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Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope	6
2 References	6
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 UE Policy Control Service	8
4.1 Service Description	8
4.1.1 Overview	8
4.1.2 Service Architecture	8
4.1.3 Network Functions.....	9
4.1.3.1 Policy Control Function (PCF)	9
4.1.3.2 NF Service Consumers.....	10
4.2 Service Operations	11
4.2.1 Introduction.....	11
4.2.2 Npcf_UEPolicyControl_Create Service Operation.....	11
4.2.2.1 General	11
4.2.2.2 UE Policy	13
4.2.2.2.1 General	13
4.2.2.2.2 UE Access Network discovery and selection policies	16
4.2.2.2.3 UE Route Selection Policy(URSP).....	16
4.2.2.3 Npcf_UEPolicyControl_Update Service Operation	17
4.2.2.3.1 General	17
4.2.2.3.2 Policy Control Request Triggers	19
4.2.2.3.3 Encoding of updated policy.....	19
4.2.2.4 Npcf_UEPolicyControl_UpdateNotify Service Operation	20
4.2.2.4.1 General	20
4.2.2.4.2 Policy update notification	20
4.2.2.4.3 Request for termination of the policy association	21
4.2.2.5 Npcf_UEPolicyControl_Delete Service Operation.....	22
5 Npcf_UEPolicyControl API.....	22
5.1 Introduction	22
5.2 Usage of HTTP.....	23
5.2.1 General.....	23
5.2.2 HTTP standard headers.....	23
5.2.2.1 General.....	23
5.2.2.2 Content type	23
5.2.3 HTTP custom headers.....	23
5.3 Resources	24
5.3.1 Resource Structure	24
5.3.2 Resource:UE Policy Associations.....	24
5.3.2.1 Description	24
5.3.2.2 Resource definition	24
5.3.2.3 Resource Standard Methods.....	25
5.3.2.3.1 POST	25
5.3.3 Resource: Individual UE Policy Association.....	25
5.3.3.1 Description	25
5.3.3.2 Resource definition	25
5.3.3.3 Resource Standard Methods.....	25
5.3.3.3.1 GET	25

5.3.3.3.2	DELETE	26
5.3.3.4	Resource Custom Operations	26
5.3.3.4.1	Overview	26
5.3.3.4.2	Operation: Update	27
5.3.3.4.2.1	Description	27
5.3.3.4.2.2	Operation Definition	27
5.4	Custom Operations without associated resources	27
5.5	Notifications	27
5.5.1	General	27
5.5.2	Policy Update Notification	27
5.5.2.1	Description	27
5.5.2.2	Operation Definition	27
5.5.3	Request for termination of the UE policy association	28
5.5.3.1	Description	28
5.5.3.2	Operation Definition	28
5.6	Data Model	28
5.6.1	General	28
5.6.2	Structured data types	29
5.6.2.1	Introduction	29
5.6.2.2	Type PolicyAssociation	30
5.6.2.3	Type PolicyAssociationRequest	31
5.6.2.4	Type PolicyAssociationUpdateRequest	32
5.6.2.5	Type PolicyUpdate	33
5.6.2.6	Type TerminationNotification	33
5.6.2.7	UePolicyTransferFailureNotification	33
5.6.3	Simple data types and enumerations	34
5.6.3.1	Introduction	34
5.6.3.2	Simple data types	34
5.6.3.3	Enumeration: RequestTrigger	34
5.6.3.4	Enumeration: PolicyAssociationReleaseCause	34
5.7	Error handling	35
5.7.1	General	35
5.7.2	Protocol Errors	35
5.7.3	Application Errors	35
5.8	Feature negotiation	35
5.9	Security	36
Annex A (normative):	OpenAPI specification	37
A.1	General	37
A.2	Npcf_UEPolicyControl API	37
Annex B (informative):	Withdrawn API versions	44
Annex C (informative):	Change history	45
History	46	

Foreword

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1 Scope

The present specification provides the stage 3 definition of the UE Policy Control Service (Npcf_UEPolicyControl) of the 5G System.

The stage 2 definition and procedures of UE Policy Control Service are contained in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4]. The 5G System Architecture is defined in 3GPP TS 23.501 [2].

Stage 3 call flows are provided in 3GPP TS 29.513 [7].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition of the 5G System are specified in 3GPP TS 29.500 [5] and 3GPP TS 29.501 [6].

The UE Policy Control Service is provided by the Policy Control Function (PCF). This service provides UE policies.

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.
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- [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 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [6] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [7] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; 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 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [12] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [13] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [14] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".
- [15] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
- [16] 3GPP TS 24.526: "UE policies for 5G System (5GS); Stage 3".

- [17] 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".
- [18] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".
- [19] 3GPP TS 33.501: "Security architecture and procedures for 5G system".
- [20] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [21] IETF RFC 7807: "Problem Details for HTTP APIs".
- [22] 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].

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].

