

ETSI TS 129 544 V17.3.0 (2022-07)



**5G ;
5G System;
Secured Packet Application Function (SP-AF) services;
Stage 3
(3GPP TS 29.544 version 17.3.0 Release 17)**

<https://standards.iteh.ai/catalog/standards/sist/18cea90e-f60b-4425-8c6b-97d7b17f6fb7/etsi-ts-129-544-v17-3-0-2022-07>



ReferenceRTS/TSGC-0429544vh30

Keywords5G

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 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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.

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1 Scope

The present document specifies the stage 3 protocol and data model for the Nspaf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the SP-AF.

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].

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] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0..>
- [7] 3GPP TR 21.900: "Technical Specification Group working methods".
- [8] 3GPP TS 33.501: "Security architecture and procedures for 5G system".
- [9] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [10] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [11] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".
- [12] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [13] IETF RFC 7807: "Problem Details for HTTP APIs".
- [14] 3GPP TS 29.503: "Unified Data Management Services"; Stage 3.
- [15] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".
- [16] 3GPP TS 31.115: "Secured packet structure for (Universal) Subscriber Identity Module (U)SIM Toolkit applications".
- [17] 3GPP TS 29.509: "Authentication Server Services; Stage 3".
- [18] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)"
- [19] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

3 Definitions, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

Void.

3.3 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].

OTA	Over The Air
SOR-AF	Steering Of Roaming Application Function
SP-AF	Secured Packet Application Function
UDM	Unified Data Management

4 Overview

4.1 Introduction

Within the 5GC, the SP-AF offers services to the UDM and to the SOR-AF via the Nspaf service based interface.

The UDM or SOR-AF shall make use of the SP-AF services when it needs to protect UE parameters for which the final consumer is the USIM (see 3GPP TS 33.501 [8] clause 6.15.2.1).

Figure 4.1-1 provides the reference model with focus on the SP-AF.

NOTE: The generation of the secured packet and the definition of the storage and handling of OTA keys or other sensitive data are out of scope of this document. For more details, refer to 3GPP TS 23.040 [18] and 3GPP TS 31.115 [16].

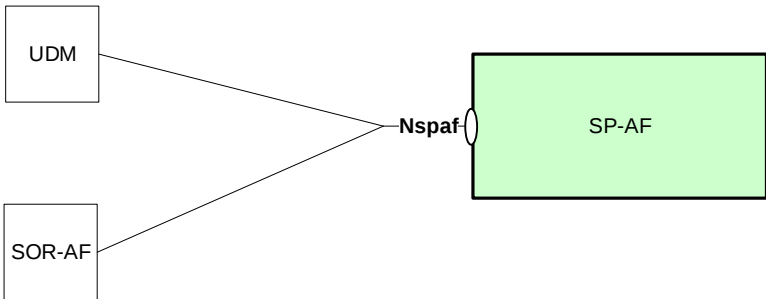


Figure 4.1-1: Reference model – SP-AF

5 Services offered by the SP-AF

5.1 Introduction

The SP-AF offers the following services via the Nspaf interface:

- Nspaf_SecuredPacket Service

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions					
Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Nspaf_SecuredPacket	6.1	Nspaf Secured Packet Service	TS29544_Nspaf_SecuredPacket.yaml	nspaf-secured-packet	A.2

5.2 Nspaf_SecuredPacket Service

5.2.1 Service Description

The Nspaf_SecuredPacket Service may be consumed by the NF consumer (e.g. UDM or SOR-AF) when it has detected that a UICC configuration parameter (e.g. Routing ID data or Steering of Roaming information) needs to be updated, and the new value is not available in secured packet format.

For the list of service operations see clause 5.2.2.1

5.2.2 Service Operations

5.2.2.1 Introduction

For the Nspaf_SecuredPacket service the following service operations are defined:

- Provide

The Nspaf_SecuredPacket Service is used by Consumer NFs (e.g. UDM or SOR-AF) to request the SP-AF to provide a secured packet that contains an UICC configuration parameter as sent in the request by means of the Provide service operation

5.2.2.2 Provide

5.2.2.2.1 General

This service operation is used by the NF Service Consumer (e.g. UDM or SOR-AF) to request construction of a secured packet that contains the provided UICC configuration information (e.g. Routing Indicator or Steering of Roaming information).

The following procedures using the Provide service operation are supported:

- Secured Packet Retrieval

5.2.2.2.2 Secured Packet Retrieval

Figure 5.2.2.2.2-1 shows a scenario where the NF consumer (e.g. UDM or SOR-AF) sends a request to the SP-AF to provide a secured packet.

The request contains the UE's identity ($\{supi\}$) and the UICC configuration parameter.

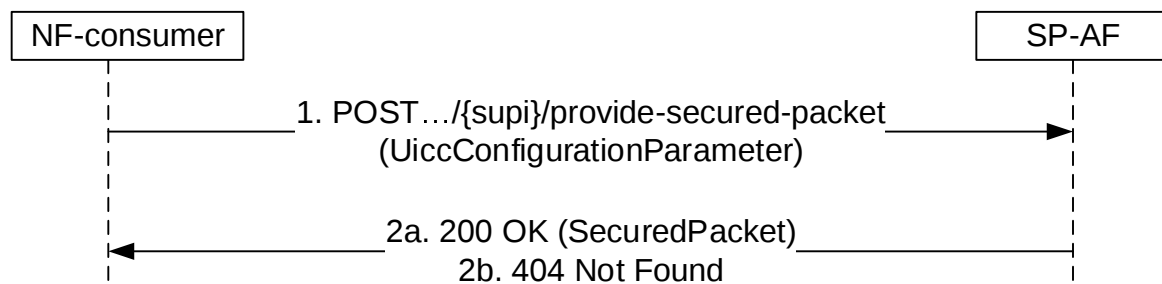


Figure 5.2.2.2-1: NF consumer requests the SP-AF to provide a secured packet

1. The NF consumer sends a POST request (custom method: provide-secured-packet) to the resource representing the SUPI.
- 2a. On success, the SP-AF responds with "200 OK", containing the requested SecuredPacket.
- 2b. If the resource does not exist (the supi is unknown in the SP-AF), the SP-AF returns the HTTP status code "404 Not Found", and additional error information should be included in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

6 API Definitions

6.1 Nspaf_SecuredPacket Service API

6.1.1 Introduction

The Nspaf_SecuredPacket service shall use the Nspaf_SecuredPacket API.

The request URI used in HTTP request from the NF service consumer towards the NF service producer shall have the structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The <apiName> shall be "nspaf-secured-packet".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, IETF RFC 7540 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [6] specification of HTTP messages and content bodies for the Nspaf_SecuredPacket API is contained in Annex A.