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Contents

Foreword

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1 Scope

The present specification provides the stage 3 definition of the Background Data Transfer (BDT) Policy Control Service (Npcf_BDTPolicyControl) of the 5G System.

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The stage 2 definition and related procedures for BDT Policy Control Service are specified in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

The 5G System stage 3 call flows are provided in 3GPP TS 29.513 [5].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [6] and 3GPP TS 29.501 [7].

The Policy Control Function (PCF) provides the BDT Policy Control Service. This service provides background data transfer policy negotiation function.

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 23.501: "System Architecture for the 5G System; Stage 2".

[3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[4] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[5] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[6] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[7] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[8] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[9] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[10] OpenAPI: "OpenAPI 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md.

[11] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[12] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Data, Application Data and Structured Data for exposure; Stage 3".

[13] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[14] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[15] IETF RFC 7396: "JSON Merge Patch".

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

[17] IETF RFC 7807: "Problem Details for HTTP APIs".

[18] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[19] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[20] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[21] 3GPP TR 21.900: "Technical Specification Group working methods".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP 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 3GPP TR 21.905 [1].

Background data transfer: feature that enables a 3rd party service provider to keep their costs lower by favouring time windows for data transfer to specific UEs in a geographical area during non-busy hours that are less costly and able to handle larger bitrates.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.501 [2], subclause 3.1 apply:

5G System

Network Function

NF service

NF service operation

Service based interface

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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].

AF	Application Function
ASP	Application Service Provider
BDT	Background Data Transfer
JSON	JavaScript Object Notation
NEF	Network Exposure Function
NG-RAN	Next Generation - Radio Access Network
NRF	Network Repository Function
PCF	Policy Control Function
SBI	Service Based Interface
TAI	Tracking Area Identity
UDR	Unified Data Repository

4 Background Data Transfer Policy Control Service

4.1 Service Description

4.1.1 Overview

The BDT Policy Control Service, as defined in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4], is provided by the Policy Control Function (PCF).

This service enables the NF service consumer to negotiate policy for a future background data transfer and offers the following functionalities:

- get background data transfer policies based on the request from the NEF; and
- update background data transfer policies based on the selection provided by the NEF.

4.1.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The Policy and Charging related 5G architecture is also described in 3GPP TS 29.513 [5].

The BDT Policy Control Service (Npcf_BDTPolicyControl) is part of the Npcf service-based interface exhibited by the Policy Control Function (PCF).

The only known NF service consumer of the Npcf_BDTPolicyControl service is the Network Exposure Function (NEF).

The NEF accesses the BDT Policy Control Service at the PCF via the N30 Reference point. In the roaming scenario, the N30 reference point is located between the PCF and the NEF in the home network only.

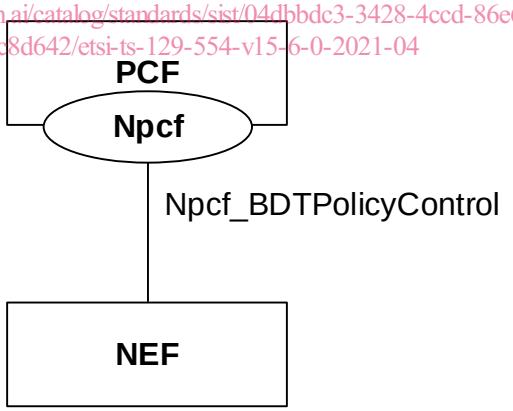

Figure 4.1.2-1: Reference Architecture for the Npcf_BDTPolicyControl Service; SBI representation

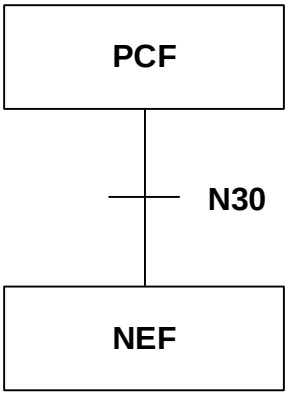

Figure 4.1.2-2: Reference Architecture for the Npcf_BDTPolicyControl Service; reference point representation

4.1.3 Network Functions

4.1.3.1 Policy Control Function (PCF)

The Policy Control Function (PCF):

- Provides background data transfer policies based on the request from the NEF. The PCF determines, based on information provided by the NEF and other available information (e.g. network policy, load status estimation for the requested time window, network area, etc.) one or more transfer policies.
- Updates background data transfer policy based on the selection provided by the NEF.

4.1.3.2 NF Service Consumers

The Network Exposure Function (NEF):

- requests the PCF to provide background data transfer policies; and
- provides the selected background data transfer policy to the PCF.

4.2 Service Operations

4.2.1 Introduction

Table 4.2.1-1: Operations of the Npcf_BDTPolicyControl Service

Service operation name	Description	Initiated by
Npcf_BDTPolicyControl_Create	Provides the requested background data transfer policies to the NF service consumer.	NF service consumer (NEF)
Npcf_BDTPolicyControl_Update	Updates the PCF with the background data transfer policy selected by the NF service consumer.	NF service consumer (NEF)

4.2.2 Npcf_BDTPolicyControl_Create service operation

4.2.2.1 General

The Npcf_BDTPolicyControl_Create service operation is used by an NF service consumer to retrieve BDT policies from the PCF.

The following procedure using the Npcf_BDTPolicyControl_Create service operation is supported:

- retrieval of BDT policies.

4.2.2.2 Retrieval of BDT policies

This procedure is used by the NEF to request BDT policies from the PCF, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.2.2-1 illustrates a retrieval of BDT policies.

