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Contents

Foreword

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

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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 Nnssf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the NSSF.

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 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md.

[7] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[8] IETF RFC 6902: "JavaScript Object Notation (JSON) Patch".

[9] 3GPP TS 23.003: "Numbering, addressing and identification".

[10] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[11] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[12] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[13] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".

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

[15] IETF RFC 7807: "Problem Details for HTTP APIs".

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

[17] 3GPP TR 21.900: "Technical Specification Group working methods".

[18] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[19] IETF RFC 7694: "Hypertext Transfer Protocol (HTTP) Client-Initiated Content-Encoding".

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].

4 Overview

4.1 Introduction

Within the 5GC, the NSSF offers services to the AMF and NSSF in a different PLMN via the Nnssf service based interface (see 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]).

Figure 4.1-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the NSSF and the scope of the present specification.

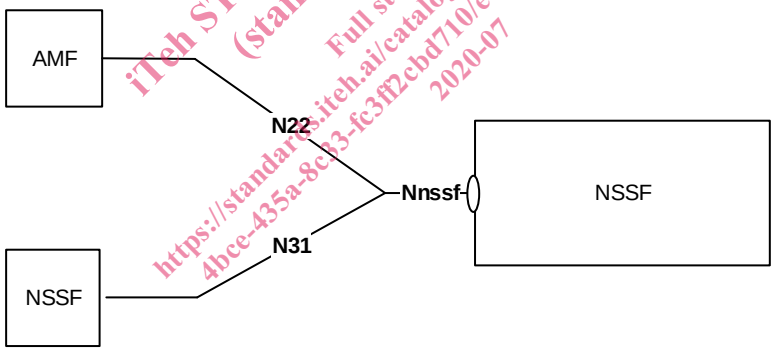

Figure 4.1-1: NSSF in 5G System architecture

The functionalities supported by the NSSF are listed in clause 6.2.14 of 3GPP TS 23.501 [2].

5 Services offered by the NSSF

5.1 Introduction

The NSSF supports the following services.

Table 5.1-1: NF Services provided by NSSF

Service Name	Description	Example Consumer
Nnssf_NSSelection	This service enables Network Slice selection in both the Serving PLMN and the HPLMN	AMF, V-NSSF
Nnssf_NSSAIAvailability	This service enables to update the S-NSSAI(s) the NF service consumer (e.g AMF) supports on a per TA basis on the NSSF and to subscribe and notify any change in status, on a per TA basis, of the SNSSAIs available per TA (unrestricted) and the restricted S-NSSAI(s) per PLMN in that TA in the serving PLMN of the UE.	AMF

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
Nnssf_NSSelection	6.1	NSSF Network Slice Selection Service	TS29531_Nnssf_NSSelection.yaml	nnssf-nsselection	A.2
Nnssf_NSSAIAvailability	6.2	NSSF NSSAI Availability Service	TS29531_Nnssf_NSSAIAvailability.yaml	nnssf-nssaiavailability	A.3

5.2 Nnssf_NSSelection Service

5.2.1 Service Description

The Nnssf_NSSelection service is used by an NF Service Consumer (e.g. AMF or NSSF in a different PLMN) to retrieve the information related to network slice in the non-roaming and roaming case. It also enables the NSSF to provide to the AMF the Allowed NSSAI and the Configured NSSAI for the Serving PLMN. The NF service consumer discovers the NSSF based on the local configuration. The NSSF in a different PLMN is discovered based on the self-constructed FQDN as specified in 3GPP TS 23.003 [9].

5.2.2 Service Operations

5.2.2.1 Introduction

For the Nnssf_NSSelection service the following service operations are defined:

- Get.

5.2.2.2 GET

5.2.2.2.1 General

The Get operation shall be used in the non-roaming or roaming scenario to retrieve:

- The Allowed NSSAI, Configured NSSAI, target AMF Set or the list of candidate AMF(s), and optionally
  - The Mapping Of Allowed NSSAI;
  - The Mapping Of Configured NSSAI;
  - NSI ID(s) associated with the Network Slice instances of the Allowed NSSAI;

- NRF(s) to be used to select NFs/services within the selected Network Slice instance(s) and NRF to be used to determine the list of candidate AMF(s) from the AMF Set, during Registration procedure and
- Information on whether the S-NSSAI(s) not included in the Allowed NSSAI which were part of the Requested NSSAI are rejected in the serving PLMN or in the current TA.

- The NRF to be used to select NFs/services within the selected network slice instance, and optionally the NSI ID associated with the S-NSSAI provided in the input, during the PDU Session Establishment procedure.

It is used in the following procedures:

- Registration with AMF re-allocation (see clause 4.2.2.2.3 of 3GPP TS 23.502 [3]);
- EPS to 5GS handover using N26 interface (see clause 4.11.1.2.2 of 3GPP TS 23.502 [3]);
- UE Configuration Update procedure (see clause 4.2.4.2 of 3GPP TS 23.502 [3]);
- SMF selection for non-roaming and roaming with local breakout (see clause 4.3.2.2.3.2 of 3GPP TS 23.502 [3]) or SMF selection for home-routed roaming scenario (see clause 4.3.2.2.3.3 of 3GPP TS 23.502 [3]).

NOTE: The list of procedures above, which trigger invoking of the Nnssf_NSSelection_Get service operation, is not exhaustive.