AMF	Access and Mobility Management Function
ANDSP	Access Network Discovery and Selection Policy
API	Application Programming Interface
DNN	Data Network Name
GPSI	Generic Public Subscription Identifier
GUAMI	Globally Unique AMF Identifier
HTTP	Hypertext Transfer Protocol
H-PCF	Home Policy Control Function
JSON	JavaScript Object Notation
N3AN	Non-3GPP access network
NF	Network Function
NRF	Network Repository Function
OS	Operating System
OSId	Operating System Identity
PCF	Policy Control Function
PEI	Permanent Equipment Identifier
PRA	Presence Reporting Area
PTI	Procedure Transaction Identity.
SUPI	Subscription Permanent Identifier
UDR	Unified Data Repository
UPSC	UE policy section code
UPSI	UE policy section identifier
URSP	UE Route Selection Policy
V-PCF	Visited Policy Control Function

4 UE Policy Control Service

4.1 Service Description

4.1.1 Overview

The UE 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 is used as part of the provisioning of UE policies determined by the PCF to the UE via the AMF and offers the following functionalities:

- creation of the UE Policy Association requested by the NF service consumer (e.g. AMF);
- provisioning of the policy control request triggers to the NF service consumer (e.g. AMF);
- provisioning of the UE policy to the V-PCF by the H-PCF in the roaming case;
- reporting of the met policy control request trigger; and
- deletion of the the UE Policy Association requested by the NF service consumer (e.g. AMF).

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 [7].

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

The known consumers of the Npcf_UEPolicyControl service are the Access and Mobility Management Function (AMF) and the Visited Policy Control Function (V-PCF).

The AMF accesses the UE Policy Control Service at the PCF via the N15 Reference point. In the roaming scenario, the N15 reference point is located between the V-PCF in the visited network and the AMF. The V-PCF accesses the UE Policy Control Service at the Home Policy Control Function (H-PCF) via the N24 Reference point.

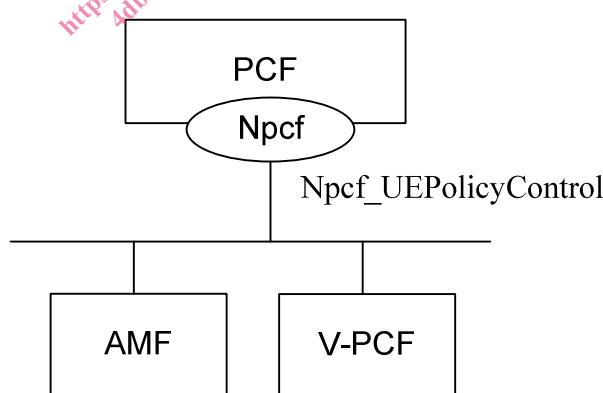


Figure 4.1.2-1: Reference Architecture for the Npcf_UEPolicyControl Service; SBI representation

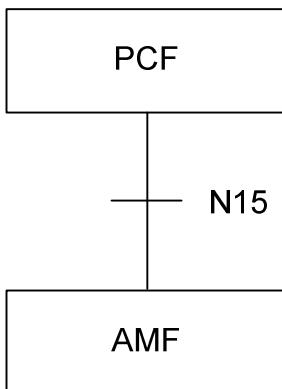


Figure 4.1.2-2: Non-roaming Reference Architecture for the Npcf_UEPolicyControlService; reference point representation

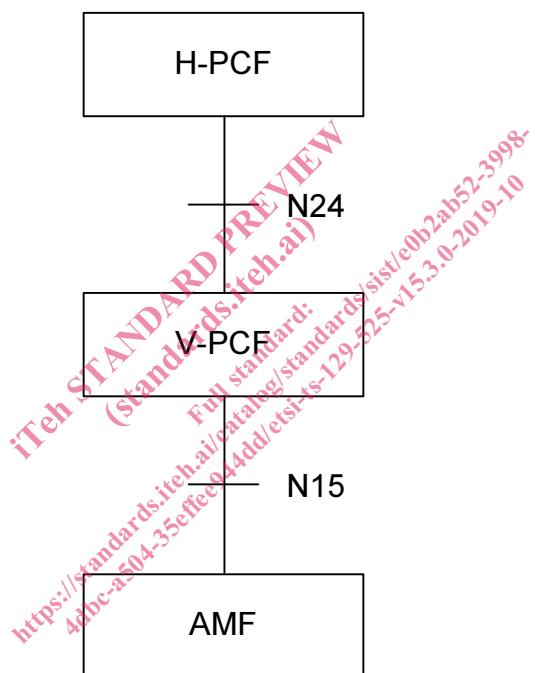


Figure 4.1.3-2: Roaming reference Architecture for the Npcf_UEPolicyControlService; reference point representation

4.1.3 Network Functions

4.1.3.1 Policy Control Function (PCF)

For non-roaming scenarios, the Policy Control Function (PCF):

- Supports unified policy framework to govern network behaviour; and
- Provides UE policy, including Access Network Discovery and Selection Policy (ANDSP) and UE Route Selection Policy (URSP) via the AMF transparently to the UE; and
- Provides policy control request triggers to the AMF.

NOTE 1: The PCF invokes the Namf_Communication service specified in 3GPP TS 29.518 [14] to provide the UE Policy.

