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**TECHNICAL SPECIFICATION**

**5G;
5G System;
5G ProSe Anchor Services;
Stage 3
(3GPP TS 29.553 version 18.3.0 Release 18)**

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# Contents

# Foreword

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

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where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

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.

# 1 Scope

The present document specifies the stage 3 protocol and data model for the Npanf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the 5G PAnF.

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

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in TS 29.500 [4] and 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 9113: "HTTP/2".

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

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

[14]    3GPP TS 33.503: "Security Aspects of Proximity based Services (ProSe) in the 5G System (5GS)".

[15]    3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; 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].

## 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].

    PAnF            Prose Anchor Function

# 4 Overview

The Prose Anchor Function (PAnF) is the network entity in the 5G Core Network (5GC) supporting security procedure over Control Plane for the 5G ProSe UE-to-Network relay and 5G ProSe UE-to-UE Relay as specified in 3GPP TS 33.503 [14]. Within the 5GC, the PAnF offers services to the AUSF and SMF via the Npanf service based interface.

Figure 4-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the PAnF:
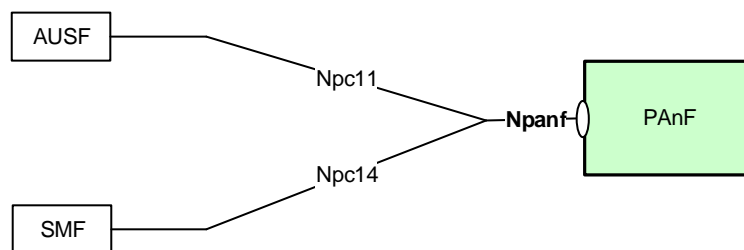


**Figure 4-1: Reference model – PAnF**

The PAnF supports the following functionalities:

- Storage and retrieval of ProSe context information of the 5G ProSe Remote UE and ProSe context information of the 5G ProSe End UE;

- Checking whether the 5G ProSe Remote UE is authorized to use the UE-to-Network Relay service and whether the End UE is authorized to use the UE-to-UE Relay service.

- Resolving the ProSe Remote User ID to SUPI.

# 5 Services offered by the 5G PAnF

## 5.1 Introduction

Table 5.1-1 shows the PAnF Services and PAnF Service Operations:

**Table 5.1-1: List of 5G PAnF Services**

| Service Name | Service Operations | Operation Semantics | Example Consumer(s) |
|---|---|---|---|
| Npanf_ProseKey | Register | Request/Response | AUSF |
| | Retrieve | Request/Response | AUSF |
| Npanf_ResolveRemoteUserId | Get | Request/Response | SMF |

Table 5.1-2 summarizes the corresponding APIs defined for this specification.

**Table 5.1-2: API Descriptions**

| Service Name | Clause | Description | OpenAPI Specification File | apiName | Annex |
|---|---|---|---|---|---|
| Npanf_ProseKey | 6.1 | PAnF Prose Key Service | TS29553_Npanf_ProseKey.yaml | npanf-prosekey | A.2 |
| Npanf_ResolveRemoteUserId | 6.2 | Resolve Remote User ID Service | TS29553_Npanf_ResolveRemoteUserId.yaml | npanf-userid | A.3 |

## 5.2 Npanf_ProseKey Service

### 5.2.1 Service Description

The Npanf_ProseKey service enables an NF to request the PAnF to store the ProSe context information for a 5G ProSe Remote UE or to store the ProSe context information for a 5G ProSe End UE or to request CP-PRUK from the PAnF. The following are the key functionalities of this NF service.

- Store the Prose context information;

- Retrieve the Prose Key.

### 5.2.2 Service Operations

#### 5.2.2.1 Introduction

The service operations defined for the Npanf_ProseKey service are as follows:

- Register: It allows a consumer NF to store the Prose Context information;

- Retrieve: It provides to the NF service consumer of the CP-PRUK matching input criteria.

### 5.2.2.2 Register

#### 5.2.2.2.1 General

The Register service operation is invoked by a NF Service Consumer to request the PAnF to store the ProSe context information for a 5G ProSe Remote UE or to store the ProSe context information for a 5G ProSe End UE.