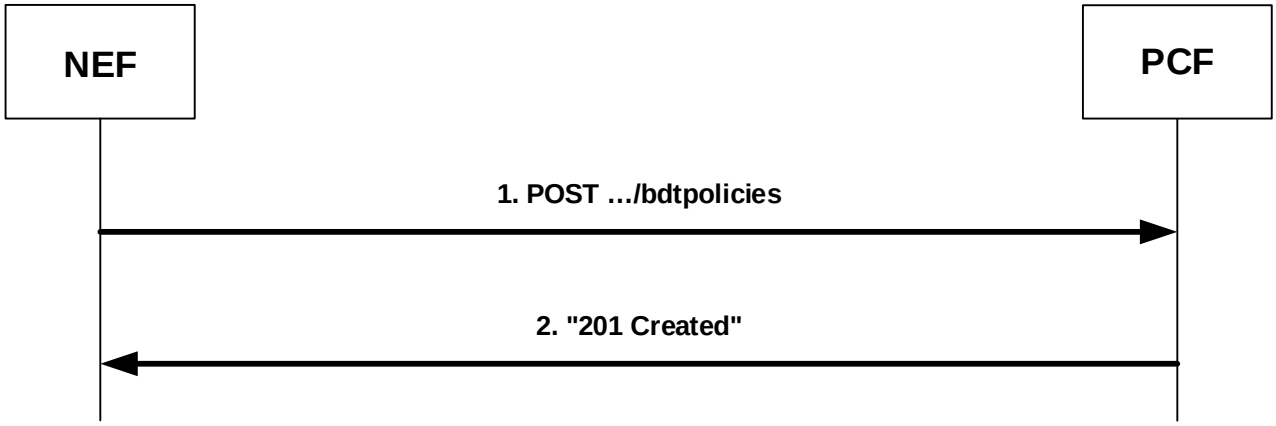

Figure 4.2.2.2-1: Retrieval of BDT policies

Upon reception of a Background Data Transfer request from the AF indicating a transfer policy request, the NEF shall invoke the Npcf_BDTPolicyControl_Create service operation by sending an HTTP POST request to the URI representing a "BDT policies" collection resource of the PCF (as shown in figure 4.2.2.2-1, step 1). The NEF shall include a "BdtReqData" data type in a payload body of the HTTP POST request. The "BdtReqData" data type shall contain:

- an ASP identifier in the "aspId" attribute;
- a volume of data per UE in the "volPerUe" attribute;
- an expected number of UEs in the "numOfUes" attribute; and
- a desired time window in the "desTimeInt" attribute,

and may include a network area information (e.g. list of TAIs and/or NG-RAN nodes and/or cells identifiers) in the "nwAreaInfo" attribute.

If the PCF cannot successfully fulfil the received HTTP POST request due to the internal PCF error or due to the error in the HTTP POST request, the PCF shall send the HTTP error response as specified in subclause 5.7.

Otherwise, upon the reception of the HTTP POST request from the NEF indicating a BDT policies request, the PCF:

- may invoke the Nudr_DataRepository_Query service operation, as described in 3GPP TS 29.504 [11] and 3GPP TS 29.519 [12], to request from the UDR all stored transfer policies;

NOTE 1: In case only one PCF is deployed in the network, transfer policies can be locally stored in the PCF and the interaction with the UDR is not required.

- shall determine one or more acceptable transfer policies based on:

  a) information provided by the NEF; and

  b) other available information (e.g. the existing transfer policies, network policy, load status estimation for the desired time window); and

- shall create a BDT Reference ID.

The PCF shall send to the NEF a "201 Created" response to the HTTP POST request, as shown in figure 4.2.2.2-1, step 2. The PCF shall include in the "201 Created" response:

- a Location header field; and
- a "BdtPolicy" data type in the payload body containing the BDT Reference ID in the "bdtRefId" attribute and acceptable transfer policy/ies in the "transfPolicies" attribute.

The Location header field shall contain the URI of the created individual BDT policy resource i.e. "{apiRoot}/npcf-bdtpolicycontrol/v1/bdtpolicies/{bdtPolicyId}".

For each included transfer policy, the PCF shall provide:

- a transfer policy ID in the "transPolicyId" attribute;
- a recommended time window in the "recTimeInt" attribute; and
- a reference to charging rate for the recommended time window in the "ratingGroup" attribute,

and may provide a maximum aggregated bitrate for the uplink direction in the "maxBitRateUl" attribute and/or a maximum aggregated bitrate for the downlink direction in the "maxBitRateDl" attribute.

If the PCF included in the "BdtPolicy" data type:

- more than one transfer policy, the PCF shall wait for the transfer policy selected by the NEF as described in subclause 4.2.3; or
- only one transfer policy, the PCF may invoke the Nudr_DataRepository_Update service operation, as described in 3GPP TS 29.504 [11] and 3GPP TS 29.519 [12], to update the UDR with the selected transfer policy, the corresponding BDT Reference ID, the volume of data per UE, the expected number of UEs and if available a network area information for the provided ASP identifier.

NOTE 2: In case only one PCF is deployed in the network, transfer policies can be locally stored in the PCF and the interaction with the UDR is not required.

4.2.3 Npcf_BDTPolicyControl_Update service operation

4.2.3.1 General

The Npcf_BDTPolicyControl_Update service operation is used by an NF service consumer to update a BDT policy to the PCF.

The following procedure using the Npcf_BDTPolicyControl_Update service operation is supported:

- indication about selected transfer policy.

4.2.3.2 Indication about selected transfer policy

When the feature "PatchCorrection" is supported, this procedure is used by the NEF to inform the PCF about selected transfer policy, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

Figure 4.2.3.2-1 illustrates an indication about selected transfer policy.