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TECHNICAL SPECIFICATION

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

The present document specifies detailed call flows of Policy and Charging Control (PCC) over the Npcf, Nsmf, Namf, Nudr, Nnef, Nchf, Nbsf, Nnwdaf and Nmbsmf service-based interfaces and their relationship with the flow level signalling in 5G system.

NOTE: The call flows depicted in this Technical Specification do not cover all traffic cases.

The stage 2 definition and procedures of PCC 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].

The stage 2 definition and procedures for PCC specific for wireless and wireline convergence are contained in 3GPP TS 23.316 [70].

The stage 2 definition and procedures of PCC for 5G multicast/broadcast services are contained in 3GPP TS 23.247 [54].

Detailed stage 3 procedures are provided in 3GPP TS 29.507 [7], 3GPP TS 29.508 [8], 3GPP TS 29.512 [9], 3GPP TS 29.514 [10], 3GPP TS 29.520 [11], 3GPP TS 29.519 [12], 3GPP TS 29.521 [22], 3GPP TS 29.594 [23], 3GPP TS 29.522 [24], 3GPP TS 29.551 [25], 3GPP TS 29.525 [31], 3GPP TS 29.554 [26], 3GPP TS 29.534 [50], 3GPP TS 29.543 [68], and 3GPP TS 29.537 [55].

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 present specification also describes the PCC reference architectures for non-roaming and roaming scenarios in 5G system.

The present specification also describes the mapping of QoS parameters at AF, PCF, SMF and MB-SMF.

The present specification also describes the session binding at PCF, and the QoS flow binding at SMF and MB-SMF.

The present specification also describes the PCF addressing.

The present specification also describes the Race condition handling.

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 29.507: "5G System; Access and Mobility Policy Control Service; Stage 3".

[8] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[9] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[10] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[11] 3GPP TS 29.520: "5G System; Network Data Analytics 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] Void

[14] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[15] 3GPP TS 29.201: "Representational State Transfer (REST) reference point between Application Function (AF) and Protocol Converter (PC)".

[16] IETF RFC 4566: "SDP: Session Description Protocol".

[17] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS) Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[18] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

[19] 3GPP TS 26.234: "End-to-end transparent streaming service; Protocols and codecs".

[20] 3GPP2 C.S0046-0 v1.0: "3G Multimedia Streaming Services".

[21] 3GPP2 C.S0055-A v1.0: "Packet Switched Video Telephony Services (PSVT/MCS)".

[22] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[23] 3GPP TS 29.594: "5G System; Spending Limit Control Service; Stage 3".

[24] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[25] 3GPP TS 29.551: "5G System; Packet Flow Description Management Service; Stage 3".

[26] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

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

[28] 3GPP TS 32.240: "Charging management; Charging architecture and principles".

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

[30] 3GPP TS 29.213: "Policy and charging control signalling flows and Quality of Service (QoS) parameter mapping".

[31] 3GPP TS 29.525: "UE Policy Control Service; Stage 3".

[32] 3GPP TS 29.518: "Access and Mobility Management Services; Stage 3".

[33] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[34] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[35] 3GPP TS 24.292: "IP Multimedia (IM) Core Network (CN) subsystem Centralized Services (ICS); Stage 3".

[36] IETF RFC 3556: "Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth".

[37] IETF RFC 3890: "A Transport Independent Bandwidth Modifier for the Session Description Protocol (SDP)".

[38] IETF RFC 5761: "Multiplexing RTP Data and Control Packets on a Single Port".

[39] IETF RFC 4145: "TCP-Based Media Transport in the Session Description Protocol (SDP)".

[40] IETF RFC 4975: "The Message Session Relay Protocol (MSRP)".

[41] 3GPP TS 24.229: " IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[42] IETF RFC 4412: "Communications Resource Priority for the Session Initiation Protocol (SIP)".

[43] IETF RFC 3264: "An Offer/Answer model with the Session Description Protocol (SDP)".

[44] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[45] 3GPP TS 23.380: "IMS Restoration Procedures".