The Register service operation is used during the following procedure:

- PC5 security establishment for 5G ProSe UE-to-Network relay communication over Control Plane (see 3GPP TS 33.503 [14], clause 6.3.3.3.2)

The NF Service Consumer (i.e. AUSF) shall request the PAnF to store the ProSe context information for a 5G ProSe Remote UE or to store the ProSe context information for a 5G ProSe End UE as shown in Figure 5.2.2.2.1-1
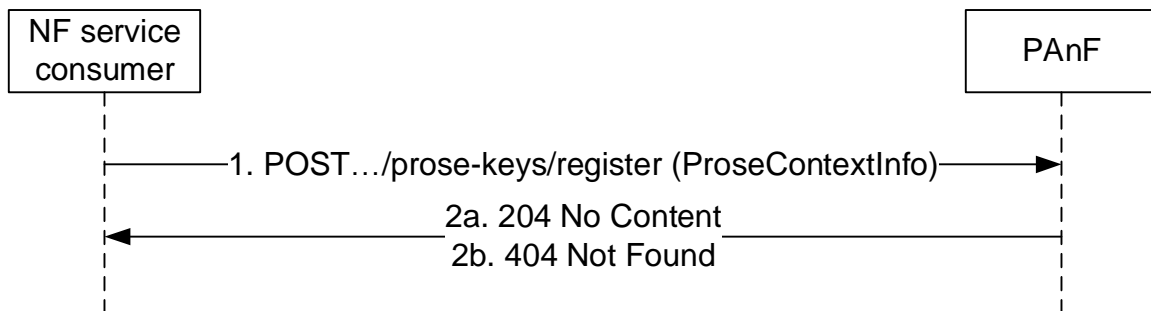


**Figure 5.2.2.2.1-1: Prose Keys registration**

1. The NF service consumer (e.g. AUSF) sends a POST request to the resource representing the Prose Context Info for a 5G ProSe Remote UE or the Prose Context Info for a 5G ProSe End UE.

2a. On success, the PAnF responds with "204 No Content".

2b. If the user does not exist, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "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.

### 5.2.2.3 Retrieve

#### 5.2.2.3.1 General

Figure 5.2.2.3.1-1 shows a scenario where the NF service consumer (e.g. AUSF) sends a request to the PAnF to retrieve the CP-PRUK. The request contains the CP-PRUK ID and Relay Service Code.
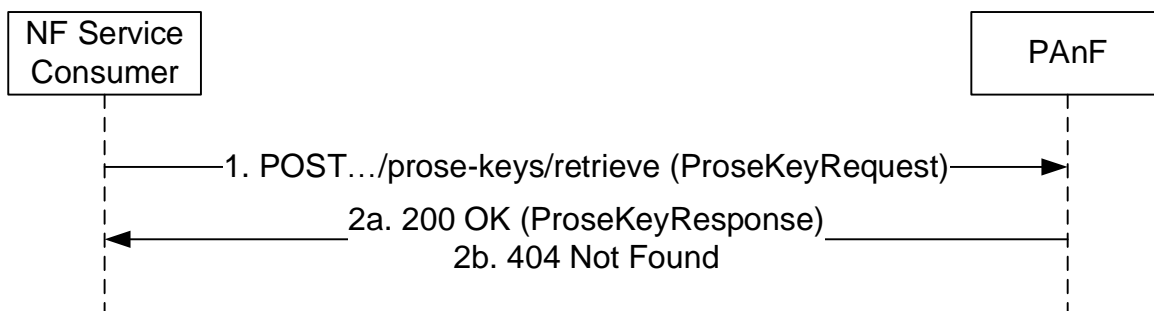


**Figure 5.2.2.3.1-1: Prose Keys retrieval**

1. The NF service consumer (e.g. AUSF) sends a POST request to the resource representing the Prose Key.

2a. On success, the PAnF responds with "200 OK" with the message body containing the ProseKeyResponse.

2b. If the user does not exist, or the ProSe Key does not exist in the in the PAnF, HTTP status code "404 Not Found" shall be returned and additional error information should be included in the response body (in the "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.

# 5.3 Npanf_ResolveRemoteUserId Service

## 5.3.1 Service Description

This service enables an NF service consumer (i.e. SMF) to request the PAnF to resolve the Remote User ID. The following are the key functionalities of this NF service.

- Resolve the Remote User ID

## 5.3.2 Service Operations

### 5.3.2.1 Introduction

### 5.3.2.2 ResolveRemoteUserId

#### 5.3.2.2.1 General

The ResolveRemoteUserId service operation is invoked by a NF Service Consumer, i.e. SMF, towards the PAnF to Resolve the Remote User ID.

