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Contents

Foreword

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1 Scope

The present document provides the stage 3 specification of the Gw and Gwn reference points. The functional requirements and the stage 2 specifications of the Gw and Gwn reference points are specified in 3GPP TS 23.203 [2]. The Gw reference point lies between the Packet Flow Description Function (PFDF) and the Policy and Charging Enforcement Function (PCEF). The Gwn reference point lies between the Packet Flow Description Function (PFDF) and the Traffic Detection Function (TDF).

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.
- For a specific reference, subsequent revisions do not apply.
- 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 and charging control architecture”.

[3] 3GPP TS 29.213: "Policy and Charging Control signalling flows and QoS parameter mapping"

[4] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[5] 3GPP TS 29.212: "Policy and Charging Control (PCC); Reference points".

[6] IETF RFC 793: "Transmission Control Protocol".

[7] Void.

[8] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

[9] IETF RFC 2818: "HTTP Over TLS".

[10] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax"

[11] IETF RFC 7159: "The JavaScript Object Notation (JSON) Data Interchange Format".

[12] IETF draft-newton-json-content-rules-09: "A Language for Rules Describing JSON Content".

NOTE: This individual draft will not further progress in IETF. It is available from the following link: https://www.ietf.org/archive/id/draft-newton-json-content-rules-09.txt.

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

[14] 3GPP TS 29.250: "Nu reference point between SCEF and PFDF for sponsored data connectivity".

[15] 3GPP TS 29.155: "Traffic steering control; Representational state transfer (REST) over St reference point".

[16] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[17] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[18] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[19] IETF RFC 7233: "Hypertext Transfer Protocol (HTTP/1.1): Range Requests".

[20] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[21] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

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].

Packet Flow Description (PFD): A set of information enabling the detection of application traffic provided by a 3rd party service provider (from 3GPP TS 23.203 [2]).

Pull mode: A mode used between the PCEF/TDF and the PFDF where the PFDs are sent by the PFDF at reception of an HTTP request from the PCEF/TDF.

Push mode: A mode used between the PCEF/TDF and the PFDF where the PFDs and/or notification of PFD deletion are sent by the PFDF in an HTTP request to the PCEF/TDF.

Combination mode: A mode used between the PCEF/TDF and the PFDF where both pull and push exist. This mode allows the PFDF to send the PFDs at reception of an HTTP request from the PCEF/TDF and provision PFD changes (creation/update/deletion) and/or notification of PFD creation/update/deletion in the HTTP request to the PCEF/TDF.

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 3GPP TR 21.905 [1].

JSON	JavaScript Object Notation
PCEF	Policy and Charging Enforcement Function
PFD	Packet Flow Description
PFDF	Packet Flow Description Function
SCEF	Service Capability Exposure Function
TDF	Traffic Detection Function

4 Gw reference point

4.1 Overview

The Gw reference point is located between the Packet Flow Description Function (PFDF) and the Policy and Charging Enforcement Function (PCEF). The Gw reference point is used for provisioning and removal of PFDs from the PFDF to the PCEF and reporting the handling result of PFDs from the PCEF to the PFDF.

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

4.2 Gw reference model

The Gw reference point is defined between the PFDF and the PCEF. The relationships between the different functional entities involved are depicted in figure 4.2.1. The overall PCC architecture is depicted in subclause 3a of 3GPP TS 29.213 [3].

Figure 4.2.1: Gw reference model

4.3 Functional elements

4.3.1 PFDF

The PFDF (Packet Flow Description Function) is a functional element which stores PFDs associated with application identifier (s) and transfers them to the PCEF via Gw interface to enable the PCEF to perform accurate application detection when the PFDs are managed by a 3rd party service provider.

The PFDF receives PFDs for the corresponding application identifier (s) from the SCEF as defined in 3GPP TS 23.682 [4]and 3GPP TS 29.250 [14].

4.3.2 PCEF

The PCEF (Policy and Charging Enforcement Function) funtionality defined in subclause 4.4.2 of 3GPP TS 29.212 [5] shall be applied. In addition, the PCEF shall support the management of PFDs provisioned by the PFDF. The application detection filter may be extended with the PFDs provided by the PFDF.

4.4 Procedures over Gw reference point

When the PFDF is deployed and the management of PFDs is supported by the PCEF, the mode of PFDs management shall be consistently configured in one PLMN, it may be:

- Pull mode only, or
- Push mode only, or
- Combination mode.

4.4.1 Request for PFDs ("Pull mode" and "Combination mode")

At the time a PCC Rule with an application identifier for which PFDs provisioned by the PFDF are not available is activated or provisioned, or when the caching timer for an application identifier elapses and a PCC Rule for the application identifier is still active, the PCEF shall request all PFDs for the application identifier from the PFDF.

The PCEF shall send an HTTP GET message to the PFDF to retrieve the PFDs for one or more application identifier(s) as defined in subclauses 6.3.3.2, 6.3.3.3 and 6.3.3.4.

