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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.
- 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 29.500: "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.

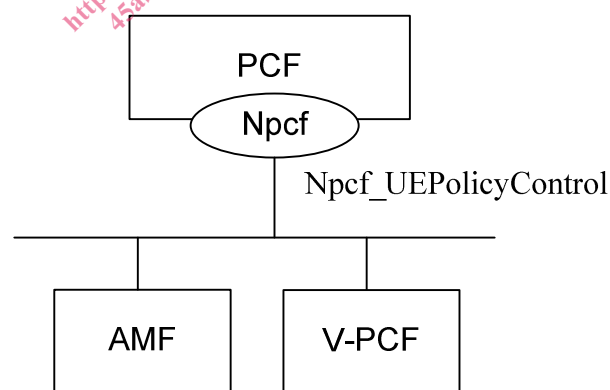


Figure 4.1.2-1: Reference Architecture for the Npcf_UEPolicyControl Service; SBI representation

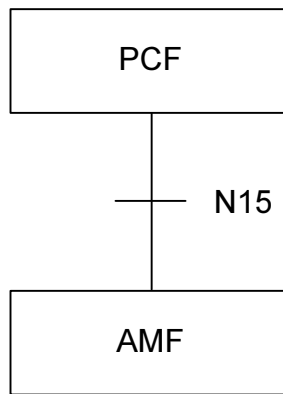


Figure 4.1.2-2: Non-roaming Reference Architecture for the Npcf_UEPolicyControlService; reference point representation

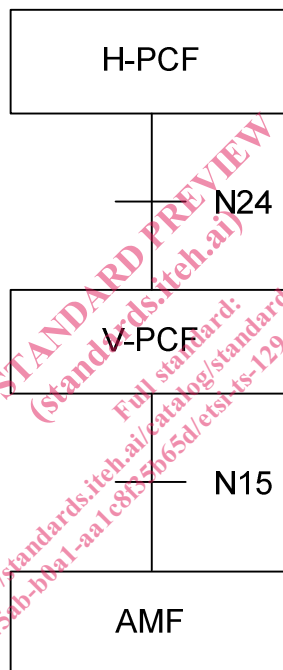


Figure 4.1.3-2: Roaming reference Architecture for the Npcf_UEPolicyControlService; reference point representation

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 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.

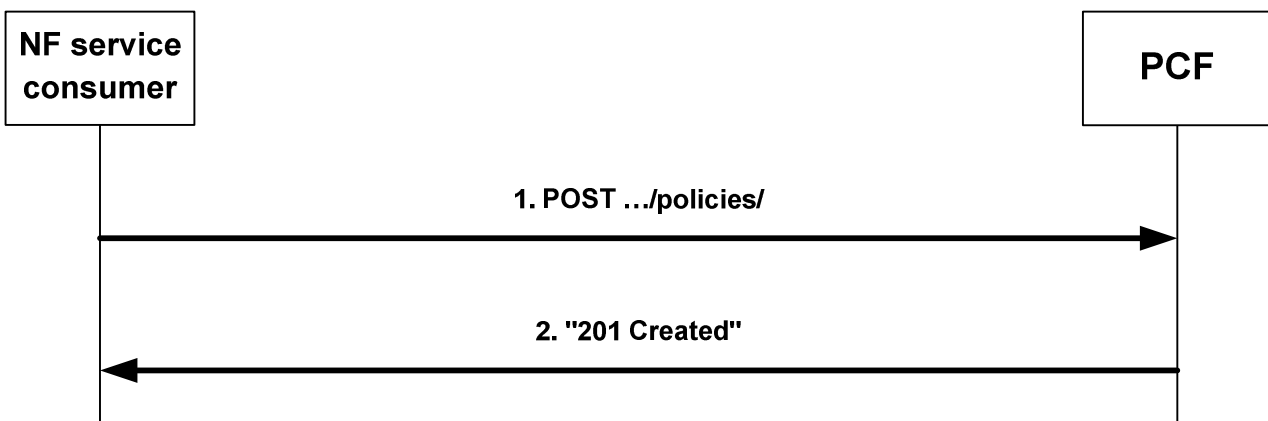


Figure 4.2.2.1-1: Creation of a UE policy association

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.