For roaming scenarios, the Visited Policy Control Function (V-PCF):

- Provides policy control request triggers to the AMF;
- Provides the ANDSP of the VPLMN via the AMF transparently to the UE; and
- Forwards the ANDSP and URSP received from the H-PCF via the AMF to the UE.

NOTE 2: The V-PCF invokes the Namf_Communication service specified in 3GPP TS 29.518 [14] to provide the UE Policy.

For roaming scenarios, the Home Policy Control Function (H-PCF):

- Provides policy control request triggers to the V-PCF; and
- Provides the ANDSP and URSP of the HPLMN to the V-PCF for forwarding to the UE via the AMF.

4.1.3.2 NF Service Consumers

The Access and Mobility Management function (AMF) performs:

- Registration management;
- Connection management;
- Reachability management;
- Mobility Management;
- Forwarding of UE Policy towards the served UE;
- Reporting of the UE state to the (V-)PCF; and
- Forwarding of the UE policy enforcement result received from the UE to the (V-)PCF.

NOTE: The AMF invokes the Namf_Communication service specified in 3GPP TS 29.518 [14] to report the UE policy enforcement result.

The Visited Policy Control Function (V-PCF) provides the functions described in subclause 4.1.3.1 towards the visited network as NF service producer and acts as NF Service consumer toward the H-PCF, performing the following functions:

- Receiving policy control request triggers, ANDSP and URSP from the H-PCF
- Reporting of the UE state and UE policy enforcement result to the H-PCF.

4.2 Service Operations

4.2.1 Introduction

Table 4.2.1-1: Operations of the Npcf_UEPolicyControl Service

Service operation name	Description	Initiated by
Npcf_UEPolicyControl_Create	Creates a UE Policy Association.	NF consumer (AMF, V-PCF in roaming case)
Npcf_UEPolicyControl_Update	Updates of an UE Policy Association and provides corresponding policies to the NF consumer when the policy control request trigger is met or the AMF is relocated due to the UE mobility and the old PCF is selected.	NF consumer (AMF, V-PCF in roaming case)
Npcf_UEPolicyControl_UpdateNotify	Provides the updated policy control request triggers to the AMF by the (V-)PCF in the non-roaming or roaming case; Provides updated UE policy and policy control request trigger to the V-PCF by the H-PCF; or initiates the UE Policy association termination towards to the NF consumer by the NF producer.	PCF (H-PCF and V-PCF in roaming case)
Npcf_UEPolicyControl_Delete	Provides means for the NF consumer to delete the UE Policy Association.	NF consumer (AMF, V-PCF in roaming case)

4.2.2 Npcf_UEPolicyControl_Create Service Operation

4.2.2.1 General

The procedure in the present subclause is applicable when the NF service consumer creates a UE policy association when the UE registers to the network, and when the the AMF is relocated (between the different AMF sets) and the new AMF selects a new PCF. The procedure for the case where the AMF is relocated and the new AMF selects the old PCF is defined in subclause 4.2.3.1.

The creation of an UE policy association only applies for normally registered UEs, i.e., it does not apply for emergency-registered UEs.

Figure 4.2.2.1-1 illustrates the creation of a policy association.

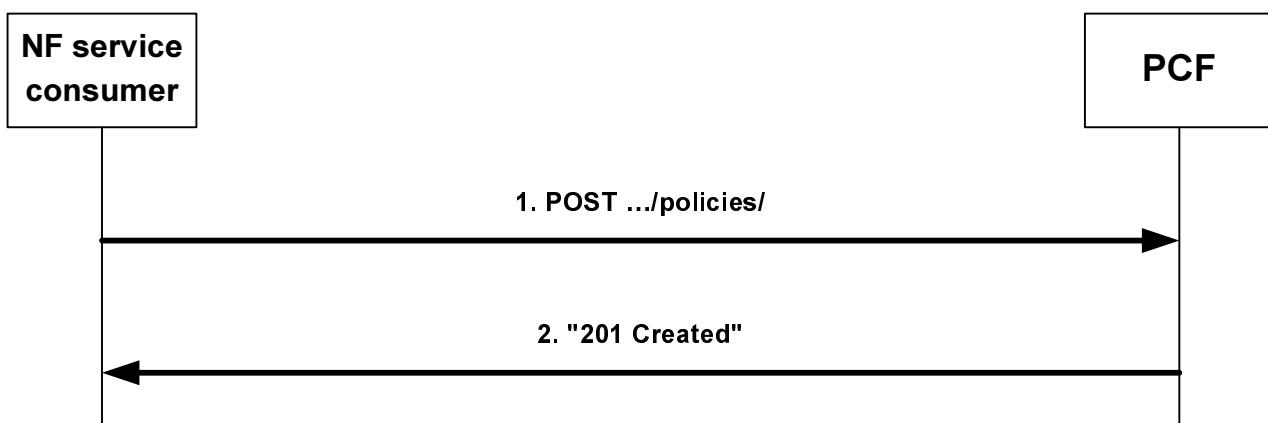


Figure 4.2.2.1-1: Creation of a UE policy association

NOTE 1: For the roaming case, the PCF represents the V-PCF if the NF service consumer is an AMF and the PCF represents the H-PCF if the NF service consumer is a V-PCF.