The ResolveRemoteUserId service operation is used during the following procedure:

- PC5 security establishment for 5G ProSe UE-to-Network relay communication over Control Plane (see 3GPP TS 33.503 [14], clause 6.3.3.3.2)

The NF Service Consumer (i.e. SMF) shall resolve the Remote User ID by invoking the "get" custom method on the resource URI of "Resolve Remote User ID" resource, see clause 6.y.3.2.4. See also Figure 5.3.2.2.1-1.
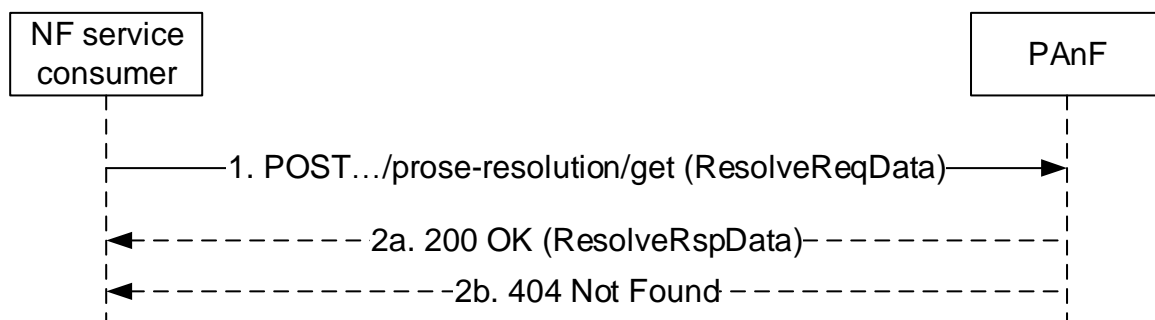


**Figure 5.3.2.2-1: Resolve the Remote User ID**

1. The NF service consumer sends a POST request to the resource representing the get custom operation. The request body shall contain the Remote User ID (CP-PRUK ID).

2a. On success, "200 OK" shall be returned. The response body shall contain the SUPI.

2b. If the user does not exist, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "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 Npanf_ProseKey Service API

### 6.1.1 Introduction

The Npanf_ProseKey service shall use the Npanf_ProseKey API.

The API URI of the Npanf_ProseKey API shall be:

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

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI 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 "npanf-prosekey".

- 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 9113 [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 Npanf_ProseKey API is contained in Annex A.

#### 6.1.2.2 HTTP standard headers

##### 6.1.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

##### 6.1.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 9457 [13].

#### 6.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

## 6.1.3 Resources

### 6.1.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 6.1.3.1-1 depicts the resource URIs structure for the Npanf_ProseKey API.
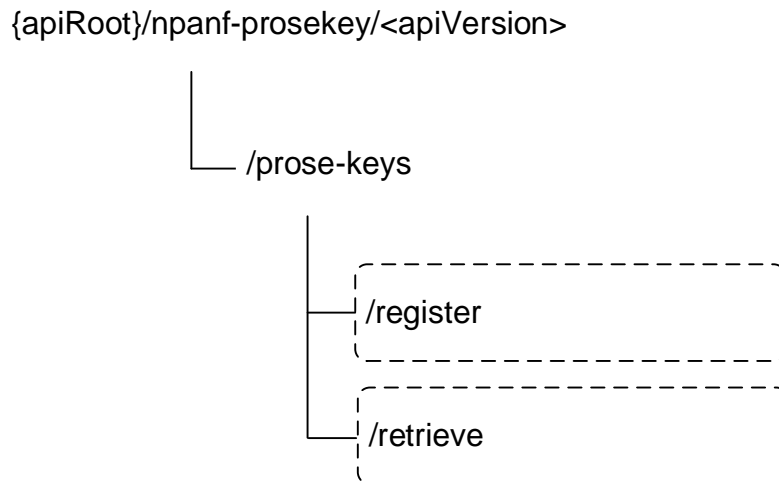


**Figure 6.1.3.1-1: Resource URI structure of the Npanf_ProseKey API**

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

**Table 6.1.3.1-1: Resources and methods overview**

| Resource name | Resource URI | HTTP method or custom operation | Description |
|---|---|---|---|
| Prose Keys | /prose-keys/register | register (POST) | Store the Prose Context |
| | /prose-keys/retrieve | retrieve (POST) | Retrieve the CP-PRUK |

### 6.1.3.2 Resource: Prose Keys

#### 6.1.3.2.1 Description

This resource is used to represent Prose Keys Registration and Retrieval.

#### 6.1.3.2.2 Resource Definition

Resource URI: {apiRoot}/npanf-prosekey/<apiVersion>/prose-keys

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

**Table 6.1.3.2.2-1: Resource URI variables for this resource**

| Name | Data type | Definition |
|---|---|---|
| apiRoot | string | See clause 6.1.1 |

### 6.1.3.2.3          Resource Standard Methods

No HTTP method has been defined for the Prose Keys resource.

### 6.1.3.2.4          Resource Custom Operations

#### 6.1.3.2.4.1          Overview

**Table 6.1.3.2.4.1-1: Custom operations**

| Operation name | Custom operation URI | Mapped HTTP method | Description |
|---|---|---|---|
| register | /prose-keys/register | POST | Store the Prose Context Info |
| retrieve | /prose-keys/retrieve | POST | Retrieve the CP-PRUK |

#### 6.1.3.2.4.2          Operation: register

##### 6.1.3.2.4.2.1          Description

The registration custom operation is used by the NF service consumer (AUSF) to store the Prose context info. For details see 3GPP TS 33.503 [14].

