NC | |
| Fixed-User-Location-Info | M | NC | |
| Guaranteed-Bitrate-DL | M | C | |
| Guaranteed-Bitrate-UL | M | C | |
| HeNB-Local-IP-Address | M | NC | |
| IP-CAN-Session-Charging-Scope | M | NC | |
| IP-CAN-Type | M | C | |
| Metering-Method | M | C | |
| Monitoring-Flags | M | NC | |
| Monitoring-Key | M | C | |
| Mute-Notification | M | C | |
| Monitoring-Time | M | NC | |
| NBIFOM-Mode | M | NC | |
| NBIFOM-Support | M | NC | |
| NetLoc-Access-Support | M | C | |
| Network-Request-Support | M | C | |
| Offline | M | C | |
| Online | M | C | |
| Packet-Filter-Content | M | NC | |
| Packet-Filter-Identifier | M | NC | |
| Packet-Filter-Information | M | NC | |
| Packet-Filter-Operation | M | NC | |
| Packet-Filter-Usage | M | NC | |
| PCC-Rule-Status | M | C | |
| PDN-Connection-ID | M | NC | |
| PRA-Install | M | NC | |
| PRA-Remove | M | NC | |
| Precedence | M | C | |
| Pre-emption-Capability | M | C | |



| Attribute Name | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|---------|
| Pre-emption-Vulnerability | M | C | |
| Presence-Reporting-Area-Elements-List | M | C | |
| Presence-Reporting-Area-Identifier | M | C | |
| Presence-Reporting-Area-Information | M | C | |
| Presence-Reporting-Area-Status | M | C | |
| Priority-Level | M | C | |
| PS-to-CS-Session-Continuity | M | NC | |
| QoS-Class-Identifier | M | C | |
| QoS-Information | M | C | |
| QoS-Negotiation | M | C | |
| QoS-Upgrade | M | C | |
| RAN-NAS-Release-Cause | M | NC | |
| RAN-Rule-Support | M | NC | |
| RAT-Type | M | C | |
| Redirect-Information | M | C | |
| Redirect-Support | M | C | |
| Reporting-Level | M | C | |
| Resource-Allocation-Notification | M | NC | |
| Resource-Release-Notification | M | NC | |
| Revalidation-Time | M | C | |
| Routing-Filter | M | NC | |
| Routing-IP-Address | M | NC | |
| Routing-Rule-Definition | M | NC | |
| Routing-Rule-Identifier | M | NC | |
| Routing-Rule-Install | M | NC | |
| Routing-Rule-Remove | M | NC | |
| Routing-Rule-Failure-Code | M | NC | |



| Attribute Name | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|--|
| Routing-Rule-Report | M | NC | |
| Rule-Activation-Time | M | C | |
| Rule-DeActivation-Time | M | C | |
| Rule-Failure-Code | M | PC | Refer to Gx Interface Description for supported values |
| Security-Parameter-Index | M | NC | |
| Session-Release-Cause | M | PC | Refer to Gx Interface Description for supported values |
| TCP-Source-Port | M | C | |
| TDF-Information | M | C | |
| TDF-Application-Identifier | M | C | |
| TDF-Application-Instance-Identifier | M | C | |
| TDF-Destination-Host | M | C | |
| TDF-Destination-Realm | M | C | |
| TDF-IP-Address | M | C | |
| TFT- Filter | M | NC | |
| TFT-Packet-Filter-Information | M | NC | |
| Traffic-Steering-Policy-Identifier-DL | M | NC | |
| Traffic-Steering-Policy-Identifier-UL | M | NC | |
| ToS-Traffic-Class | M | NC | |
| Tunnel-Header-Filter | M | NC | |
| Tunnel-Header-Length | M | NC | |
| Tunnel-Information | M | NC | |
| UDP-Source-Port | M | C | |
| UE-Local-IP-Address | M | C | |
| Usage-Monitoring-Information | M | C | |
| Usage-Monitoring-Level | M | C | |



| Attribute Name | Qualifier | Compliance | Comment |
|------------------------------|-----------|------------|---------|
| Usage-Monitoring-Report | M | C | |
| Usage-Monitoring-Support | M | C | |
| User-Location-Info-Time | M | C | |
| PCSCF-Restoration-Indication | M | NC | |

5.4 Gx Re-Used AVPs

Table 59 Gx Re-Used AVPs

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| 3GPP-Charging-Characteristics | M | C | |
| 3GPP-GGSN-Address | M | NC | |
| 3GPP-GGSN-IPv6-Address | M | NC | |
| 3GPP-MS-TimeZone | M | C | |
| 3GPP-RAT-Type | M | C | |
| 3GPP-Selection-Mode | M | NC | |
| 3GPP-SGSN-Address | M | C | |
| 3GPP-SGSN-IPv6-Address | M | C | |
| 3GPP-SGSN-MCC-MNC | M | C | |
| 3GPP-User-Location-Info | M | C | |
| 3GPP2-BSID | M | NC | |
| Access-Network-Charging-Address | M | NC | |
| Access-Network-Charging-Identifier-Value | M | NC | |
| AF-Charging-Identifier | M | C | |
| AF-Signalling-Protocol | M | C | |
| AN-Trusted | M | C | |
| Application-Service-Provider-Identity | M | NC | |
| BSSID | M | NC | |
| Called-Station-Id | M | C | |
| CC-Request-Number | M | C | |



| Text | Qualifier | Compliance | Comment |
|--------------------------------|-----------|------------|--|
| CC-Request-Type | M | C | |
| Charging-Information | M | C | |
| Content-Version | M | NC | |
| DRMP | M | NC | |
| Dynamic-Address-Flag | M | NC | |
| Dynamic-Address-Flag-Extension | M | NC | |
| Extended-Max-Requested-BW-DL | M | C | |
| Extended-Max-Requested-BW-UL | M | C | |
| Final-Unit-Indication | M | NC | |
| Flow-Description | M | C | |
| Flows | M | C | |
| Flow-Status | M | C | |
| Framed-IP-Address | M | C | |
| Framed-IPv6-Prefix | M | C | |
| Granted-Service-Unit | M | C | Refer to Gx Interface Description for supported values |
| Logical-Access-ID | M | NC | |
| Max-Requested-Bandwidth-UL | M | C | |
| Max-Requested-Bandwidth-DL | M | C | |
| OC-OLR | M | NC | |
| OC-Supported-Features | M | NC | |
| Origination-Time-Stamp | M | NC | |
| PDN-Connection-Charging-ID | M | NC | |
| Physical-Access-ID | M | NC | |
| Quota-Consumption-Time | M | NC | |
| RAI | M | C | |
| Rating-Group | M | C | |
| Redirect-Address-Type | M | C | |
| Redirect-Server-Address | M | C | |
| Required-Access-Info | M | NC | |



| Text | Qualifier | Compliance | Comment |
|----------------------|-----------|------------|---------|
| Service-Identifier | M | C | |
| Sharing-Key-DL | M | NC | |
| Sharing-Key-UL | M | NC | |
| Sponsor-Identity | M | NC | |
| SSID | M | NC | |
| Subscription-Id | M | C | |
| Supported-Features | M | C | |
| Trace-Data | M | NC | |
| Trace-Reference | M | NC | |
| TWAN-Identifier | M | C | |
| User-CSG-Information | M | NC | |
| User-Equipment-Info | M | C | |
| Used-Service-Unit | M | C | |

