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| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Core Network and Terminals;  Network slice capability enablement- Service Enabler Architecture Layer for Verticals (SEAL);  Protocol specification;  Stage 3  (Release 18) | |
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Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

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 protocol aspects of the SEAL service for the network slice capability enablement to support identifying network slices with capabilities for vertical applications in the 3GPP system based on 5GS management system services and 5GS network services. The protocol aspects specify the User Equipment (UE) supporting the client functionality of this SEAL service and the network supporting the server functionality of this SEAL service, where the client functionality and server functionality are specified in 3GPP TS 23.434 [2] and 3GPP TS 23.435 [13].

The present document is applicable to the application server supporting the Vertical Application Layer server (VAL server) functionality for a specific Vertical Application Layer service (VAL service). The specification for the VAL server for a specific VAL service is out of scope of the present document.

# 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".

[1A] 3GPP TR 21.900: "Technical Specification Group working methods".

[2] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".

[2A] 3GPP TS 23.502: "Procedures for the 5G System (5GS); Stage 2".

[3] 3GPP TS 24.526: "User Equipment (UE) policies for 5G System (5GS); Stage 3".

[3A] 3GPP TS 24.546: "Configuration management - Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification".

[4] 3GPP TS 24.547: "Identity management - Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification".

[5] Void.

[6] IETF RFC 4825: "The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)".

[7] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".

[8] IETF RFC 9110:"HTTP Semantics".

[8A] IETF RFC 9111: "HTTP Caching".

[8B] IETF RFC 9112: "HTTP/1.1".

[8C] IETF RFC 9113: "HTTP/2".

[9] Void

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

[11] Void

[12] OMA OMA-TS-XDM\_Core-V2\_1-20120403-A: "XML Document Management (XDM) Specification".

[13] 3GPP TS 23.435: "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service".

[14] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[15] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".

[16] 3GPP TS 26.532: "Data Collection and Reporting; Protocols and Formats".

[17] 3GPP TS 29.435: "Service Enabler Architecture Layer for Verticals (SEAL); Network Slice Capability Enablement (NSCE) Server Services; Stage 3".

[18] 3GPP TS 29.122: " T8 reference point for Northbound Application Programming Interfaces (APIs)".

[19] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[20] 3GPP TS 29.549:" Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification".

[21] 3GPP TS 33.434: "Service Enabler Architecture Layer for Verticals (SEAL); Security Aspects".

[22] Open API Specification: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms 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].

**SEAL network slice capability enablement client**: An entity that provides the client side functionalities corresponding to the SEAL network slice capability enablement service.

**SEAL network slice capability enablement server**: An entity that provides the server side functionalities corresponding to the SEAL network slice capability enablement service.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.434 [2] apply:

**SEAL client**

**SEAL server**

**SEAL service**

**VAL server**

**VAL service**

**VAL user**

**Vertical**

**Vertical application**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 26.532 [16] apply:

**Data Collection Client**

**Data Collection AF**

## 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].

5GCN 5G Core Network

AF Application Function

DNN Data Network Name

EDN Edge Data Network

ETN Event Triggered Network

HTTP Hypertext Transfer Protocol

KQI Key Quality Indicator

NSCE Network Slice Capability Enablement

PCF Policy Control Function

QoE Quality of Experience

SEAL Service Enabler Architecture Layer

SNSCE-C SEAL Network Slice Capability Enablement Client

SNSCE-S SEAL Network Slice Capability Enablement Server

S-NSSAI Single Network Slice Selection Assistance Information

UE User Equipment

URSP UE Route Selection Policy

VAL Vertical Application Layer

XCAP XML Configuration Access Protocol

XDMC XML Document Management Client

XDMS XML Document Management Server

XML Extensible Markup Language

# 4 General description

The present document enables a SEAL Network Slice Capability Enablement Client (SNSCE-C) and a Vertical Application Layer server (VAL server) that communicate with a SEAL Network Slice Capability Enablement Server (SNSCE-S). The network slice capability enablement is a SEAL service that provides the network slice capability enablement related capabilities to one or more vertical applications.

In a trusted network, the network slice capability enablement can be used to re-map a vertical application to different slices based on the configuration of the SNSCE-S for updating the application traffic. Therefore, the SNSCE-S acts as an Application Function (AF) and influences the UE's URSP rules for the application traffic by providing guidance on the route selection descriptors S-NSSAI and DNN.

NOTE: In this release, S-NSSAI and DNN are only used as the route selection descriptor.

# 5 Functional entities

## 5.1 SEAL network slice capability enablement client (SNSCE-C)

The SNSCE-C functional entity acts as the application client for managing network slice capabilities.

To be compliant with the HTTP procedures in the present document the SNSCE-C:

a) shall support the role of XCAP client as specified in IETF RFC 4825 [6];

b) shall support the role of XDMC as specified in OMAOMA-TS-XDM\_Core-V2\_1 [12]; and

c) shall support route selection descriptors configuration e.g. S-NSSAI and DNN adaptation due to new requirements or change of requirements for one or more application;

## 5.2 SEAL network slice capability enablement server (SNSCE-S)

The SNSCE-S is a functional entity which provides slice capability enablement to administer the network slice for one or more vertical applications.