Upon receipt of the HTTP request for the pull operation, the PFDF shall respond to the PCEF indicating whether the pull operation was successful or not by using one of the HTTP status codes; if the pull operation is successful, the PFDF :

- shall provide the PFDs of the specified application identifier(s) from the request within the body of the HTTP response; and
- if there are caching time value(s) configured for any of the specified application identifier(s), shall set the caching-time to the caching time value(s) for those application identifier(s) in the body of the HTTP response.

The PCEF shall install, update or remove the received PFD(s) for the application identifier(s).

The PCEF shall also for each application identifier start a caching timer with a value

- according to the received caching time value for that application identifier, if such a value is received for that application identifier; or
- otherwise with a default caching time value configured in the PCEF.

NOTE 1: The PCEF(s) and the PFDF(s) within an operator network are configured with the same default caching time value to be applied for all application identifiers.

NOTE 2: In the combination mode, the HTTP POST message from the PFDF does not impact the running caching timer of an application identifier.

When the PCEF removes the last PCC rule that refers to the corresponding application identifier, or when the caching timer expires and no PCC rule refers to the application identifier, the PCEF may remove the PFD(s) related with the application identifier.

The PFDs retrieved from PFDF take precedence over any PFDs pre-configured in the PCEF. If all PFDs retrieved from the PFDF are removed for an application identifier, the pre-configured PFDs shall be applied again for the application identifier.

4.4.2 Provisioning of PFDs ("Push mode"" and "Combination mode")

The PFDF may create, update or remove one or multiple PFDs associated with application identifier(s) to the PCEF. When the request for creation, update, or removal for an application identifier(s) is received from the SCEF, for the Push mode, the PFDF shall for each PCEF it serves:

- immediately send to the PCEF an HTTP POST message including the provisioned changes of one or more application identifiers as specified in subclause 6.3.3.5, or
- wait for a period shorter than the allowed delay (e.g.to aggregate all the PFDs for several application) , then send to the PCEF an HTTP POST message including the provisioned changes.

For the Combination mode, the PFDF may for each PCEF it serves wait for a period shorter than the allowed delay (e.g. to aggregate all the PFDs for several application) and, if no HTTP GET request for that application identifier is received during the waiting time, then send an HTTP POST message including the provisioned changes and/or notification of PFD creation/update for that application identifier as specified in subclause 6.3.3.5.

NOTE 1: In the combination mode, the PFDF can check the received allowed delay against the caching time as specified in subclause 4.4.1 of 3GPP TS 29.250 [14], in order to utilize the pull procedure.

When the PCEF receives the HTTP POST message, the PCEF shall

- for an application identifier(s) where no flag is provided, remove the all existing all PFD(s) (if available) and install all the new provided PDF(s).
- for an application identifier(s) where the removal-flag is also provided and set to true, delete the existing PFD(s);
- for an application identifier(s) where partial-flag is also provided and set to true
  - install a new PFD(s) if the new PFD(s) with a new PFD identifier(s) is received,
  - update an existing PFD(s) if a new PFD(s) with the same PFD identifier(s) is recevied, and/or
  - delete an existing PFD(s) if the same PFD identifier(s) without any content is received;
- acknowledge the HTTP POST message by sending a corresponding HTTP response with the appropriate status code (200 OK for success) as described in subsclause 6.3.4; and
- retrieve the PFDs for the corresponding application identifier(s) as defined in subclause 4.4.1 either immediately if the allowed-delay is not provided, or within the provided allowed-delay for the application identifier(s) where the notification-flag is included and set to true.

NOTE 2: It depends on the implementation whether the PCEF initiates separate pull requests to retrieve the PFDs for different application identifier(s) within the allowed-delay. The decision to send PFD, and/or notification of PFD creation/update/deletion for certain application identifier on the PFDF is based on the operator policy.

NOTE 3: In the push mode, the PFDF can be configured with the list of PCEFs per application identifier(s).

NOTE 4: The caching timer is not applicable for the PCEF/TDF in Push mode.

5 Gwn reference point

5.1 Overview

The Gwn reference point is located between the Packet Flow Description Function (PFDF) and the Traffic Detection Function (TDF). The Gwn reference point enables transport of PFDs from the PFDF to the TDF for a particular Application Identifier or for a set of Application Identifiers.

The Gwn reference point supports the following functions:

- Creation, updating and removal of individual or the whole set of PFDs from the PFDF to the TDF.
- Confirmation of creation, updating and removal of PFDs from the TDF to the PFDF.

NOTE: The interaction between the PFDF and the TDF is not related to any IP-CAN session.

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

5.2 Gwn reference model

The Gwn reference point is defined between the PFDF and the TDF. The relationships between the different functional entities involved are depicted in figure 5.2.1. The overall PCC architecture is depicted in subclause 3a of 3GPP TS 29.213 [3].

Figure 5.2.1: Gwn reference model

5.3 Functional elements

5.3.1 PFDF

Subclause 4.3.1 is applicable with the clarification that the TDF replaces the PCEF and Gwn interface replaces Gw interface.

5.3.2 TDF

The TDF (Traffic Detection Function) funtionality defined in subclause 4b.4.2 of 3GPP TS 29.212 [5] shall be applied. In addition, the TDF shall support the management of PFDs provisioned by the PFDF.