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Policy and charging control: Spending limit reporting over Sy reference point
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Foreword

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1 Scope

The present document provides the stage 3 specification of the Sy reference point for the present release. The functional requirements and the stage 2 specifications of the Sy reference point are contained in TS 23.203 [2]. The Sy reference point lies between the Policy and Charging Rule Function (PCRF) and the Online Charging System (OCS). The internal OCS functionality for policy counter provision management pertaining to Sy is specified in TS 32.296 [16].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.203: "Policy Control and Charging architecture".

[3] Void.

[4] IETF RFC 4005: "Diameter Network Access Server Application"

[5] IETF RFC 4006: "Diameter Credit Control Application".

[6] IETF RFC 5719: "Updated IANA Considerations for Diameter Command Code Allocations"

[7] IETF RFC 2234: "Augmented BNF for syntax specifications".

[8] 3GPP TS 29.213:"Policy and charging control signalling flows and Quality of Service (QoS) parameter mapping".

[9] Void.

[10] Void.

[11] Void.

[12] Void.

[13] IETF RFC 791:"Transmission Control Protocol".

[14] IETF RFC 4960:"Stream Control Transmission Protocol".

[15] 3GPP TS 29.229:"Cx and Dx interfaces based on the Diameter protocol".

[16] 3GPP TS 32.296:"Telecommunication management; charging management; Online Charging System (OCS) applications and interfaces".

[17] ETSI TS 283 034 v2.2.0:"Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol".

[18] IETF RFC 3046:"DHCP Relay Agent Information Option".

[19] 3GPP TS 29.212:"Policy and Charging Control (PCC); Reference points".

[20] IETF RFC 7683:"Diameter Overload Indication Conveyance".

[21] IETF RFC 7944: "Diameter Routing Message Priority".

[22] IETF RFC 8583: "Diameter Load Information Conveyance".

[23] IETF RFC 6733: "Diameter Base Protocol".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

policy counter: A mechanism within the OCS to track spending applicable for a subscriber.

policy counter identifier: A reference to a policy counter in the OCS for a subscriber.

policy counter status: A label whose values are not standardized and that is associated with a policy counter's value relative to the spending limit(s) (the number of possible policy counter status values for a policy counter is one greater than the number of thresholds associated with that policy counter, i.e policy counter status values describe the status around the thresholds). This is used to convey information relating to subscriber spending from OCS to PCRF. Specific labels are configured jointly in OCS and PCRF.

spending limit: A spending limit is the usage limit of a policy counter (e.g. monetary, volume, duration) that a subscriber is allowed to consume.

spending limit report: a notification, containing the current policy counter status generated from the OCS to the PCRF via the Sy reference point.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

DRMP	Diameter Routing Message Priority
OCS	Online charging system
OFCS	Offline charging system
PCEF	Policy and Charging Enforcement Function
PCRF	Policy and Charging Rule Function
RCAF	RAN Congestion Awareness Function
SLA	Spending-Limit-Answer (SL-Answer)
SLR	Spending-Limit-Request (SL- Request)
SNA	Spending-Status-Notification-Answer (SN-Answer)
SNR	Spending-Status-Notification-Request (SN- Request)
STA	Session-Termination-Answer (ST-Answer)
STR	Session-Termination-Request (ST- Request)

4 Sy reference point

4.1 Overview

The Sy reference point is located between the Policy and Charging Rules Function (PCRF) and the Online Charging System (OCS). The Sy reference point enables transfer of policy counter status information relating to subscriber spending from OCS to PCRF and supports the following functions:

- Request of policy counter status reporting from PCRF to OCS and subscribe to or unsubscribe from spending limit reports (i.e. notifications of policy counter status changes).
- Notification of spending limit reports from OCS to PCRF.
- Cancellation of spending limit reporting from PCRF to OCS.

Since the Sy reference point resides between the PCRF and OCS in the HPLMN, roaming with home routed or visited access as well as non-roaming scenarios are supported in the same manner.

The stage 2 level requirements for the Sy reference point are defined in 3GPP TS 23.203 [2].

Signalling flows related to the Sy interface are specified in 3GPP TS 29.213 [8].

Refer to Annex G of 3GPP TS 29.213 [8] for Diameter overload control procedures over the Sy interface.

Refer to Annex J of 3GPP TS 29.213 [8] for Diameter message priority mechanism procedures over the Sy interface.