5.4.1 Use of the Supported-Features AVP on the Gx Reference Point

Table 60 Use of the Supported-Features AVP on the Gx Reference Point

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------------------------|
| If the CCR command does not contain any Supported-Features AVP(s) and the PCRF supports Rel-7 Gx functionality, the CCA command shall not include the Supported-Features AVP. In this case, both PCEF and PCRF shall behave as specified in the Rel-7 version. | M | NC | Gx Rel-7 is not supported |
| - If the CCR command contains the Supported-Features AVP the PCRF shall include the Supported-Features AVP in the CCA command, with the 'M' bit cleared, indicating only the features that both the PCRF and PCEF support. | M | C | |
| Once the PCRF and PCEF have negotiated the set of supported features during session establishment, the set of common features shall be used | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| during the lifetime of the Diameter session. | | | |

Table 61 Features of Feature-List-ID 1 Used in Gx

| Text | Qualifier | Compliance | Comment |
|-------------------------------|-----------|------------|---------------------------|
| Rel8 | M | NC | Gx Rel-8 is not supported |
| Rel9 | M | C | |
| ProvAFsignalFlow | O | C | |
| Rel10 | M | C | |
| SponsoredConnectivity | O | NC | |
| IFOM | O | NC | |
| ADC | O | C | |
| vSRVCC | O | C | |
| EPC-routed | O | NC | |
| rSRVCC | O | NC | |
| NetLoc | O | C | |
| UMCH | O | NC | |
| ExtendedFilter | O | NC | |
| Trusted-WLAN | O | C | |
| SGW-Rest | O | NC | |
| TimeBasedUM | O | NC | |
| PendingTransaction | O | C | |
| ABC | O | NC | |
| NetLoc-Trusted-WLAN | O | NC | |
| FBAC | O | NC | |
| ConditionalAPNPolicyInfo | O | NC | |
| RAN-NAS-Cause | O | NC | |
| CNO-ULI | O | C | |
| PCSCF-Restoration-Enhancement | O | NC | |
| MissionCriticalQCIs | O | NC | |
| ResShare | O | NC | |
| ExUsage | O | NC | |



| Text | Qualifier | Compliance | Comment |
|-----------------------|-----------|------------|---------|
| NBIFOM | O | NC | |
| TSC | O | NC | |
| NetLoc-Untrusted-WLAN | O | C | |
| CondPolicyInfo | O | NC | |

Table 62 Features of Feature-List-ID 2 used in Gx

| Text | Qualifier | Compliance | Comment |
|------------------------------|-----------|------------|---------|
| Enh-RAN-NAS-Cause | O | NC | |
| ENB-Change | O | NC | |
| Rule-Versioning | O | NC | |
| Multiple-PRA | O | NC | |
| CondPolicyInfo-DefaultQoS | O | NC | |
| Rule-Bound-to-Default-Bearer | O | NC | |
| 3GPP-PS-Data-Off | O | NC | |
| Extended-BW-NR | O | C | |

5.4.2

Flow-Description AVP

Table 63 Flow-Description AVP

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The Flow-Description AVP (AVP code is defined in 3GPP TS 29.214 [10]) is of type IPFilterRule, and defines a packet filter for an IP flow with the following information: | M | C | |
| Action shall be keyword "permit". | M | C | |
| Direction shall be keyword "out". | M | C | |
| - Protocol shall be the decimal protocol number or, to indicate that the value is not used for matching packets, the keyword "ip". | M | C | |
| - Source IP address (possibly masked) or, to indicate that the | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| value is not used for matching packets, the keyword "any". | | | |
| - Source port is optional and, if present, shall be the decimal port number or port range. | M | C | |
| - Destination IP address (possibly masked) or, to indicate that the value is not used for matching packets, the keyword "assigned". | M | C | |
| - Destination port is optional and, if present, shall be the decimal port number or port range. | M | C | |
| - The parameter encoding shall comply with IETF RFC . | M | C | |
| - No "options" shall be used. | M | C | |
| - The invert modifier "!" for addresses shall not be used. | M | C | |
| The direction "out" indicates that the IPFilterRule "source" parameters correspond to the "remote" parameters in the packet filter and the IPFilterRule "destination" parameters correspond to the "local" (UE end) parameters. The Flow-Description AVP applies in the direction(s) as specified in the accompanying Flow-Direction AVP. | M | C | |

5.5 Gx Specific Experimental-Result-Code AVP Values

5.5.1 General

No requirement



5.5.2 Success

Table 64 Success

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The Result-Code AVP values defined in Diameter BASE IETF RFC 6733 [61] shall be applied. | M | C | |

5.5.3 Permanent Failures

Table 65 Permanent Failures

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| <p>The Result-Code AVP values defined in Diameter BASE IETF RFC 6733 [61] are applicable, as an addition the following Result-Code AVP value defined in IETF RFC 4006 [9] is applicable:</p> <p>DIAMETER_USER_UNKNOWN (5030)</p> <p>DIAMETER_ERROR_INITIAL_PARAMETERS (5140)</p> <p>DIAMETER_ERROR_TRIGGER_EVENT (5141)</p> <p>DIAMETER_PCC_RULE_EVENT (5142)</p> <p>DIAMETER_ERROR_BEARER_NOT_AUTHORIZED (5143)</p> <p>DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED (5144)</p> <p>DIAMETER_ERROR_CONFLICTING_REQUEST (5147)</p> <p>DIAMETER_ADC_RULE_EVENT (5148)</p> <p>DIAMETER_ERROR_LATE_OVERLAPPING_REQUEST (5453)</p> <p>DIAMETER_ERROR_TIMED_OUT_REQUEST (5454)</p> | M | PC | Refer to Gx Interface Description document for supported values (Result-Code AVP) |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| DIAMETER_ERROR_NBIFOM_NOT_AUTHORIZED (5149) | | | |

5.5.4 Transient Failures

Table 66 Transient Failures

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| The Result-Code AVP values defined in Diameter Base IETF RFC 6733 [61] are applicable. Also the following specific Gx Experimental-Result-Code value is defined for transient failures: DIAMETER_PCC_BEARER_EVENT (4141) DIAMETER_AN_GW_FAILED (4143) DIAMETER_PENDING_TRANS ACTION (4144) | M | PC | Refer to Gx Interface Description document for supported values (Experimental-Result AVP). |

5.6 Gx Messages

5.6.1 Gx Application

Compliant

5.6.2 CC-Request (CCR) Command

Compliant

5.6.3 CC-Answer (CCA) Command

Compliant

5.6.4 Re-Auth-Request (RAR) Command

Compliant



5.6.5 Re-Auth-Answer (RAA) Command Compliant



6 5a Gxx Protocols

Not compliant



7 5b Sd Protocol

7.1 5b.1 Protocol Support

Table 67 Protocol Support

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The Sd application is defined as a vendor specific Diameter application, where the vendor is 3GPP. The vendor identifier assigned by IANA to 3GPP (http://www.iana.org/assignments/enterprise-numbers) is 10415. The Application-ID for the Sd Application is 16777303 and this value shall be used in the Diameter command header as well as any Application-ID AVPs (Auth-Application-Id/ Vendor-Specific-Application-Id) in the command body. | M | C | |

7.2 5b.2 Initialization, Maintenance and Termination of Connection and Session

Table 68 Initialization, Maintenance and Termination of Connection and Session

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| After establishing the transport connection, the PCRF and the TDF shall advertise the support of the Sd specific Application by including the value of the application identifier in the Auth-Application-Id AVP and the value of the 3GPP (10415) in the Vendor-Id AVP of the Vendor-Specific-Application-Id AVP contained in the Capabilities Exchange-Request | M | C | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| and Capabilities-Exchange-Answer commands. | | | |
| The Diameter session on Sd is established either at the request of the PCRF in case of solicited application reporting or at the request of the TDF in case of unsolicited application reporting. | M | PC | Unsolicited application reporting not supported. |
| Session modifications may be initiated by either TDF or PCRF. Session termination is initiated at the request of the PCRF as specified in clause 4b.5.4. | C | C | |