5.2.2.2.2 Get service operation of Nnssf_NSSelection service

In this procedure, the NF Service Consumer (e.g. AMF) retrieves the Allowed NSSAI, Configured NSSAI, target AMF Set or the list of candidate AMF(s) and other optional information.

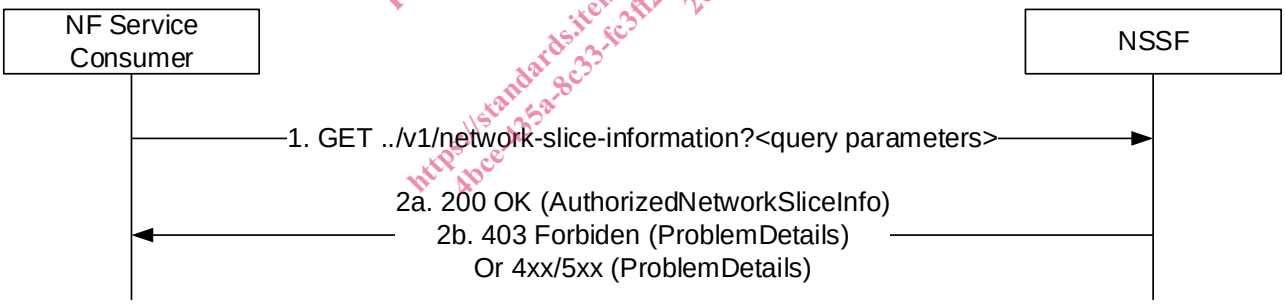

Figure 5.2.2.2.2-1: Retrieve the network slice information during the registration procedure

1 The AMF shall send a GET request to the NSSF. One or more of the following parameters shall be included as query parameters: Requested NSSAI, Subscribed S-NSSAI(s) with the indication if marked as default S-NSSAI, PLMN ID of the SUPI, TAI, NF type of the NF service consumer, Requester ID.

2a On success, "200 OK" shall be returned when the NSSF is able to find authorized network slice information for the requested network slice selection information, the response body shall include a payload body containing at least the Allowed NSSAI, target AMF Set or the list of candidate AMF(s); the payload body may additionally contain a target AMF Service Set.

2b If no slice instances can be found for the requested slice selection information, then the NSSF shall return a 403 Forbidden response with the "ProblemDetails" IE containing the Application Error "SNSSAI_NOT_SUPPORTED" (cf. Table 6.2.7.3-1).

On failure, the NSSF shall return one of the HTTP status codes together with the response body listed in Table 6.1.3.2.3.1-3.

5.2.2.2.3 Get service operation of Nnssf_NSSelection service during the PDU session establishment

In this procedure, the NF Service Consumer (e.g. AMF) retrieves the NRF and the optionally the NSI ID of the network slice instance:

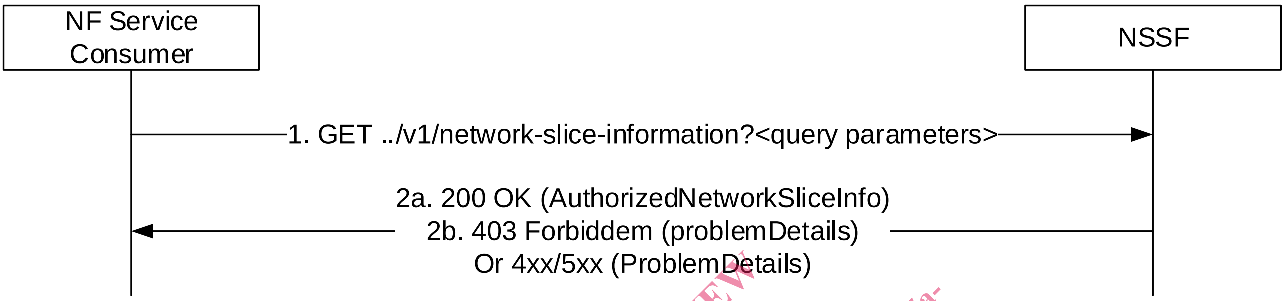

Figure 5.2.2.2.3-1: Retrieve the network slice information during the PDU session establishment procedure

1 The NF Service consumer (e.g. AMF or NSSF in the different PLMN) shall send a GET request to the NSSF. The request shall include query parameters, contain at least S-NSSAI, S-NSSAI from the HPLMN that maps to the S-NSSAI from the Allowed NSSAI of the Serving PLMN, the NF type of the NF service consumer and Requester ID. For the procedure invoked in the Serving PLMN, the query parameters shall also contain non-roaming/LBO roaming/HR roaming indication, PLMN ID of the SUPI and TAI.

2a On success, "200 OK" shall be returned when the NSSF is able to find network slice instance information for the requested network slice selection information, the response body shall include a payload body containing at least the NRF to be used to select NFs/services within the selected Network Slice instance;

2b If no slice instances can be found for the requested slice selection information, then the NSSF shall return a 403 Forbidden response with the "ProblemDetails" IE containing the Application Error "SNSSAI_NOT_SUPPORTED" (cf. Table 6.2.7.3-1).

On failure, the NSSF shall return one of the HTTP status codes together with the response body listed in Table 6.1.3.2.3.1-3.

5.2.2.2.4 Get service operation of Nnssf_NSSelection service during UE configuration update procedure

In this procedure, the NF Service Consumer (e.g. AMF) retrieves network slice configuration information (e.g. the Allowed NSSAI and the Configured NSSAI) during the UE configuration update procedure.