Refer to Annex K of 3GPP TS 29.213 [8] for Diameter load control procedures over the Sy interface.

4.2 Sy Reference model

The Sy reference point is defined between the PCRF and the OCS. The relationships between the involved functional entities are depicted in figure 4.2.1. The overall PCC architecture is depicted in clause 3a of 3GPP TS 29.213 [8]

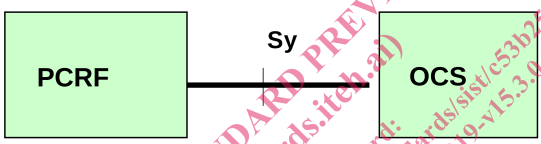

Figure 4.2.1: Sy reference model

.Figure 4.2.2: Void

4.3 Subscriber Spending Limits

Policy decisions based on spending limits is a function that allows the PCRF to make policy decisions based on the status of policy counters that are maintained in the OCS. The PCRF uses the policy counter statuses received from the OCS as input to its policy decisions, e.g. downgrade the QoS (e.g. APN-AMBR) or modify the PCC/QoS/ADC Rules.

When the status of policy counters is first required to make a policy decision for a subscriber, the PCRF uses the Initial Spending Limit Report Request procedure. The PCRF may request specific or all policy counter statuses to be reported by the OCS for the user. The OCS provides the status to the PCRF of the requested policy counters, and will notify the PCRF of any changes in the status of those policy counters. Optionally, the OCS can provide one or more pending statuses for a requested policy counter with the times that have to be applied. The pending status of a policy counter shall autonomously become the current status of a policy counter at the PCRF when the indicated corresponding time is reached. Subsequently, the provided information for pending statuses of a policy counter shall overwrite the previously received information.

NOTE 1: The mechanism for provisioning the policy counters in the OCS is out of scope of this document.

NOTE 2: A policy counter in the OCS can represent the spending for one or more services, one or more devices, one or more subscribers, etc. The representation is operator dependent. There is no explicit relationship between Charging-Key and policy counter.

The PCRF may request reporting for specific policy counter(s) that it is not currently subscribed and/or cancel reporting for specific policy counter status(es) using the Intermediate Spending Limit Report Request. The PCRF may cancel spending limit reporting for all policy counter(s) using the Final Spending Limit Report Request.

The updated subscriber profile may also trigger the PCRF sending the Initial/Intermediate/Final Spending Limit Report Request to the OCS to subscribed and/or cancel reporting for policy counter status(es). If spending limit reporting for a policy counter is enabled, the OCS shall notify the PCRF of changes in the status of this policy counter (e.g. daily spending limit of $2 reached) and optionally pending statuses of this policy counter with the activation time (e.g. due to a billing period that will expire at midnight).

4.4 Functional elements

4.4.1 PCRF

The Policy Control and Charging Rules Function (PCRF) is a functional element that encompasses policy control decision and flow based charging control functionalities.

The PCRF may take information on the subscriber's spending status into account in its policy decisions. The PCRF may request spending limit reporting for policy counters from the OCS using the Initial or Intermediate Spending Limit Report Request procedure as specified in clause 4.5.1. The PCRF may cancel spending limit reporting for specific policy counter(s) using the Intermediate Spending Limit Report Request procedure, or for all policy counter(s) using the Final Spending Limit Report Request procedure as specified in clause 4.5.3.

The PCRF shall have at least one active IP-CAN session to be able to initiate an Sy session to be used when required for spending limit reporting for that subscriber. The PCRF shall terminate the Sy session when the last IP-CAN session for that subscriber is terminated or no IP-CAN session for the same user depends on the spending status information provided over Sy reference point.

The PCRF may use the status of each relevant policy counter as input to its policy decision as required by the decision logic.

4.4.2 OCS

The Online Charging System (OCS), for the purpose of policy decisions based on the subscriber's spending, shall:

- maintain the policy counter statuses applicable for a subscriber.
- report the policy counter status values for the subscriber when requested to the PCRF.
- when a policy counter status changes, report the change to the PCRF.

4.5 Spending Limits procedures over Sy reference point

4.5.1 Initial/Intermediate Spending Limit Report Request

4.5.1.1 General

This procedure shall be used by the PCRF to request the status of policy counters available at the OCS, and to subscribe or unsubscribe to updates of policy counters by the OCS.

This procedure is mapped to the Spending-Limit-Request/Answer commands specified in section 5.6.