7.3

5b.3 Sd Specific AVPs

Table 69 Sd Specific Diameter AVPs

| Text | Qualifier | Compliance | Comment |
|---------------------|-----------|------------|--------------------------------------|
| ADC-Rule-Base-Name | M | C | |
| ADC-Rule-Definition | M | NC | Only predefined ADC rules supported. |
| ADC-Rule-Install | M | C | |
| ADC-Rule-Name | M | C | |
| ADC-Rule-Remove | M | C | |
| ADC-Rule-Report | M | NC | |

7.4

5b.4 Sd Re-Used AVPs

Table 70 Sd Re-Used AVPs

| Text | Qualifier | Compliance | Comment |
|-----------------------------------|-----------|------------|---------|
| AN-GW-Address | M | NC | |
| AN-Trusted | M | NC | |
| Application-Detection-Information | M | C | |



| Text | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|---|
| Application-Service-Provider-Identity | M | NC | |
| BSSID | M | NC | |
| Called-Station-Id | M | C | |
| CC-Request-Number | M | C | |
| CC-Request-Type | M | C | |
| Charging-Information | M | NC | |
| Credit-Management-Status | M | NC | |
| CSG-Information-Reporting | M | NC | |
| DRMP | M | NC | |
| Dynamic-Address-Flag | M | NC | |
| Dynamic-Address-Flag-Extension | M | NC | |
| Event-Report-Indication | M | NC | |
| Event-Trigger | M | PC | Refer to Sd Interface Description for supported values. |
| Extended-Max-Requested-BW-UL | M | NC | |
| Extended-Max-Requested-BW-DL | M | NC | |
| Final-Unit-Indication | M | NC | |
| Fixed-User-Location-Info | M | NC | |
| Flow-Description | M | C | |
| Flow-Direction | M | C | |
| Flow-Information | M | PC | ADC-Rule-Definition AVP not supported. |
| Flow-Status | M | NC | |
| Framed-IP-Address | M | C | |
| Framed-Ipv6-Prefix | M | PC | |
| Granted-Service-Unit | M | NC | |
| IP-CAN-Type | M | NC | |
| Load | M | NC | |
| Logical-Access-ID | M | NC | |



| Text | Qualifier | Compliance | Comment |
|-------------------------------------|-----------|------------|---------|
| Max-Requested-Bandwidth-UL | M | NC | |
| Max-Requested-Bandwidth-DL | M | NC | |
| Metering-Method | M | NC | |
| Monitoring-Flags | M | NC | |
| Monitoring-ey | M | NC | |
| Monitoring-Time | M | NC | |
| Mute-Notification | M | NC | |
| OC-OLR | M | NC | |
| OC-Supported-Features | M | NC | |
| Offline | M | NC | |
| Online | M | NC | |
| PCC-Rule-Status | M | NC | |
| PDN-Connection-Charging-ID | M | NC | |
| Physical-Access-ID | M | NC | |
| Precedence | M | NC | |
| Presence-Reporting-Area-Identifier | M | NC | |
| Presence-Reporting-Area-Information | M | NC | |
| Presence-Reporting-Area-Status | M | NC | |
| QoS-Information | M | NC | |
| Quota-Consumption-Time | M | NC | |
| RAI | M | NC | |
| RAT-Type | M | NC | |
| Rating-Group | M | NC | |
| Redirect-Address-Type | M | NC | |
| Redirect-Information | M | NC | |
| Redirect-Server-Address | M | NC | |
| Redirect-Support | M | NC | |
| Reporting-Level | M | NC | |
| Revalidation-Time | M | NC | |
| Rule-Failure-Code | M | NC | |
| Rule-Activation-Time | M | NC | |
| Service-Identifier | M | NC | |



| Text | Qualifier | Compliance | Comment |
|---------------------------------------|-----------|------------|---|
| Session-Release-Cause | M | PC | Refer to Sd Interface Description for supported values. |
| Sponsor-Identity | M | NC | |
| SSID | M | NC | |
| Subscription-Id | M | C | |
| Supported-Features | M | NC | |
| Traffic-Steering-Policy-Identifier-DL | M | NC | |
| Traffic-Steering-Policy-Identifier-UL | M | NC | |
| TDF-Application-Identifier | M | C | |
| TDF-Application-Instance-Identifier | M | C | |
| ToS-Traffic-Class | M | NC | |
| TWAN-Identifier | M | NC | |
| Usage-Monitoring-Information | M | NC | |
| Usage-Monitoring-Level | M | NC | |
| Usage-Monitoring-Report | M | NC | |
| Usage-Monitoring-Support | M | NC | |
| Used-Service-Unit | M | NC | |
| User-Equipment-Info | M | C | |
| 3GPP-Charging-Characteristics | M | NC | |
| 3GPP-GGSN-Address | M | NC | |
| 3GPP-GGSN-Ipv6-Address | M | NC | |
| 3GPP-MS-TimeZone | M | NC | |
| 3GPP-Selection-Mode | M | NC | |
| 3GPP-SGSN-Address | M | NC | |
| 3GPP-SGSN-MCC-MNC | M | NC | |
| 3GPP-User-Location-Info | M | NC | |
| 3GPP2-BSID | M | NC | |

7.4.1 5b.4.1 Use of the Supported-Features AVP on the Sd Reference Point

Not compliant

7.5 5b.5 Sd Specific Experimental-Result-Code AVP Values

7.5.1 5b.5.1 General

No requirement

7.5.2 5b.5.2 Success

Table 71 Success

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The Result-Code AVP values defined in Diameter BASE IETF RFC 6733 [61] shall be applied. | M | C | |

7.5.3 5b.5.3 Permanent Failures

Table 72 Permanent Failures

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| The Result-Code AVP values defined in Diameter BASE IETF RFC 6733 [61] are applicable. Also the following specific Gx Experimental-Result-Codes value is reused for TDF session: DIAMETER_ADC_RULE_EVENT (see 5.5.3): | M | PC | Refer to Sd Interface Description for supported values (Result-Code AVP). |

7.5.4 5b.5.4 Transient Failures

Table 73 Transient Failures

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| The Result-Code AVP values defined in Diameter Base IETF RFC 6733 [61] are applicable. | M | PC | Refer to Sd Interface Description for supported values (Experimental-Result AVP). |



| | |
|-------|---|
| 7.6 | 5b.6 Sd Messages |
| 7.6.1 | 5b.6.1 Sd Application Compliant |
| 7.6.2 | 5b.6.2 TDF-Session-Request (TSR) Command Compliant |
| 7.6.3 | 5b.6.3 TDF-Session-Answer (TSA) Command Compliant |
| 7.6.4 | 5b.6.4 CC-Request (CCR) Command Compliant |
| 7.6.5 | 5b.6.5 CC-Answer (CCA) Command Compliant |
| 7.6.6 | 5b.6.6 Re-Auth-Request (RAR) Command Compliant |
| 7.6.7 | 5b.6.7 Re-Auth-Answer (RAA) Command Compliant |



