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Contents

Foreword

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

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
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In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol and data model for the PLMN and/or SNPN interconnection Interface. It provides stage 3 protocol definitions and message flows, and specifies the APIs for the procedures on the PLMN interconnection interface (i.e N32).

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

The stage 2 level N32 procedures are specified in 3GPP TS 33.501 [6].

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 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

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

[6] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[7] IETF RFC 9113: "HTTP/2".

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

[9] IETF RFC 9110: "HTTP Semantics".

[10] Void.

[11] IETF RFC 793: "Transmission Control Protocol".

[12] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".

[13] IETF RFC 7518: "JSON Web Algorithms (JWA)".

[14] IETF RFC 7516: "JSON Web Encryption (JWE)".

[15] IETF RFC 4648: "The Base16, Base32, and Base64 Data Encodings".

[16] IETF RFC 7515: "JSON Web Signature (JWS)".

[17] IETF RFC 6901: "JavaScript Object Notation (JSON) Pointer".

[18] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".

[19] 3GPP TS 23.003: "Numbering, addressing and identification".

[20] 3GPP TR 21.900: "Technical Specification Group working methods".

[21] IETF RFC 7468: "Textual Encodings of PKIX, PKCS, and CMS Structures".

[22] IETF RFC 9457: "Problem Details for HTTP APIs".

[23] IETF RFC 1952: "GZIP file format specification version 4.3".

[24] Void

[25] 3GPP TS 29.518: "5G System; Access and Mobility Management Service; Stage 3".

[26] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

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

[28] 3GPP TS 22.261: "Service requirements for the 5G system; Stage 1".

[29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services; Stage 2".

[30] GSMA PRD IR.67: "DNS Guidelines for Service Providers and GRX and IPX Providers version 23.0".

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].

c-SEPP: The SEPP that is present on the NF service consumer side is called the c-SEPP.

p-SEPP: The SEPP that is present on the NF service producer side is called the p-SEPP.

NOTE: For the purpose of N32-c procedures, the two interacting SEPPs are called "initiating" SEPP and "responding" SEPP. The c-SEPP and p-SEPP terminology is not used in this specification though it is used in 3GPP TS 33.501 [6].

c-IPX: The IPX on the NF service consumer side.

p-IPX: The IPX of the NF service producer side.

N32-c context: This context is set up at the SEPP after the Security Capability Exchange procedure is finalized. It defines the security capability that is mutually agreed and effective for both the cSEPP and the pSEPP.

Roaming Hub: A type of Roaming Intermediary that provides a set of services to client PLMNs to facilitate the deployment and the operation of roaming and interworking services; as defined by GSMA (see clause 3.1 of 3GPP TS 33.501 [6]).

Roaming Intermediary: an entity that provides roaming related services (see clause 3.1 of 3GPP TS 33.501 [6]).

Leaf IE: it is a JSON attribute defined as a simple data type, an enumeration or an array of simple data type.

Non-Leaf IE: it is a JSON attribute defined as an object (i.e. structured data type) or an array of structured data type.

Recursive non-leaf IE: it is a non-leaf attribute defined with the same data type as one of its ancestor attributes (see examples in Annex F.3).

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].

GZIP	GNU ZIP
IPX	IP Exchange Service
JOSE	Javascript Object Signing and Encryption
JWE	JSON Web Encryption
JWS	JSON Web Signature
PRINS	PRotocol for N32 INterconnect Security
RI	Roaming Intermediary
SEPP	Security and Edge Protection Proxy
TLS	Transport Layer Security
UPU	UE Parameters Update

4 General Description

4.1 Introduction

This clause provides a general description of the interconnect interfaces used between the PLMNs and/or SNPNs for transporting the service based interface message exchanges.

4.2 N32 Interface

4.2.1 General

The N32 interface is used between SEPPs of different PLMNs for both roaming and PLMN interconnect scenarios.

The N32 interface may also be used between SEPPs from an SNPN and another SNPN or PLMN, for SNPN interconnect scenarios (e.g. for SNPN connectivity with a Credentials Holder network, see clause 5.30.2.9.3 of 3GPP TS 23.501 [2]). Unless specified otherwise, references to "PLMN" throughout this specification shall be substituted by "SNPN" for a SEPP that is deployed in an SNPN.

The SEPP that is on the NF service consumer side is called the c-SEPP and the SEPP that is on the NF service producer is called the p-SEPP. The NF service consumer or SCP may be configured with the c-SEPP or discover the c-SEPP by querying the NRF. The NF service producer or SCP may be configured with the p-SEPP or discover the p-SEPP by querying the NRF.

The N32 interface can be logically considered as 2 separate interfaces as given below.

- N32-c, a control plane interface between the SEPPs for performing initial handshake and negotiating the parameters to be applied for the actual N32 message forwarding.
- N32-f, a forwarding interface between the SEPPs which is used for forwarding the communication between the NF service consumer and the NF service producer after applying application level security protection or TLS security protection.

4.2.2 N32-c Interface

The following figure shows the scope of the N32-c interface.