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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 and N2 PC5 policy.

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 9113: "HTTP/2".

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

[10] OpenAPI: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[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 9457: "Problem Details for HTTP APIs".

[22] 3GPP TR 21.900: "Technical Specification Group working methods".

[23] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[24] 3GPP TS 24.587: "Vehicle-to-Everything (V2X) services in 5G System (5GS); Stage 3".

[25] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

[26] 3GPP TS 29.505: "5G System; Usage of the Unified Data Repository service for Subscription Data; Stage 3".

[27] 3GPP TS 29.504:"5G System; Unified Data Repository Services; Stage 3".

[28] 3GPP TS 24.554: "Proximity based services (ProSe) in 5G system (5GS) protocol aspects; Stage 3".

[29] 3GPP TS 24.555: "Proximity based services (ProSe) in 5G system (5GS); User Equipment (UE) policies; Stage 3".

[30] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[31] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[32] 3GPP TS 24.577: "Aircraft-to-Everything (A2X) services in 5G System (5GS) protocol aspects; Stage 3".

[33] 3GPP TS 24.588: "Aircraft-to-Everything (A2X) services in 5G System (5GS); UE policies".

[34] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3"

[35] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[36] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[37] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[38] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[39] 3GPP TS 29.594: "5G System; Spending Limit Control Service; Stage 3".

[40] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[41] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[42] 3GPP TS 24.514: "Ranging based services and sidelink positioning in 5G system(5GS); Stage 3".

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].

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.503 [4], clause 3.1 and 3GPP TS 23.501 [2], clause 3.1 apply:

VPLMN specific URSP rules

Configured NSSAI

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].

5G-BRG	5G Broadband Residential Gateway
5G-CRG	5G Cable Residential Gateway
5G-RG	5G Residential Gateway
5G-VN	5G Virtual Network
A2X	Aircraft-to-Everything
A2XP	Aircraft-to-Everything Policy
AMF	Access and Mobility Management Function
ANDSP	Access Network Discovery and Selection Policy
API	Application Programming Interface
CHF	Charging Function
DNN	Data Network Name
EPS	Evolved Packet Core System
FN-RG	Fixed Network Residential Gateway
FN-BRG	Fixed Network Broadband Residential Gateway
FN-CRG	Fixed Network Cable Residential Gateway
FQDN	Fully Qualified Domain Name
GPSI	Generic Public Subscription Identifier
GUAMI	Globally Unique AMF Identifier
HFC	Hybrid Fiber-Coaxial
HTTP	Hypertext Transfer Protocol
H-PCF	Home Policy Control Function
JSON	JavaScript Object Notation
N3AN	Non-3GPP access network
N3IWF	Non-3GPP InterWorking Function
NID	Network Identifier
NF	Network Function
NRF	Network Repository Function
NSWO	Non-Seamless WLAN Offload
OS	Operating System
OSId	Operating System Identity
PCF	Policy Control Function
PDU	Packet Data Unit
PEI	Permanent Equipment Identifier
PIN	Personal IoT Network
PRA	Presence Reporting Area
ProSeP	5G ProSe Policy
PTI	Procedure Transaction Identity
RSLPP	Ranging and Sidelink Positioning Policy

RSN	Redundancy Sequence Number
SL	Sidelink
SMF	Session Management Function
SNPN	Stand-alone Non-Public Network
SSC	Service and Session Continuity
SUPI	Subscription Permanent Identifier
TNGF	Trusted Non-3GPP Gateway Function
UDR	Unified Data Repository
UPSC	UE policy section code
UPSI	UE policy section identifier
URSP	UE Route Selection Policy
V2X	Vehicle-to-Everything
V2XP	Vehicle-to-Everything Policy
V-PCF	Visited Policy Control Function
VPS	VPLMN Specific
W-5GAN	Wireline 5G Access Network
W-5GCAN	Wireline 5G Cable Access Network
W-AGF	Wireline Access Gateway 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 (e.g. ANDSP, URSP, V2XP, A2XP, ProSeP, RSLPP) determined by the PCF to the UE via the AMF and as part of the provisioning of N2 PC5 policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL determined by the PCF to the NG-RAN via the AMF. In case of URSP provisioning in EPS this service may be used as part of the provisioning of URSP determined by the PCF to the UE via a PCF for a PDU session. This service hence offers the following functionalities:

- creation of a UE Policy Association as requested by the NF service consumer (e.g. AMF);
- provisioning of policy control request trigger(s) to the NF service consumer (e.g. AMF);
- provisioning of the UE policy (e.g. ANDSP, URSP, V2XP, A2XP,ProSeP, RSLPP) to the V-PCF by the H-PCF in the roaming case;
- provisioning of the N2 PC5 policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL to the V-PCF by the H-PCF in the roaming case;
- update of a UE Policy Association as requested by the NF service consumer (e.g. AMF);
- reporting of the met policy control request trigger(s) by the NF service consumer;
- update of policy control request trigger(s) by the PCF to the NF service consumer (e.g. AMF);
- deletion of a UE Policy Association as requested by the NF service consumer (e.g. AMF);
- enable the PCF to request the termination of a UE Policy Association to the NF service consumer (e.g. AMF);
- provisioning of the URSP to a PCF for a PDU session in case of URSP provisioning in EPS; and
- provisioning of slice-based N3IWF/TNGF selection policies based on the UE subscribed/configured S-NSSAI(s).

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 NF service 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 case of URSP delivery in EPS, when the PCF for the PDU session and the PCF for the UE are different, the PCF for the PDU session accesses the UE Policy Control Service at the PCF via the N43 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.

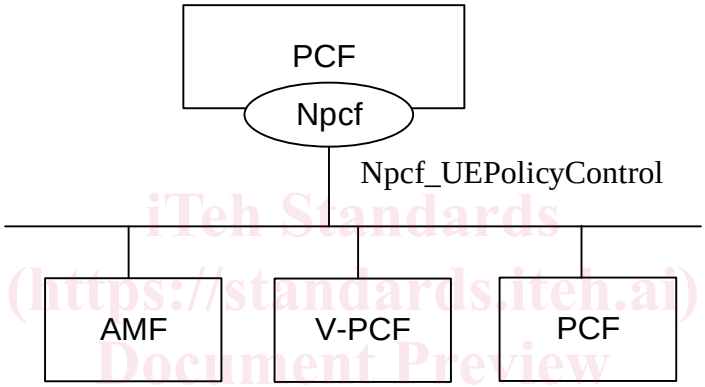

Figure 4.1.2-1: Reference Architecture for the Npcf_UEPolicyControl Service; SBI representation

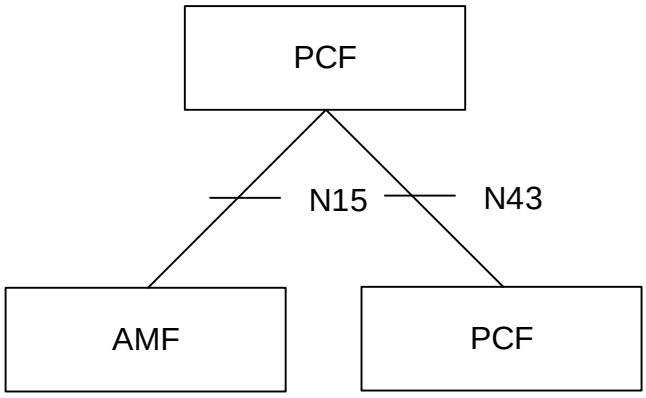

Figure 4.1.2-2: Non-roaming Reference Architecture for the Npcf_UEPolicyControlService; reference point representation

NOTE 1: When the N43 reference point exists, i.e. when the PCF is a NF service consumer of the Npcf_UEPolicyControl service, the PCF for the PDU session interacts with the PCF for the UE, and the non-roaming and home routed roaming architecture are the same.

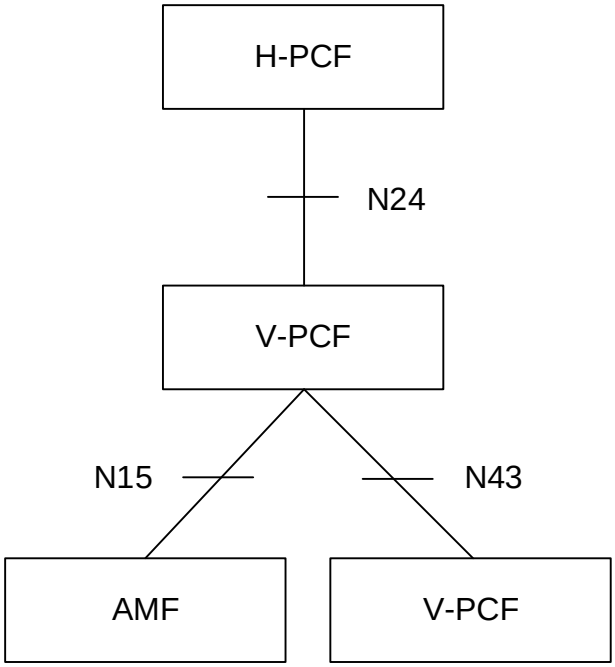

Figure 4.1.3-2: Roaming reference Architecture for the Npcf_UEPolicyControlService; reference point representation