8 5c St Diameter Protocol

Not compliant



9 Annex A (Normative): Access Specific Aspects (GPRS)

9.1 A.1 Scope

No requirement

9.2 A.2 Reference Model

No requirement

9.3 A.2 Functional Elements

9.3.1 A.2.1 PCRF

Table 74 PCRF

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| For GPRS it shall be possible to support policy control, that is, access control and QoS control, on a per-PDP context basis for the UE initiated bearer control case. | M | PC | Supported only for the default bearer. Multiple IP-CAN bearers are not supported in UE-init procedures. |

9.4 A.3 PCC Procedures

9.4.1 A.3.1 Request for PCC Rules

Table 75 Request for PCC Rules

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| If the PCRF does not accept one or more of the TFT filters provided by the PCEF in a CC | M | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| Request (e.g. because the PCRF does not allow the UE to request enhanced QoS for services not known to the PCRF), the PCRF shall reject the request using a CC Answer with the Gx experimental result code TRAFFIC_MAPPING_INFO_REJECTED (5144) | | | |

9.4.2

A.3.2 Provisioning of PCC Rules

Table 76 Provisioning of PCC Rules

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| If the PCRF performs the bearer binding and installs or activates a new PCC rule, the PCRF shall indicate the IP CAN bearer where the new rule shall be installed or activated using a Bearer-Identifier AVP within the Charging-Rule-Install AVP. | M | NC | The SAPC does not perform bearer binding, as UE-Init procedures (multiple IP-CAN bearers) are not supported. |
| If the PCRF modifies an already installed PCC rule, the PCRF does not need to indicate the bearer. | M | C | |
| If the PCRF does not perform the bearer binding and installs or activates a new PCC rule, the PCRF does not indicate the bearer within the Charging-Rule-Install AVP | M | C | |
| If the PCRF performs the bearer binding, the PCRF may move previously installed or activated PCC rule(s) from one IP CAN bearer to another IP CAN bearer. To move such PCC rule(s), the PCRF shall indicate the new bearer using the Bearer-Identifier AVP within a Charging-Rule-Install AVP and shall indicate the charging rules(s) to be moved using | Op | NC | The SAPC does not perform bearer binding, as UE-Init procedures (multiple IP-CAN bearers) are not supported. |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| Charging-Rule name AVP(s), and/or a Charging-Rule-Base-Name AVP(s), and/or Charging-Rule-Definition AVP(s) (for PCC rule(s) that are modified at the same time). | | | |
| The PCRF may request the establishment of a bearer dedicated to IMS signalling by providing the applicable PCC rules to the PCEF. | Op | C | Dynamic PCC Rules can be downloaded including QCI for IMS signalling. |
| When the PCEF includes the Bearer-Usage AVP required for the bearer within the CCR command during the IP-CAN session establishment procedure, the PCRF shall provide the Bearer-Usage AVP back in the response with the authorized usage. | M | NC | The SAPC does not return Bearer-Usage AVP |
| If the PCEF includes IMS_SIGNALLING within the Bearer-Usage AVP and the PCRF accepts that default bearer is dedicated to IMS signalling, the PCRF shall include the IMS_SIGNALLING within the Bearer-Usage AVP. In this case, the PCRF shall restrict the bearer to only be used for IMS signalling as specified in 3GPP TS 23.228 [31] by applying the applicable QCI for IMS signalling. | M | PC | The SAPC does not return Bearer-Usage AVP |
| If the PCEF includes the IMS_SIGNALLING within the Bearer-Usage AVP in the CCR command, but the PCRF does not include the IMS_SIGNALLING within the Bearer-Usage AVP in the CCA command, the PCC Rules provided by the PCRF shall have a QCI value different from the QCI value for the IMS signalling. | M | C | The SAPC does not return Bearer-Usage AVP |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| When the PCRF performs the bearer binding and the UE initiates a Secondary PDP Context Activation, if the PCEF includes the Bearer-Usage AVP indicating IMS_SIGNALLING and the PCRF accepts that a bearer dedicated to IMS signalling shall be used, the PCRF shall return the IMS_SIGNALLING within the Bearer-Usage AVP. The provided PCC rules shall have the QCI applicable for IMS signalling. | M | NC | The SAPC does not perform bearer binding, as UE-Init procedures (multiple IP-CAN bearers) are not supported. |

9.4.2.1

A.3.2.1 PCC Rule Request for Services not Known to PCRF

Table 77 PCC Rule Request for Services not Known to PCRF

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When the PCRF receives a request for PCC rules while no suitable authorized PCC rules are configured in the PCRF, and if the user is not allowed to access AF session based services but is allowed to request resources for services not known to the PCRF, refer to subclause 4.5.2, the PCRF may downgrade the bitrate parameters and the QCI according to PCC internal policies when authorizing the request. | M | NC | |

9.4.2.2

A.3.2.2 Selecting a PCC Rule and IP CAN Bearer for Downlink IP Packets

No requirement



9.4.3 A.3.3 Provisioning and Policy Enforcement of Authorized QoS

9.4.3.1 A.3.3.0 Overview

Table 78 Overview

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF may provide the authorized QoS that applies to a bearer to the PCEF. | Op | C | |
| When the authorized QoS applies to an IP CAN bearer, it shall be provisioned outside a Charging-Rule-Definition AVP and it shall also include the Bearer-Identifier AVP to indicate what bearer it applies to. | M | C | |
| If the PCRF performs the bearer binding, the authorized QoS per IP CAN bearer presents the QoS for this IP CAN bearer. Authorized QoS per QCI is not applicable. | M | C | |
| In case the PCRF provides PCC rules dynamically, authorised QoS information for the IP-CAN bearer (combined QoS) may be provided. | Op | C | |