##### 6.1.3.2.4.2.2          Operation Definition

This operation shall support the request data structures specified in table 6.1.3.2.4.2.2-1 and the response data structure and response codes specified in table 6.1.3.2.4.2.2-2.

**Table 6.1.3.2.4.2.2-1: Data structures supported by the POST Request Body on this resource**

| Data type | P | Cardinality | Description |
|---|---|---|---|
| ProseContextInfo | M | 1 | Contains the SUPI, CP-PRUK, CP-PRUK ID, RSC. |

**Table 6.1.3.2.4.2.2-2: Data structures supported by the POST Response Body on this resource**

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:<br>- USER_NOT_FOUND |
| NOTE:          The mandatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply. | | | | |

#### 6.1.3.2.4.3          Operation: retrieve

##### 6.1.3.2.4.3.1          Description

The retrieval custom operation is used by the NF service consumer (AUSF) to retrieve the Prose Key. For details see 3GPP TS 33.503 [14].

##### 6.1.3.2.4.3.2          Operation Definition

This operation shall support the request data structures specified in table 6.1.3.2.4.3.2-1 and the response data structure and response codes specified in table 6.1.3.2.4.3.2-2.

**Table 6.1.3.2.4.3.2-1: Data structures supported by the POST Request Body on this resource**

| Data type | P | Cardinality | Description |
|---|---|---|---|
| ProseKeyRequest | M | 1 | Contains the 5GPRUK ID, RSC. |

**Table 6.1.3.2.4.3.2-2: Data structures supported by the POST Response Body on this resource**

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| ProseKeyResponse | M | 1 | 200 OK | Upon success, a response body containing the Prose Key shall be returned. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors:<br>- USER_NOT_FOUND<br>- DATA_NOT_FOUND |
| NOTE: The mandatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply. | | | | |

## 6.1.4 Custom Operations without associated resources

There is no custom operation without associated resources supported in Npanf_ProseKey Service.

## 6.1.5 Notifications

There is no notification defined for Npanf_ProseKey service.

## 6.1.6 Data Model

### 6.1.6.1 General

This clause specifies the application data model supported by the API.

Table 6.1.6.1-1 specifies the data types defined for the Npanf_ProseKey service based interface protocol.

**Table 6.1.6.1-1: Npanf_ProseKey specific Data Types**

| Data type | Clause defined | Description | Applicability |
|---|---|---|---|
| ProseContextInfo | 6.1.6.2.2 | ProSe Context Information | |
| ProseKeyRequest | 6.1.6.2.3 | Contains the CP-PRUK ID, RSC. | |
| ProseKeyResponse | 6.1.6.2.4 | Contains the CP-PRUK | |
| 5GPruk | 6.1.6.3.2 | ProSe Remote User Key over Control Plane | |

Table 6.1.6.1-2 specifies data types re-used by the Npanf_ProseKey service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Npanf_ProseKey service based interface.

**Table 6.1.6.1-2: Npanf_ProseKey re-used Data Types**

| Data type | Reference | Comments | Applicability |
|---|---|---|---|
| RelayServiceCode | 3GPP TS 29.571 [15] | Relay Service Code | |
| Supi | 3GPP TS 29.571 [15] | see 3GPP TS 23.501 [2] clause 5.9.2 | |
| 5GPrukId | 3GPP TS 29.571 [15] | ProSe Remote User Key ID over Control Plane | |

### 6.1.6.2 Structured data types

#### 6.1.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

#### 6.1.6.2.2 Type: ProseContextInfo

**Table 6.1.6.2.2-1: Definition of type ProseContextInfo**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| supi | Supi | M | 1 | The SUPI of the UE | |
| 5gPrukId | 5GPrukId | M | 1 | This IE shall indicate the CP-PRUK ID of the 5G ProSe Remote UE or the 5G ProSe End UE. | |
| 5gPruk | 5GPruk | M | 1 | This IE shall indicate the CP-PRUK of the 5G ProSe Remote UE or the 5G ProSe End UE. | |
| relayServiceCode | RelayServiceCode | M | 1 | This IE shall indicate the Relay Service Code from the 5G ProSe Remote UE or the 5G ProSe End UE. | |

#### 6.1.6.2.3 Type: ProseKeyRequest

**Table 6.1.6.2.3-1: Definition of type ProseKeyRequest**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| 5gPrukId | 5GPrukId | M | 1 | This IE shall indicate the CP-PRUK ID of the 5G ProSe Remote UE or the 5G ProSe End UE. | |
| relayServiceCode | RelayServiceCode | M | 1 | This IE shall indicate the Relay Service Code from the 5G ProSe Remote UE or the 5G ProSe End UE. | |