[46] 3GPP TS 23.221: "Architectural requirements".

[47] 3GPP TS 29.505: "5G System; Usage of the Unified Data Repository Service for Subscription Data; Stage 3".

[48] 3GPP TS 29.552: "5G System; Network Data Analytics signalling follows; Stage 3".

[49] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[50] 3GPP TS 29.534: "5G System; Access and Mobility Policy Authorization Service; Stage 3".

[51] 3GPP TS 29.510: "5G System; Network function repository services; Stage 3".

[52] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[53] 3GPP TS 29.212: "Policy and Charging Control (PCC); Reference points".

[54] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".

[55] 3GPP TS 29.537: "5G System; Multicast/Broadcast Policy Control Services; Stage 3".

[56] 3GPP TS 29.564: "5G System; User Plane Function Services; Stage 3".

[57] 3GPP TS 23.548: "5G System Enhancements for Edge Computing; Stage 2".

[58] 3GPP TS 29.532: "5G System; 5G Multicast-Broadcast Session Management Services; Stage 3".

[59] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane of EPC Nodes".

[60] 3GPP TS 29.565: "5G System; Time Sensitive Communication and Time Synchronization Function services; Stage 3".

[61] 3GPP TS 29.503: "5G System; Unified Data Management services; Stage 3".

[62] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[63] IETF RFC 8655: "Deterministic Networking Architecture".

[64] IETF RFC 9633: "Deterministic Networking (DetNet) YANG Data Model".

[65] IETF RFC 6241: "Network Configuration Protocol (NETCONF)".

[66] IETF RFC 8040: "RESTCONF Protocol".

[67] 3GPP TS 29.591: "5G System; Network Exposure Function Southbound Services; Stage 3".

[68] 3GPP TS 29.543: "5G System; Data Transfer Policy Control Services; Stage 3".

[69] IETF RFC 8864: "Negotiation Data Channels Using the Session Description Protocol (SDP)".

[70] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[71] IETF RFC 8939: "Deterministic Networking (DetNet) Data Plane: IP".

[72] 3GPP TS 23.527: "5G System; Restoration Procedures".

3 Definitions, symbols 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 23.501 [2], clause 3.1 apply:

Onboarding Standalone Non-Public Network

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].

5GC	5G Core Network
5G DDNMF	5G Direct Discovery Name Management Function
5QI	5G QoS Identifier
5G VN	5G Virtual Network
A2X	Aircraft-to-Everything
A2XP	Aircraft-to-Everything Policy
AF	Application Function
AMBR	Aggregate Maximum Bit Rate
AMF	Access and Mobility Management Function
ARP	Allocation and Retention Priority
AW	Average Window
BDT	Background Data Transfer
BSF	Binding Support Function
CHEM	Coverage and Handoff Enhancements using Multimedia error robustness feature
CHF	Charging Function
DetNet	Deterministic Networking
DSCP	Differentiated Services Code Point
DN-AAA	Data Network Authentication, Authorization and Accounting
DTS	Data Transport Service
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio-Access Network
HR-SBO	Home Routed-Session BreakOut
LBO	Local Breakout
MBR	Maximum Bitrate
MBS	Multicast/Broadcast Service
MBSF	Multicast/Broadcast Service Function
MB-SMF	Multicast/Broadcast Session Management Function
MCS	Mission Critical Service
MME	Mobility Management Entity
MPD	Media Presentation Description
MPS	Multimedia Priority Service
MTU	Maximum Transmission Unit
NEF	Network Exposure Function
NID	Network Identifier
NPLI	Network Provided Location Information