9.4.3.2 A.3.3.1 Provisioning of Authorized QoS per IP CAN Bearer

Table 79 Provisioning of Authorized QoS per IP CAN Bearer

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When receiving a CCR with a QoS-Information AVP, the PCRF shall decide upon the requested QoS information within the CCR command. | M | C | |
| The PCRF may compare the authorized QoS derived according to Clause 6.3 of 3GPP TS 29.213 with the requested QoS. | Op | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| If the requested QoS is less than the authorised QoS, the PCRF may either request to upgrade the IP CAN QoS by supplying that authorised QoS in the QoS-Information AVP to the PCEF (for example, if the PCRF has exact knowledge of the required QoS for the corresponding service), or the PCRF may only authorise the requested QoS by supplying the requested QoS in the QoS-Information AVP to the PCEF (for example, if the PCRF only derives upper limits for the authorized QoS for the corresponding service) | | | |
| If the requested bitrates is higher than the authorised bitrates, the PCRF shall downgrade the IP CAN QoS by supplying the authorised QoS in the QoS-Information AVP to the PCEF. | M | C | |
| The following restrictions apply to the PCRF QoS authorization process: If the QoS-Negotiation AVP is received by the PCRF indicating that QoS negotiation is not allowed, the PCRF shall provision the requested QoS as authorized QoS. | M | C | |
| If the QoS-Upgrade AVP has been received by the PCRF indicating that QoS upgrade is not supported, the PCRF shall not provision an authorized bitrates (e.g. GBR, MBR) that are higher than the requested QoS | M | C | |
| If for any reason the PCRF cannot authorize the requested QoS (for example, authorized QoS would exceed the subscribed QoS), the PCRF shall indicate to the PCEF that the request is rejected by answering | M | NC | DIAMETER_AUTHORIZATION_REJECTED (5003) is supported |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| with a CCA command including the Experimental-Result-Code AVP set to the value DIAMETER_ERROR_BEARER_NOT_AUTHORIZED (5143) together with the bearer-identifier AVP. | | | |
| Otherwise, the PCRF shall provide a response for the CCR to the PCEF by issuing a CCA command without this experimental result code. The PCRF may use this CCA at the same time for the solicited PCC rule provisioning procedure. The CCA command shall include a QoS-Information AVP at command level including the Bearer-Identifier AVP used in the corresponding CCR and the authorized QCI and bitrates. | M | C | |
| If PCRF decides to move rules between bearers, the CCA command shall also include the QoS-Information AVP(s) for the impacted bearers. | M | NC | SAPC does not support rule movement. |
| The PCRF may also decide to modify the authorized QoS per IP CAN bearer if it receives a CCR with other event triggers. | Op | C | |
| The PCRF shall then provision the updated authorized QoS per IP CAN bearer in the CCA within a QoS-Information AVP at command level including the corresponding Bearer-Identifier AVP. | M | PC | SAPC includes Bearer-Identifier of general bearer if provided by PCEF in previous CCR. Multiple IP-CAN bearers are not supported in UE-init procedures. |
| The PCRF may decide to modify the authorized QoS per IP CAN bearer at any time. | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| To modify the authorized QoS per IP CAN bearer, the PCRF shall send an unsolicited authorization to the PCEF. The unsolicited authorization shall be performed by sending a RAR command to the PCEF and including the QoS-Information AVP(s) with the new authorized values per IP CAN bearer. | M | C | |
| The PCRF may use this RAR at the same time for the unsolicited PCC rule provisioning procedure | Op | C | |
| If the trigger to modify the authorized QoS comes from the AF, before starting an unsolicited provisioning, the PCRF may start a timer to wait for a UE requested corresponding PDP context modification. At the expiry of the timer, if no PCC rule request has previously been received by the PCRF, the PCRF should go on with the unsolicited authorization as explained above. | Op | NC | Immediate installation (no timer) of QoS is done on general bearer. |
| In addition to a provisioning of the "Authorized QoS" per IP CAN Bearer, the PCRF may also provide an authorized QoS per PCC rule. | M | C | |

9.4.3.3 A.3.3.2 Policy Enforcement for Authorized QoS per IP CAN Bearer

No requirement

9.4.3.4 A.3.3.3 Policy Enforcement for Authorized QoS per Service Data Flow

No requirement

9.4.3.5 A.3.3.4 Policy Enforcement for Authorized QoS per QCI

No requirement



9.4.3.6

A.3.3.5 Void

No requirement

9.4.3.7

A.3.3.6 Provisioning of Authorized QoS per APN

Table 80 Provisioning of Authorized QoS per APN

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| If the PCRF receives the requested QoS per APN as part of the IP-CAN session establishment procedure, the PCRF shall provision the authorized unconditional APN policy information and may provision the authorized conditional APN policy information in the response. | M | PC | The SAPC does not support conditional APN policy information. |
| The PCRF may also provide QoS per APN with time conditions. | Op | NC | |

9.4.4

A.3.4 Indication of IP-CAN Bearer Termination Implications

Table 81 Indication of IP-CAN Bearer Termination Implications

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| When the PCRF receives the CC-Request indicating the implications of a bearer termination, it shall acknowledge the message by sending a CC-Answer to the PCEF. | M | C | |
| The PCRF has the option to make a new PCC decision for the affected PCC Rules. Within the CC-answer, the PCRF may provision PCC rules. | Op | NC | Multiple IP-CAN bearers are not supported in UE-Init procedures. |
| When the PCRF performs the bearer binding, the PCRF may provision PCC rules for example, to move PCC rules previously applied to the terminated IP CAN bearer to any of the | Op | NC | The SAPC does not perform bearer binding, as UE-Init procedures |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| remaining IP CAN bearer(s). The Bearer-Identifier of the selected bearer(s) will be provided. The PCEF shall remove all PCC rules previously applied to the terminated IP CAN bearer, which have not been moved | | | (multiple IP-CAN bearers) are not supported. |

9.4.5 A.3.5 Indication of IP-CAN Session Termination

No requirement

9.4.6 A.3.6 Request of IP-CAN Bearer Termination

Table 82 Request of IP-CAN Bearer Termination

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| If the termination of the last IP CAN bearer within an IP CAN session is requested, the PCRF and PCEF shall apply the procedures in clause A.3.7. | M | NC | |
| If the selected Bearer Control Mode is UE-only, the PCRF may request the termination of an existing IP CAN bearer within an IP CAN session by using the PCC rule provisioning procedures in clause 4.5.2 to remove all PCRF-provisioned PCC rules and deactivate all PCC rules predefined within the PCEF, which have been applied to this IP CAN bearer. The PCRF may either completely remove these PCC rules from the IP CAN session or move them to another IP CAN bearer within the IP CAN session. | Op | NC | Multiple IP-CAN bearers are not supported in UE-Init procedures. |
| If the selected Bearer Control Mode (BCM) is UE-only, and the PCRF receives a trigger for the removal of all PCC rules bound to an IP CAN bearer from the AF, the following steps apply. In | Op | PC | UE Init mode for dedicated bearers is not supported. The SAPC removes/ |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|--|
| order to avoid race conditions, the PCRF should start a timer to wait for the UE-initiated termination message. If a UE-initiated termination of an IP CAN bearer is performed before timer expiry, the PCRF will receive an Indication of IP-CAN Bearer Termination Implications according to Clause 4.5.6 and shall then not perform the network-initiated termination of that IP CAN bearer. | | | deactivates all the PCC Rules immediately (no timer) |
| Otherwise, if the timer expires, the PCRF shall remove/deactivate all the PCC rules that have been previously installed/activated for that IP-CAN bearer | M | NC | |
| If the PCRF decides to remove all PCC rules bound to an IP CAN bearer due to an internal trigger or trigger from the SPR, the PCRF shall instantly remove/deactivate all the PCC rules that have been previously installed/activated on that IP-CAN bearer. | M | C | A RAR with PCC Rules is sent towards the PCEF. |

9.4.7

A.3.7 Request of IP-CAN Session Termination

Table 83 Request of IP-CAN Session Termination

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| If the selected Bearer Control Mode (BCM) is UE-only, and the PCRF receives a trigger for the removal of all PCC rules bound to an IP CAN session from the AF, the following steps apply. In order to avoid race conditions, the PCRF should start a timer to wait for the UE-initiated bearer termination message. If a UE-initiated bearer termination of an IP CAN session is performed | M | NC | The SAPC removes/deactivates all the PCC Rules immediately (no timer) No timer is used for general bearer. |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| before timer expiry, the PCRF will receive an Indication of IP-CAN Session Termination according to Clause A.3.5 and shall then not perform the network-initiated termination of that IP CAN session. | | | |
| Otherwise, if the timer expires, the PCRF shall remove/deactivate all the PCC rules that have been previously installed or activated for that IP-CAN session. | M | NC | |

9.4.8 A.3.8 Bearer Control Mode Selection

Table 84 Bearer Control Mode Selection

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF derives the Selected Bearer-Control-Mode AVP based on the received Network-Request-Support AVP, access network information, subscriber information and operator policy. | M | C | |
| At IP-CAN session establishment, if the GGSN provided the Network-Request-Support AVP, the PCRF shall provide the Selected Bearer-Control-Mode AVP to the GGSN using the PCC Rules provision procedure at IP-CAN session establishment. At IP-CAN session modification, if the GGSN provided the Network-Request-Support AVP, the PCRF shall also provide the Bearer-Control-Mode AVP with the new value if the selected bearer control mode has changed. | M | NC | |

9.4.9 A.3.9 Bearer Binding Mechanism

Compliance according to annex D.2 of SOC for 3GPP TS 29.213.