#### 6.1.6.2.4 Type: ProseKeyResponse

**Table 6.1.6.2.4-1: Definition of type ProseKeyResponse**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| 5gPruk | 5GPruk | M | 1 | This IE shall indicate the CP-PRUK of the 5G ProSe Remote UE or the 5G ProSe End UE. | |

### 6.1.6.3 Simple data types and enumerations

#### 6.1.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

### 6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

**Table 6.1.6.3.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|-------------|---------------|
| 5GPruk | string | ProSe Remote User Key over Control Plane<br><br>String value carrying the CP-PRUK in hexadecimal presentation.<br>pattern: "^[A-Fa-f0-9]{64}$" | |

### 6.1.6.4 Data types describing alternative data types or combinations of data types

There is no data type describing alternative data types or combinations of data types in Npanf_ProseKey Service.

### 6.1.6.5 Binary data

There is no binary data type in Npanf_ProseKey Service.

## 6.1.7 Error Handling

### 6.1.7.1 General

For the Npanf_ProseKey API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4].

In addition, the requirements in the following clauses are applicable for the Npanf_ProseKey API.

### 6.1.7.2 Protocol Errors

No specific procedures for the Npanf_ProseKey service are specified.

### 6.1.7.3 Application Errors

The application errors defined for the Npanf_ProseKey service are listed in Table 6.1.7.3-1.

**Table 6.1.7.3-1: Application errors**

| Application Error | HTTP status code | Description |
|-------------------|------------------|-------------|
| USER_NOT_FOUND | 404 Not Found | The provided subscriber identifier is not found. |
| DATA_NOT_FOUND | 404 Not Found | The requested data is not found/does not exist. |

## 6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Npanf_ProseKey API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

**Table 6.1.8-1: Supported Features**

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
| | | |

## 6.1.9    Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Npanf_ProseKey API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Npanf_ProseKey API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.2.2.

NOTE:    When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Npanf_ProseKey service.

The Npanf_ProseKey API defines the followingscopes for OAuth2 authorization as specified in 3GPP TS 33.501 [8]:

**Table 6.1.9-1: OAuth2 scopes defined in Npanf_ProseKey API**

| Scope | Description |
|---|---|
| "npanf_prosekey" | Access to the Npanf_ProseKey API. |
| "npanf_prosekey:register:invoke" | Access to invoke register Prose Context |
| "npanf_prosekey:retrieve:invoke" | Access to invoke retrieve CP-PRUK |

# 6.2      Npanf_ResolveRemoteUserId Service API

## 6.2.1    Introduction

The Npanf_ResolveRemoteUserId shall use the Npanf_ResolveRemoteUserId API.

The API URI of the Npanf_ResolveRemoteUserId API shall be:

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

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [6], i.e.:

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

with the following components:

-    The {apiRoot} shall be set as described in 3GPP TS 29.501 [6].

-    The <apiName> shall be "npanf-userid".

-    The <apiVersion> shall be "v1".

-    The <apiSpecificResourceUriPart> shall be set as described in clause 6.2.3.

## 6.2.2    Usage of HTTP

### 6.2.2.1      General

HTTP/2, IETF RFC 9113 [8], shall be used as specified in clause 5 of 3GPP TS 29.500 [5].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [5].

The OpenAPI [7] specification of HTTP messages and content bodies for the Npanf_ResolveRemoteUserId API is contained in Annex A.

### 6.2.2.2      HTTP standard headers

#### 6.2.2.2.1         General

See clause 5.2.2 of 3GPP TS 29.500 [5] for the usage of HTTP standard headers.

#### 6.2.2.2.2         Content type

JSON, IETF RFC 8259 [9], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [5]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 9457 [13].

### 6.2.2.3      HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

## 6.2.3      Resources

### 6.2.3.1      Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 6.2.3.1-1 describes the resource URI structure of the Npanf_ResolveRemoteUserId API.
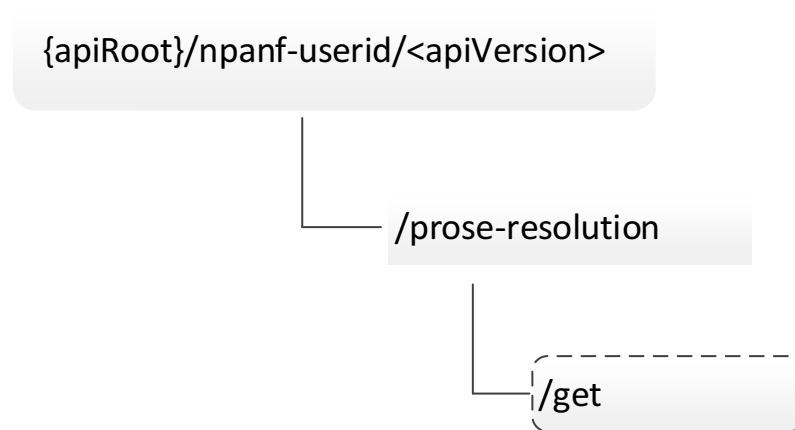