NRF	Network Repository Function
NSSAI	Network Slice Selection Assistance Information
NWDAF	Network Data Analytics Function
ON-SNPN	Onboarding Standalone Non-Public Network
PCC	Policy and Charging Control
PCF	Policy Control Function
PDB	Packet Delay Budget
PDTQ	Planned Data Transfer with QoS requirements
PDUID	ProSe Discovery UE ID
PER	Packet Error Rate
PFD	Packet Flow Description
PFDF	Packet Flow Description Function
PMIC	Port Management Information Container
PL	Priority Level
ProSe	Proximity Services
ProSeP	5G ProSe Policy
PSA	PDU Session Anchor
PSAP	Public Safety Access Point
P-CSCF	Proxy Call Session Control Function
QFI	QoS Flow Identifier
QNC	QoS Notification Control
QoE	Quality of Experience
QoS	Quality of Service
RSLPP	Ranging and Sidelink Positioning Policy
SCP	Service Communication Proxy
SDF	Service Data FlowSDP Session Description Protocol
SEPP	Security Edge Protection Proxy
SFC	Service Function Chain
SL	Sidelink
SMF	Session Management Function
S-NSSAI	Single Network Slice Selection Assistance Information
SNPN	Stand-alone Non-Public Network
SPI	Security Parameter Index
TNAP	Trusted Network Access Point
TA	Tracking Area
TSC	Time Sensitive Communication
TSCAI	Time Sensitive Communication Assistance Information
TSN	Time Sensitive Networking
UDM	Unified Data Management
UDR	Unified Data Repository
UL CL	UpLink CLassifier
UMIC	User plane node Management Information Container
UPF	User Plane Function
UPSI	UE policy section identifier
URSP	UE Route Selection Policy
V2X	Vehicle-to-Everything
V2XP	Vehicle-to-Everything Policy

4 Reference architecture

The policy framework functionality in 5G is comprised of the functions of the Policy Control Function (PCF), the policy and charging enforcement functionality supported by the SMF and UPF, the access and mobility policy enforcement functionality supported by the AMF, the Network Data Analytics Function (NWDAF), the Network Exposure Function (NEF), the Charging Function (CHF), the Unified Data Repository (UDR), the Time Sensitive Communication and Time Synchronization Function (TSCTSF), the Application Function (AF) and the 5G Direct Discovery Name Management Function (5G DDNMF).

The policy framework functionality for multicast-broadcast services in 5G is comprised of the functions of the Policy Control Function (PCF), the Multicast/Broadcast Service Function (MBSF), the Multicast-Broadcast Session Management Function (MB-SMF), the Network Exposure Function (NEF), the Unified Data Repository (UDR) and the Application Function (AF).

For the roaming scenario, the Security Edge Protection Proxy (SEPP) is deployed between the V-PCF and H-PCF. 3GPP TS 23.503 [4] specifies the 5G policy framework stage 2 functionality.