9.4.10 A.3.10 Void

No requirement

9.4.11 A.3.11 PCC Rule Error Handling

Table 85 PCC Rule Error Handling

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| If no Bearer-Identifier is provided then the PCRF shall assume that PCC rule failed to activate to all assigned IP-CAN bearers | M | C | The SAPC does not perform bearer binding, as UE-Init procedures (multiple IP-CAN bearers) are not supported. |

9.4.12 A.3.12 IMS Emergency Session Support

9.4.12.1 A.3.12.1 Request of PCC Rules for an Emergency Services

Table 86 Request of PCC Rules for an Emergency Services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| If the PCRF detects that the initial or subsequent CCR command shall be rejected, it shall execute the procedure for the type of Gx experimental result code described in subclause A.3.1. | M | C | |
| Any PCEF-initiated requests for PCC Rules for an IMS Emergency service that include the "TFT_CHANGE" Event-Trigger AVP shall be rejected by the PCRF with the error DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED | M | NC | Event-trigger TFT_CHANGE is not supported by SAPC |

9.4.12.2

A.3.12.2 Provisioning of PCC Rules for an Emergency services

Table 87 Provisioning of PCC Rules for an Emergency services

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF shall execute the procedures described in subclause A.3.2 to provision PCC Rules | M | C | |
| The PCRF shall detect that a Gx session is restricted to IMS Emergency services when a CCR command is received with a CC-Request-Type AVP set to value "INITIAL_REQUEST" and the Called-Station-Id AVP includes a PDN identifier that matches one of the Emergency APNs from the configurable list | M | C | |
| The PCRF: -shall provision PCC Rules restricting the access to Emergency Services (e.g. P-CSCF(s), DHCP(s) and DNS (s) and SUPL(s) addresses) required by local operator policies in a CCA command according to the procedures described in clause A.3.2. | M | C | |
| may provision the authorized QoS within the QoS-Information AVP in a CCA command according to the procedures described in clause A.3.3.1 except for obtaining the authorized QoS upon interaction with the SPR | M | C | |
| shall assign NW mode to the PCC Rules that are bound to an IP-CAN session restricted to Emergency services | M | C | |
| NOTE 1: The PCRF does not provision the authorized QoS per QCI for Gx sessions established for the Emergency purposes | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| When the PCRF receives IMS service information for an Emergency service and derives authorized PCC Rules from the service information, the Priority-Level AVP, the Pre-emption-Capability AVP and the Pre-emption-Vulnerability AVP in the QoS information within the PCC Rule shall be assigned values as required by local operator policies | M | C | |
| If the Bearer Control Mode is assigned to "UE_NW" the PCRF shall assign NW mode to the PCC Rules that are bound to an IP-CAN session restricted to Emergency services and immediately initiate a PUSH procedure as described in subclause A.3.2 to provision PCC Rules and the procedures described in subclause A.3.3.2a to provision the authorized QoS per service data flow, except for the QoS Information within the PCC Rules that shall be assigned a priority within the Priority-Level AVP as required by local operator policies | M | C | |
| Any PCEF-initiated request for PCC Rules for an IMS Emergency service triggered by Event-Trigger AVP assigned to "TFT-change" shall be rejected by the PCRF with the error DIAMETER_ERROR_TRAFFIC_MAPPING_INFO_REJECTED | M | NC | Event-trigger TFT_CHANGE is not supported by SAPC |

9.4.13

A.3.13 Removal of PCC Rules for Emergency Services

Table 88 Removal of PCC Rules for Emergency Services

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The reception of a request to terminate an AF session for an IMS Emergency service by the | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| PCRF follows the same procedure defined in subclause 4.5.15.2.3 | | | |

9.4.14 A.3.14 Removal of PCC Rules at Gx Session Termination

Table 89 Removal of PCC Rules at Gx Session Termination

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The reception of a request to terminate an AF session for an IMS Emergency service by the PCRF follows the same procedure defined in subclause 4.5.15.2.3 | M | C | |

9.4.15 A.3.15 IMS Restoration Support

No requirement

9.4.16 A.3.16 Provisioning of CSG Information Reporting Indication

Table 90 Provisioning of CSG Information Reporting Indication

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF may provide one or more CSG-Information-Reporting AVPs during IP-CAN session establishment, to request the PCEF to report the user CSG information change applicable for an IP-CAN session to the OFCS. | Op | NC | |

9.4.17 A.3.17 Packet-Filter-Usage AVP

Not compliant



9.4.18

A.3.18 Precedence Handling

Table 91 Precedence Handling

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| PCRF provides only one precedence value per PCC rule. | M | C | |
| For network initiated IP-CAN session modification, since one PCC rule may result in more than one TFT filters, the PCEF shall ensure that each TFT filter is assigned unique precedence value across all TFT filters of the corresponding PDN connection (as specified in 3GPP TS 24.008. | NR | | |
| When two PCC rules result in two sets of TFT filters, the PCEF shall also ensure that the relative precedence of the each set of TFT filters is same as the relative precedence of the corresponding PCC rule. | NR | | |
| NOTE: The maximum value of precedence of the TFT filter is limited as specified in 3GPP TS 24.008 | NR | | |
| Provisioning of CSG information reporting indication to the TDF applies when ABC feature is supported | M | NC | |

9.4.19

A.3.19 Reporting Access Network Information

Refer to [Reporting Access Network Information](#) on page 62.

9.4.20

A.3.20 User CSG Information Reporting

Not compliant



9.5 A.4 QoS Mapping

9.5.1 A.4.1 GPRS QCI to UMTS QoS Parameter Mapping

No requirement

9.5.2 A.4.2 GPRS ARP to UMTS ARP Parameter Mapping

No requirement



10 Annex B (Normative): Access Specific Aspects, 3GPP (GERAN/UTRAN/E-UTRAN) EPS

10.1 B.1 Scope

No requirement

10.2 B.2 Functional Elements

10.2.1 B.2.1 PCRF

No requirement

10.2.2 B.2.2 PCEF

No requirement

10.2.3 B.2.3 BBERF

No requirement

10.3 B.3 PCC Procedures

10.3.1 B.3.1 Request for PCC and/or QoS Rules

Table 92 Request for PCC and/or QoS Rules

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| For GERAN and UTRAN accesses, the PCRF shall provide packet filters in the PCC rule as received in the Packet-Filter-Information AVP for each packet filter requested by the UE. | M | NC | |
| For GERAN and UTRAN accesses, if the PCRF receives a | M | NC | |

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| request for addition of service data flow(s) with a reference to existing packet filter identifiers (and by that to existing PCC rule(s)), the PCRF shall update the existing PCC rule for the new service data flow(s) without changing the QCI and ARP. | | | |
| For GERAN and UTRAN accesses, when BCM is MS-only and the UE requests to create a TFT for a PDP context without a TFT created by the PDP Context Activation Procedure, the PCRF shall authorize a PCC rule which contains the packet filters as requested by the UE when receiving the CCR request from the PCEF. | M | NC | |
| For GERAN and UTRAN accesses, when BCM is MS-only and the UE requests to delete the existing TFT, the PCRF should provide at least one new PCC rule to be installed at the same time when the PCC rule corresponding to the TFT is removed. | Op | NC | |
| For E-UTRAN accesses with UE initiated resource modification procedure, the PCRF shall either authorize the same QoS as requested QoS within the QoS-Information AVP or reject the request if the requested QoS can not be authorized. | M | NC | |
| The PCRF may reject the request using a CC-Answer with the Gx experimental result code DIAMETER_ERROR_INITIAL_PARAMETERS (5140) | Op | NC | |