**Figure 6.2.3.1-1: Resource URI structure of the Npanf_ResolveRemoteUserId API**

Table 6.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

**Table 6.2.3.1-1: Resources and methods overview**

| Resource name | Resource URI | HTTP method or custom operation | Description |
|---|---|---|---|
| Resolve Remote User ID | /prose-resolution | get (POST) | ResolveRemoteUserId service operation |

### 6.2.3.2 Resource: Resolve Remote User ID

#### 6.2.3.2.1 Description

This resource represents resolving Remote User ID by the PAnF.

#### 6.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/<apiName>/<apiVersion>/prose-resolution**

This resource shall support the resource URI variables defined in table 6.2.3.2.2-1.

**Table 6.2.3.2.2-1: Resource URI variables for this resource**

| Name | Data type | Definition |
|------|-----------|------------|
| apiRoot | string | See clause 6.2.1 |

#### 6.2.3.2.3 Resource Standard Methods

There is no standard method supported by the resource.

#### 6.2.3.2.4 Resource Custom Operations

##### 6.2.3.2.4.1 Overview

**Table 6.2.3.2.4.1-1: Custom operations**

| Operation name | Custom operaration URI | Mapped HTTP method | Description |
|----------------|------------------------|--------------------|-------------|
| get | {resourceUri}/get | POST | ResolveRemoteUserId service operation |

##### 6.2.3.2.4.2 Operation: get

###### 6.2.3.2.4.2.1 Description

This custom operation requests to resolve the Remote User ID by the PAnF.

###### 6.2.3.2.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 6.2.3.2.4.2.2-1 and the response data structure and response codes specified in table 6.2.3.2.4.2.2-2.

**Table 6.2.3.2.4.2.2-1: Data structures supported by the POST Request Body on this resource**

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| ResolveReqData | M | 1 | Resolve Request Data, including the Remote User ID of the 5G ProSe Remote UE. |

**Table 6.2.3.2.4.2.2-2: Data structures supported by the POST Response Body on this resource**

| Data type | P | Cardinality | Response codes | Description |
|---|---|---|---|---|
| ResolveRspData | M | 1 | 200 OK | Resolve Response Data, including the SUPI of the 5G ProSe Remote UE. |
| ProblemDetails | O | 0..1 | 404 Not Found | The "cause" attribute shall be set to one of the following application error:<br>- USER_NOT_FOUND<br>See table 6.2.7.3-1 for the description of these errors. |
| NOTE1: The manadatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [5] also apply. | | | | |
| NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

## 6.2.4 Custom Operations without associated resources

There is no custom operation without associated resources supported in Npanf_ResolveRemoteUserId Service.

## 6.2.5 Notifications

There is no notification defined for Npanf_ResolveRemoteUserId service.

## 6.2.6 Data Model

### 6.2.6.1 General

This clause specifies the application data model supported by the API.

Table 6.2.6.1-1 specifies the data types defined for the Npanf_ResolveRemoteUserId service based interface protocol.

**Table 6.2.6.1-1: Npanf_ResolveRemoteUserId specific Data Types**

| Data type | Clause defined | Description | Applicability |
|---|---|---|---|
| ResolveReqData | 6.2.6.2.2 | Resolve Request Data, including the Remote User ID of the 5G ProSe Remote UE. | |
| ResolveRspData | 6.2.6.2.3 | Resolve Response Data, including the SUPI of the 5G ProSe Remote UE. | |

Table 6.2.6.1-2 specifies data types re-used by the Npanf_ResolveRemoteUserId service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Npanf_ResolveRemoteUserId service based interface.

**Table 6.2.6.1-2: Npanf_ResolveRemoteUserId re-used Data Types**

| Data type | Reference | Comments | Applicability |
|---|---|---|---|
| Supi | 3GPP TS 29.571 [15] | Supi | |
| 5GPrukId | 3GPP TS 29.571 [15] | ProSe Remote User Key ID over Control Plane | |

### 6.2.6.2 Structured data types

#### 6.2.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

6.2.6.2.2          Type: ResolveReqData

**Table 6.2.6.2.2-1: Definition of type ResolveReqData**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| cpPrukId | 5GPrukId | M | 1 | This IE shall indicate the CP-PRUK ID of the 5G ProSe Remote UE. | |

6.2.6.2.3          Type: ResolveRspData

**Table 6.2.6.2.3-1: Definition of type ResolveRspData**

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|---|---|---|---|---|---|
| supi | Supi | M | 1 | This IE shall indicate the SUPI. | |

## 6.2.6.3          Simple data types and enumerations

### 6.2.6.3.1          Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

### 6.2.6.3.2          Simple data types

The simple data types defined in table 6.2.6.3.2-1 shall be supported.