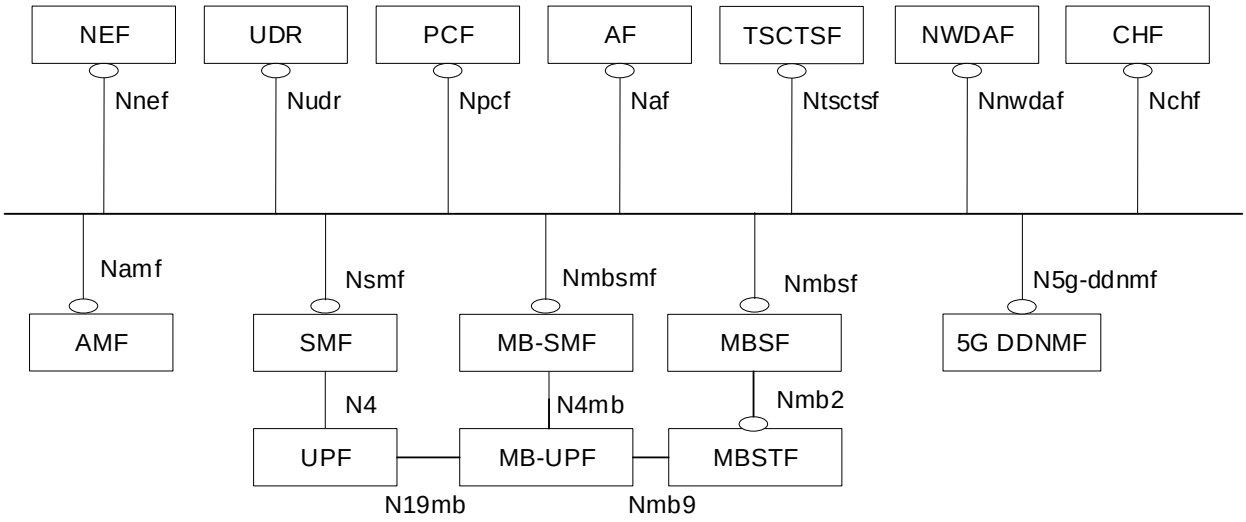

Figure 4.1-1a: Overall non-roaming 5G Policy framework architecture (service based representation)

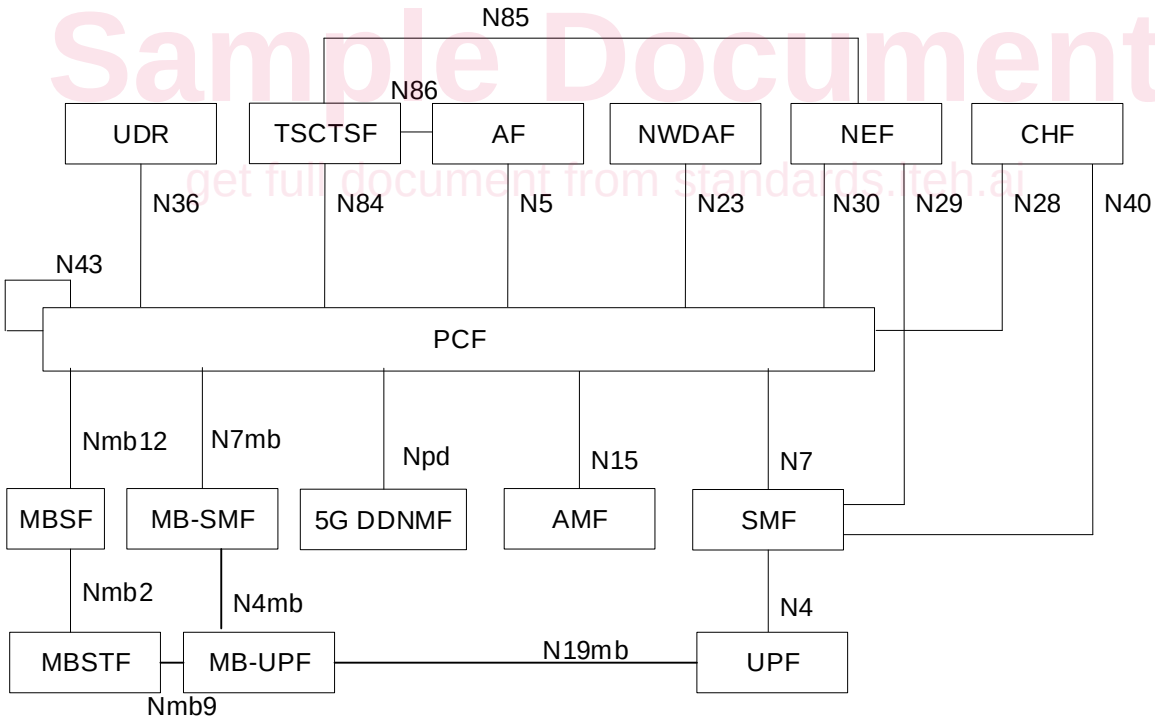

Figure 4.1-1b: Overall non-roaming 5G Policy framework architecture (reference point representation)

NOTE 1: The N4, N4mb, Nmb2, Nmb9 and N19mb interfaces are not part of the Policy Framework architecture but shown in the figures for completeness.

NOTE 2: If an SCP is deployed it can be used for indirect communication between NFs and NF services as described in Annex E of 3GPP TS 23.501 [2].

NOTE 3: MB-SMF, MBSTF, MB-UPF and MBSF apply only when the MBS PCC Architecture as described in 3GPP TS 23.247 [54] is deployed. In this case only the entities shown in that architecture are applicable.