10.3.2

B.3.2 Provisioning of PCC and/or QoS Rules

Table 93 Provisioning of PCC and/or QoS Rules

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| For GTP-based 3GPP accesses, the PCRF may request the establishment of a bearer dedicated to IMS signalling by providing the applicable PCC rules to the PCEF | Op | C | |
| For PMIP-based 3GPP accesses, the PCRF may request the establishment of a bearer dedicated to IMS signalling by providing the applicable QoS rules to the BBERF. | Op | NC | |
| When the PCEF includes the Bearer-Usage AVP required for the default bearer within the CCR command during the IP-CAN session establishment procedure, the PCRF shall provide the Bearer-Usage AVP back in the response with the authorized usage. | M | NC | The SAPC does not return Bearer-Usage AVP |
| If during IP-CAN session establishment procedure, the PCEF includes IMS_SIGNALLING within the Bearer-Usage AVP and the PCRF accepts that default bearer is dedicated to IMS signalling, the PCRF shall include the IMS_SIGNALLING within the Bearer-Usage AVP. In this case, the PCRF shall restrict the bearer to only be used for IMS signalling as specified in 3GPP TS 23.228 [31] by applying the applicable QCI for IMS signalling. | M | NC | The SAPC does not return Bearer-Usage AVP |
| If the PCEF includes the IMS_SIGNALLING within the Bearer-Usage AVP in the CCR command, but the PCRF does not include the IMS_SIGNALLING within the Bearer-Usage AVP in the CCA | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| command, the PCC Rules provided by the PCRF shall have a QCI value different from the QCI value for the IMS signalling | | | |
| When UE initiates a resource modification request, if the PCEF includes the Bearer-Usage AVP indicating IMS_SIGNALLING and the PCRF accepts that a bearer dedicated to IMS signalling shall be used, the PCRF shall return the IMS_SIGNALLING within the Bearer-Usage AVP. The provided PCC rules shall have the QCI applicable for IMS signalling | M | NC | The SAPC does not return Bearer-Usage in CCA. |

10.3.3 B.3.3 Provisioning and Policy Enforcement of Authorized QoS

10.3.3.1 B.3.3.1 Provisioning of authorized QoS per APN

No requirement

Table 94 Provisioning of Authorized QoS per APN

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| The PCRF shall provision the authorized unconditional APN policy information and may provision the authorized conditional APN policy information as part of the IP-CAN session establishment procedure | M | PC | The SAPC does not support conditional APN policy information. |
| The PCRF may also provide QoS per APN with time conditions. | Op | NC | |

10.3.3.2 B.3.3.2 Policy Enforcement for Authorized QoS per APN

No requirement



10.3.3.3

B.3.3.3 QoS Handling for Interoperation with Gn/Gp SGSN

Table 95 QoS Handling for Interoperation with Gn/Gp SGSN

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| The PCRF shall provide the authorized QoS information according to clause 4.5.5.2 (when the authorized QoS applies to the service data flow), clause 4.5.5.8 (when the authorized QoS applies at APN level) or 4.5.5.9 (when the authorized QoS applies to the default bearer). | M | C | |

10.3.3.4

B.3.3.4 Void

10.3.3.5

B.3.3.5 Policy Provisioning for Authorized QoS per Service Data Flow

Table 96 Policy Provisioning for Authorized QoS per Service Data Flow

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| For the authorization of a PCC rule with a GBR QCI the PCRF shall assign a GBR value within the limit supported by the serving network (i.e. GERAN/UTRAN). | M | C | GBR value configured should be within the limit |
| The PCRF shall subscribe the RAT_CHANGE event to get the RAT type information for PCC rule authorization. | M | C | The subscription to the different event-triggers can be selected by means of configuration |
| NOTE: For the authorization of PCC Rules with the same QCI the PCRF may also check that aggregated GBR is within the limits supported by the serving network to minimize the risk of rejection of the bearer by the serving network. | Op | C | |

10.3.3.6 B.3.3.6 Policy Enforcement for Authorized QoS of the Default EPS Bearer

Table 97 Policy Enforcement for Authorized QoS of the Default EPS Bearer

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| Whenever the PCRF modifies the Authorized QoS of the default bearer, the PCRF shall simultaneously modify the QCI and/or ARP of all PCC/QoS Rules that, according to the operator policy, shall have the same QoS as the default bearer. | M | NC | |

10.3.4 B.3.4 Packet-Filter-Information AVP

No requirement

10.3.5 B.3.5 Bearer Control Mode Selection

See [Bearer Control Mode Selection](#) on page 40

10.3.6 B.3.6 Trace Activation/Deactivation at P-GW

Not compliant

10.3.7 B.3.7 IMS Restoration Support

Not compliant

10.3.8 B.3.8 Provisioning of CSG Information Reporting Indication

Table 98 Provisioning of CSG Information Reporting Indication

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF may provide one or more CSG-Information-Reporting AVPs during IP-CAN session establishment, to request the PCEF to report the user CSG information change applicable for an IP-CAN session to the OFCS. | Op | NC | |



10.3.9 B.3.9 Packet-Filter-Usage AVP

Not compliant

10.3.10 B.3.10 User CSG Information Reporting

Not compliant

10.3.11 B.3.11 Request of IP-CAN Bearer Termination

No requirement

10.3.12 B.3.12 CS to PS Handover

Not compliant

10.3.13 B.3.13 Precedence Handling

Compliant

Table 99 Precedence Handling

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| PCRF provides only one precedence value per PCC rule. | M | C | |

10.3.14 B.3.14 S-GW Restoration Support

Not compliant

10.3.15 B.3.15 Reporting Access Network Information

Refer to [Reporting Access Network Information](#) on page 62.

10.3.16 B.3.16 Presence Reporting Area Information Reporting

Table 100 Presence Reporting Area Information Reporting

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| The PCRF determines at IP-CAN session establishment, whether reports for change of UE presence in Presence | M | C | |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| Reporting Area are desired for the IP-CAN session based on the subscriber's profile configuration and the Supported-Features AVP indicating the value "CNO-ULI" | | | |
| If the reporting is desired for the IP-CAN session, the PCRF shall provide the Presence-Reporting-Area-Information AVP which contains the Presence Reporting Area Identifier within the Presence-Reporting-Area-Identifier AVP, and, for a UE-dedicated Presence Reporting Area, the list of elements composing the presence reporting area within the Presence-Reporting-Area-Elements-List AVP to the PCEF | M | C | |
| The PCRF may activate the reporting changes of UE presence in Presence Reporting Area by subscribing to the CHANGE_OF_UE_PRESENCE_IN_PRESENCE_REPORTING_AREA_REPORT event trigger at the PCEF at any time during the lifetime of the IP-CAN session | Op | C | |
| NOTE 1: If Presence Reporting Area reporting is not supported, the PCRF can instead activate location change reporting that reports actual location. Due to the potential increase in signalling load, careful consideration of the network load is necessary for such reporting, e.g. limiting the number of subscribers subject to such reporting | Op | C | |
| The PCRF may also provide Presence-Reporting-Area-Identifier AVP within Presence-Reporting-Area-Information AVP via TSR command during the TDF session establishment. The TDF may request the notification of | Op | NC | Presence Reporting Area not supported in TDF interactions |



| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| "CHANGE_OF_UE_PRESENCE_IN_PRESENCE_REPORTING_AREAREPORT (48)" by including it in Event-Trigger AVP within Event-Report-Indication AVP via TSA or CCR command to indicate the PCRF to report the presence reporting area status change | | | |
| If the TDF has requested the notification of the change of UE presence in Presence Reporting Area, the PCRF shall provide Presence-Reporting-Area-Information AVP within the Event-Report-Indication AVP via RAR command to the TDF | M | NC | Presence Reporting Area not supported in TDF interactions |
| NOTE 2: The PCRF may acquire the necessary data for presence reporting from the SPR. The relation to existing subscriber databases is not specified in this Release. | Op | PC | The SAPC supports only acquiring the Presence Reporting Area Identifier for the subscriber from the SPR Acquiring the list of elements of the Presence Reporting Area is not supported |
| The PCRF may be notified during the lifetime of an IP-CAN session that the UE is located in an access network where local configuration indicates that the reporting change of UE presence in Presence Reporting Area is not supported. The PCRF may unsubscribe to the change of UE presence in Presence Reporting Area by providing the Event-Trigger AVP with removing the value CHANGE_OF_UE_PRESENCE_IN_PRESENCE_REPORTING_AR | Op | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| EA_REPORT (48), if previously activated | | | |

10.3.17

B.3.17 Multiple Presence Reporting Area Information Reporting

Not compliant



11 Annex C (Informative): Mapping Table for Type of Access Networks

No requirement

12 Annex D (Normative): Access Specific Aspects (EPC-based Non-3GPP)

No requirement

12.1 D.1 Scope

No requirement

12.2 D.2 EPC-based eHRPD Access

Not compliant

12.2.1 D.2.1 General

Not compliant

12.2.2 D.2.2 Gxa Procedures

Not compliant

12.2.2.1 D2.2.1 Request for QoS Rules

Not compliant

12.2.2.2 D.2.2.2 Provisioning of QoS Rules

Not compliant

12.2.2.3 D.2.2.3 Provisioning and Policy Enforcement of Authorized QoS

12.2.2.3.1 D.2.2.3.1 Provisioning of Authorized QoS

Table 101 Provisioning of Authorized QoS

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| When receiving a CCR with a QoS-Information AVP, the PCRF shall decide upon the | M | NC | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---|
| <p>requested QoS information within the CCR command.</p> <p>- The PCRF may compare the authorized QoS derived according to Clause 6.3 of 3GPP TS 29.213 [8] with the requested QoS for the service data flow. If the requested QoS is less than the authorised QoS, the PCRF may either request to upgrade the IP CAN QoS by supplying that authorised QoS in the QoS-Information AVP within the QoS-Rule-Definition AVP to the BBERF (e.g. if the PCRF has exact knowledge of the required QoS for the corresponding service), or the PCRF may only authorise the requested QoS by supplying the requested QoS in the QoS-Information AVP within the QoS-Rule-Definition AVP to the BBERF (e.g. if the PCRF only derives upper limits for the authorized QoS for the corresponding service data flow). If the requested QoS is higher than the authorised QoS, the PCRF shall downgrade the IP CAN QoS by supplying the authorised QoS in the QoS-Information AVP within the QoS-Rule-Definition AVP to the BBERF.</p> | | | |
| The PCRF may decide to modify the authorized QoS at any time | O | NC | |
| The PCRF shall send an unsolicited authorization to the BBERF as described in 4a.5.2 | M | NC | |
| If the trigger to modify the authorized QoS comes from the AF, before starting an unsolicited provisioning, the PCRF may start a timer to wait for a UE requested corresponding QoS modification. At the expiry of the timer, if no QoS rule request | O | NC | AF interactions are not supported for eHRPD access. |

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---------|
| has previously been received by the PCRF, the PCRF should go on with the unsolicited authorization as explained above. | | | |

12.2.2.3.2 D.2.2.3.2 Policy Enforcement for Authorized QoS

Not compliant

12.2.2.4 D.2.3 Bearer Control Mode Selection

Table 102 Bearer Control Mode Selection

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|--|
| The PCRF derives the selected Bearer-Control-Mode AVP based on the received Network-Request-Support AVP, access network information, subscriber information and operator policy. | M | NC | |
| The PCRF selects the same Bearer Control Mode for all PDN connections from a UE to the same APN. | M | NC | Multiple PDN connections to the same APN are not supported |
| The selected Bearer-Control-Mode AVP shall be provided to the HSGW using the QoS rule provision procedures at Gateway control session establishment. | M | NC | |

12.2.2.5 D.2.4 QoS Mapping

Not compliant



12.3 D.3 EPC-based Trusted WLAN Access with S2a

Table 103 EPC-based Trusted WLAN Access with S2a

| Text | Qualifier | Compliance | Comment |
|--|-----------|------------|---|
| The PCEF provides the PCRF with the access network information as described in clause 4.5.1, with the exception of the user location information that, if available, is included in the TWAN-Identifier AVP. RAT-Type AVP set to "WLAN" and AN-Trusted AVP set to "Trusted" shall be provided. If the Netloc-Trusted-WLAN is supported, the procedure described in clause 4.5.22 shall apply with the exception of the user location information that, if available, is included in the TWAN-Identifier AVP. | M | NC | Netloc-Trusted-WLAN feature is not supported. |

12.4 D.4 EPC-based Untrusted WLAN Access

Table 104 EPC-based Untrusted WLAN Access

| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| At IP-CAN Session Establishment the PCEF provides the PCRF with the IP-CAN-Type AVP indicating Non-3GPP-EPS, the RAT-Type AVP indicating the access technology type as provided by the access network, the serving network identifier in 3GPP-SGSN-MCC-MNC AVP and the AN-Trusted AVP set to "Untrusted". | M | C | |
| If the following information is available as appropriate, the PCEF also provides the PCRF with location information within the TWAN-Identifier AVP, a location timestamp in the User-Location-Info-Time AVP and | M | C | |



| Text | Qualifier | Compliance | Comment |
|---|-----------|------------|---------|
| the UE local IP address within the UE-Local-IP-Address AVP as received from the access network. | | | |
| If the NetLoc-Untrusted-WLAN feature is supported, reporting access network information procedure described in subclause 4.5.22 shall apply with the exception that the PCEF provides the PCRF with location information within the TWAN-Identifier AVP, a location timestamp in the User-Location-Info-Time AVP and the UE local IP address within the UE-Local-IP-Address AVP as received from the access network. | C | C | |
| IP-CAN_CHANGE and RAT_CHANGE event triggers as defined in subclause 5.3.7 apply in this access. When reporting these events, the PCEF shall, in addition to the IP-CAN-Type AVP and/or RAT-Type AVP, provide the AN-Trusted AVP set to "Untrusted". As described for the case of an IP-CAN Session Establishment, the PCEF provides also the PCRF with location information it may have received from the ePDG and the ePDG IP address used as IPSec tunnel endpoint with the UE. | M | C | |



13 Annex E (Normative): Access Specific Aspects, Fixed Broadband Access Interworking with EPC

Not compliant



14 Annex F (Informative): Disabling/Re-Enabling Usage Monitoring for a PCC/ADC Rule

Not compliant



15 Annex G (Normative): Access Specific Aspects, Fixed Broadband Access Network Convergence

Not compliant



16 Annex H (Informative) Policy Control for Remote UEs behind a ProSe UE-to-network Relay UE

Not compliant



17 Annex I (Informative): Change History

No requirement



18 Reference List

Ericsson Documents

1. Gx Interface Description
2. Sd Interface Description

Standard

1. 3GPP Technical Specification Policy and Charging Control over Gx Reference Point - 29.212