**Table 6.2.6.3.2-1: Simple data types**

| Type Name | Type Definition | Description | Applicability |
|---|---|---|---|
| | | | |

## 6.2.6.4          Data types describing alternative data types or combinations of data types

There is no data type describing alternative data types or combinations of data types in Npanf_ResolveRemoteUserId Service.

## 6.2.6.5          Binary data

There is no binary data type in Npanf_ResolveRemoteUserId Service.

## 6.2.7          Error Handling

### 6.2.7.1          General

For the Npanf_ResolveRemoteUserId API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [6]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [5] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [5].

In addition, the requirements in the following clauses are applicable for the Npanf_ResolveRemoteUserId API.

### 6.2.7.2          Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [5].

### 6.2.7.3 Application Errors

The application errors defined for the Npanf_ResolveRemoteUserId service are listed in Table 6.2.7.3-1.

**Table 6.2.7.3-1: Application errors**

| Application Error | HTTP status code | Description |
|---|---|---|
| USER_NOT_FOUND | 404 Not Found | The provided subscriber identifier is not found. |

## 6.2.8 Feature negotiation

The optional features in table 6.2.8-1 are defined for the Npanf_ResolveRemoteUserId API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [5].

**Table 6.2.8-1: Supported Features**

| Feature number | Feature Name | Description |
|---|---|---|
| N/A | | |

## 6.2.9 Security

As indicated in 3GPP TS 33.501 [11] and 3GPP TS 29.500 [5], the access to the Npanf_ResolveRemoteUserId API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [12]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [13]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Npanf_ResolveRemoteUserId API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [13], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Npanf_ResolveRemoteUserId service.

The Npanf_ResolveRemoteUserId API defines a single scope "npanf-userid" for OAuth2 authorization (as specified in 3GPP TS 33.501 [11]) for the entire service, and it does not define any additional scopes at resource or operation level.

# Annex A (normative): OpenAPI specification

# A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE 1: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [5] and clause 5B of 3GPP TR 21.900 [7]).

# A.2 Npanf_ProseKey API

```
openapi: 3.0.0

info:
  title: Npanf_ProseKey
  version: 1.1.0-alpha.2
  description: |
    PAnF ProseKey Service.
    © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: 3GPP TS 29.553 V18.1.0; 5G System; 5G ProSe Anchor Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.553/

servers:
  - url: '{apiRoot}/npanf-prosekey/<apiVersion>'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - npanf-prosekey

paths:
  /prose-keys/register:
    post:
      summary: Register the Prose Key
      operationId: ProseKeyRegistration
      tags:
        - prosekey registration
      security:
        - {}
        - oAuth2ClientCredentials:
          - npanf_prosekey
        - oAuth2ClientCredentials:
          - npanf_prosekey
          - npanf_prosekey:register:invoke
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ProseContextInfo'
        required: true
```

```
      responses:
        '204':
          description: Successful Response
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '502':
          $ref: 'TS29571_CommonData.yaml#/components/responses/502'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          description: Unexpected error

  /prose-keys/retrieve:
    post:
      summary: retrieve the prose key
      operationId: ProseKeyRetrieval
      tags:
        - Prose Key Retrieval
      security:
        - {}
        - oAuth2ClientCredentials:
          - npanf_prosekey
        - oAuth2ClientCredentials:
          - npanf_prosekey
          - npanf_prosekey:retrieve:invoke
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ProseKeyRequest'
        required: true
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ProseKeyResponse'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '502':
          $ref: 'TS29571_CommonData.yaml#/components/responses/502'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          description: Unexpected error
```

```
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            npanf-prosekey: Access to the Npanf_ProseKey API
            npanf-prosekey:register:invoke: Access to invoke register Prose Context
            npanf-prosekey:retrieve:invoke: Access to invoke retrieve CP-PRUK

  schemas:
#
#  Structured Data Types
#
    ProseContextInfo:
      description: Prose Context Info.
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
        5gPruk:
          $ref: '#/components/schemas/5GPruk'
        5gPrukId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GPrukId'
        relayServiceCode:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RelayServiceCode'
      required:
        - supi
        - 5gPruk
        - 5gPrukId
        - relayServiceCode

    ProseKeyRequest:
      description: Prose Key Request.
      type: object
      properties:
        5gPrukId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GPrukId'
        relayServiceCode:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/RelayServiceCode'
      required:
        - 5gPrukId
        - relayServiceCode

    ProseKeyResponse:
      description: Prose Key Response.
      type: object
      properties:
        5gPruk:
          $ref: '#/components/schemas/5GPruk'
      required:
        - 5gPruk

#
#  Simple Data Types
#
    5GPruk:
      description: ProSe Remote User Key over Control Plane
      type: string
      pattern: '^[A-Fa-f0-9]{64}$'

#
#  Enumeration Data Types
#
```