NOTE 2: In LBO roaming scenarios, the V-PCF for the PDU session interacts with the V-PCF for the UE (i.e., the V-PCF for the PDU session is a NF service consumer of the Npcf_UEPolicyControl service offered by the V-PCF of the UE).

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;
- provides UE policy, including Access Network Discovery and Selection Policy (ANDSP), UE Route Selection Policy (URSP), Vehicle-to-Everything Policy (V2XP), Aircraft-to-Everything Policy (A2XP), 5G ProSe Policy (ProSeP) and/or Ranging and Sidelink Positioning Policy (RSLPP) via the AMF transparently to the UE;
- provides policy control request trigger(s) to the AMF;

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

- provides N2 PC5 policy, containing the PC5 QoS parameters used by NG-RAN for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL via the AMF to the NG-RAN;

NOTE 2: The PCF invokes the Namf_Communication service specified in 3GPP TS 29.518 [14] to provide the N2 PC5 Policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL.

- provides URSP via a PCF for a PDU session transparently to the UE in case of URSP provisioning in EPS;
- provides policy control request trigger(s) to a PCF for a PDU session in case of URSP provisioning in EPS; and
- provides slice-based N3IWF/TNGF selection policies based on the UE subscribed S-NSSAI(s).

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

- provides policy control request trigger(s) to the AMF;

- provides the ANDSP of the VPLMN via the AMF transparently to the UE;
- forwards the ANDSP, URSP, V2XP, A2XP, ProSeP and/or RSLPP received from the H-PCF via the AMF to the UE;

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

- forwards the N2 PC5 policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL received from the H-PCF via the AMF to the NG-RAN;

NOTE 4: The V-PCF invokes the Namf_Communication service specified in 3GPP TS 29.518 [14] to provide the N2 PC5 Policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL.

- provides slice-based N3IWF/TNGF selection policies based on the UE Configured NSSAI; and
- for the LBO roaming scenarios, and in case of URSP provisioning in EPS:
  a. provides policy control request trigger(s) received from the H-PCF to a V-PCF for a PDU session; and
  b. forwards to the UE the URSP received from the H-PCF using a V-PCF for a PDU session.

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

- provides policy control request trigger(s) to the V-PCF;
- provides the UE policy (e.g. ANDSP, URSP, V2XP, A2XP, ProSeP or RSLPP) of the HPLMN to the V-PCF for forwarding to the UE via the the AMF;
- provides the N2 PC5 policy for V2X communications and/or A2X communications and/or 5G ProSe and/or Ranging/SL to the V-PCF for forwarding to the NG-RAN via the AMF; and
- in case of URSP provisioning in EPS:
  a. for the LBO roaming scenarios, provides URSP to the V-PCF for forwarding to the UE via a V-PCF for a PDU session.
  b. for the Home Routed scenarios, provides URSP to the PCF for the PDU session in the HPLMN, for forwarding to the UE via the H-SMF.

The policy decisions made by the PCF may also be based on one or more of the following:

- Information obtained from the UDR (e.g., UE Policy Subscription data and/or Service Parameter Data provided by the AF/NEF via the UDR);
- Information obtained from the AMF, e.g., UE related and access related information;
- Information obtained from the NWDAF;
- Information from the CHF about spending limits control, e.g., status of each relevant policy counter and optional pending policy counter statuses; and

NOTE 5: In this release of the specification, policy decisions based on spending limits control apply to URSP only.

- PCF pre-configured policy context.

4.1.3.2 NF Service Consumers

The known NF service consumers of the Npcf_UEPolicyControl are the AMF, the V-PCF in the roaming case, and a PCF for a PDU session in case of URSP provisioning in EPS.

The Access and Mobility Management function (AMF) performs:

- registration management;
- connection management;