# A.3     Npanf_ResolveRemoteUserId API

```
openapi: 3.0.0
info:
  version: '1.1.0-alpha.1'
  title: 'Npanf_ResolveRemoteUserId'
```

```
      description: |
        PAnF Resolve Remote User Id Service.
        © 2023, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
        All rights reserved.

externalDocs:
  description: 3GPP TS 29.553 V18.3.0; 5G System; 5G ProSe Anchor Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.553/

servers:
  - url: '{apiRoot}/npanf-userid/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

security:
  - {}
  - oAuth2ClientCredentials:
    - npanf-userid

paths:
  /prose-resolution/get:
    post:
      summary: Request to resolve the Remote User ID
      operationId: ProseResolve
      tags:
        - Resolve Remote User ID
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ResolveReqData'
      responses:
        '200':
          description: Success
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ResolveRspData'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '502':
          $ref: 'TS29571_CommonData.yaml#/components/responses/502'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          description: Unexpected error

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            npanf-userid: Access to the Npanf_ResolveRemoteUserId API

  schemas:
#
```

```
#   Structured Data Types
#
    ResolveReqData:
      description: Representation of the Resolve Request Data.
      type: object
      properties:
        cpPrukId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/5GPrukId'
      required:
        - cpPrukId

    ResolveRspData:
      description: Representation of the Resolve Response Data.
      type: object
      properties:
        supi:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
      required:
        - supi

#
#   Simple Data Types
#


#
#   Enumeration Data Types
#
```

# Annex B (informative):
# Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2022-08 | CT4#111 e | C4-224498 | | | | Initial draft<br>Implementation of pCRs agreed in CT4#111-e including  C4-224430,C4-224046,C4-224431,C4-224432,C4-224592,C4-224433,C4-224593,C4-224373,C4-224374,C4-224594,C4-224595,C4-224377,C4-224378,C4-224596 | 0.1.0 |
| 2022-09 | CT#97-e | CP-222239 | | | | TS presented for information and approval | 1.0.0 |
| 2022-09 | CT#97-e | | | | | Approved in CT#97-e | 17.0.0 |
| 2022-12 | CT#98-e | CP-223054 | 0002 | 2 | F | 5GPRUK Name Alignment | 17.1.0 |
| 2022-12 | CT#98-e | CP-223054 | 0003 | 1 | F | Remove editor's note and white spaces | 17.1.0 |
| 2022-12 | CT#98-e | CP-223028 | 0001 | 1 | F | Missing Mandatory Status Codes in OpenAPI | 18.0.0 |
| 2022-12 | CT#98-e | CP-223033 | 0007 | - | F | 29.553 Rel-18 API version and External doc update | 18.0.0 |
| 2023-06 | CT#100 | CP-231026 | 0011 | - | B | OAuth2 scopes in the Npanf_ProseKey API | 18.1.0 |
| 2023-06 | CT#100 | CP-231078 | 0015 | 2 | A | Adding Npanf_ResolveRemoteUserId service | 18.1.0 |
| 2023-06 | CT#100 | CP-231070 | 0018 | - | F | 29.553 Rel-18 API version and External doc update | 18.1.0 |
| 2023-09 | CT#101 | CP-232071 | 0021 | - | A | Resolve Editor's Note | 18.2.0 |
| 2023-09 | CT#101 | CP-232071 | 0023 | 1 | F | Corrections on Npanf_ResolveRemoteUserId | 18.2.0 |
| 2023-12 | CT#102 | CP-233055 | 0024 | 1 | B | Update the functionalities of PAnF | 18.3.0 |
| 2023-12 | CT#102 | CP-233028 | 0025 | 1 | F | RFC7540 obsoleted by RFC9113 | 18.3.0 |
| 2023-12 | CT#102 | CP-233031 | 0028 | 1 | F | ProblemDetails RFC 7807 obsoleted by 9457 | 18.3.0 |
| 2023-12 | CT#102 | CP-233031 | 0029 | 1 | F | Editorial Correction | 18.3.0 |
| 2023-12 | CT#102 | CP-233082 | 0030 | - | F | 29.553 Rel-18 API version and External doc update | 18.3.0 |

# History

| Document history | | |
|---|---|---|
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