To be compliant with the HTTP procedures in the present document the SNSCE-S shall:

a) shall support the role of XCAP server as specified in IETF RFC 4825 [6]; and

b) shall support the role of XDMS as specified in OMA OMA-TS-XDM\_Core-V2\_1 [12];

c) shall provide the 5GC network a guidance for route selection descriptors to assign new S-NSSAI and DNN.

# 7 Network slice capability enablement services

## 7.1 General

The clause describes the procedures of the network slice capability enablement services.

Table 7.1-1 summarizes the SBI services produced by the SNSCE-S APIs defined for this specification.

Table 7.1-1: API Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Service Name | Clause | Description | OpenAPI Specification File | apiName | Annex |
| ETN\_Configuration | 8.1.1 | Event triggered network slice configuration | TS24549\_ETC\_Configuration.yaml | su\_nsc | C.2 |
| NSCE\_SliceInfo | 8.3.1 | Notification of slice information | TS24549\_NSCE\_SliceInfo.yaml | nsce\_sliceinfo | C.3 |

## 7.2 Network slice adaptation service

### 7.2.1 Service description

#### 7.2.1.1 Overview

The network slice adaptation procedure is a SEAL service of providing network slice capability enablement capabilities for network slice re-mapping from one VAL service to one or more other VAL services, according to 3GPP TS 23.434 [2] and 3GPP TS 23.435 [13]. The network server entity, providing the functionality for the network slice re-mapping, acts as an AF communicating with 5GCN to provide guidance to update and modify the S-NSSAIs and the DNNs of the route selection descriptors of the URSP rules, 3GPP TS 24.526 [3], for one or more application traffics per UE.

NOTE: In this release, S-NSSAI and DNN are only used as the route selection descriptor.

### 7.2.2 Service operations

#### 7.2.2.1 Introduction

The service operation, defined for ETN\_Configuration API for network capability configuration, is shown in table 7.2.2.1-1.

Table 7.2.2.1-1: Operations for network capability configuration

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Event\_Triggered\_Network\_Slice\_Adaptation | This service operation is used by SNSCE-C to trigger the event of the network slice configuration. | SNSCE-C |

#### 7.2.2.2 Event\_Triggered\_Network\_Slice\_Adaptation

##### 7.2.2.2.1 General

These clauses describe the procedures on the SNSCE-C and SNSCE-S side when an event triggered request for network slice configuration is sent by the SNSCE-C to the SNSCE-S. The event triggered network slice configuration request causes a network slice adaptation and sent by the SNSCE-C acting as application client requesting a new or a change in network slice configuration.

##### 7.2.2.2.2 Network slice adaptation using Event\_Triggered\_Network\_Slice\_Adaptation service operation

To request for the network slice adaptation, the SNSCE-C shall send an HTTP PUT request message according to procedures specified in IETF RFC 9110 [8]. In the HTTP PUT request message, the SNSCE-C:

NOTE 1: How the requested network slice is known by the SNSCE-C is out of scope of this release.

a) shall set the Request-URI to the URI identifying the SNSCE-S according to the pattern"{apiRoot}/su\_nsc/val-services/{valServiceId}/configurations/{configurationId}", where:

1) {valServiceId} set to the identity of the VAL application; and

2) {configurationId}set to the identity of slice adaptation configuration,

b) shall set the "Host" header field to the URI identifying of SNSCE-S and the port information;

c) shall include an Authorization header field with the "Bearer" authentication scheme set to an access token of the "bearer" token type as specified in IETF RFC 6750 [7]; and

d) shall include a body containing the data type NwSliceAdptEvent as defined in clause 8.1.1.6.2.2,

Upon receipt an HTTP PUT request:

a) with a Request-URI according to "{apiRoot}/su\_nsc/val-services/{valServiceId}/configurations/{configurationId} identifying:

1) "valServiceId" identifying the VAL application; and

2) "configurationId" identifying the slice adaptation configuration; and

b) with a body containing the data type NwSliceAdptEvent as defined in clause 8.1.1.6.2.2, the SNSCE-S shall determine the sender identity of the sender is authorized or not as specified in 3GPP TS 24.547 [4].

If:

a) the sender is not an authorized user, the SNSCE-S shall respond with an HTTP 403 (Forbidden) response message and avoid the rest of steps; or

b) the sender is an authorized user, the SNSCE-S:

1) shall attempt to update the network S-NSSAI for one or more VAL UEs with the identities listed in the VAL UE list for the VAL service, identified by VAL service ID by using the parameters for requested S-NSSAI, requested DNN, and requested application requirements from the HTTP PUT request message;

NOTE 2: To update the application traffic, the SNSCE-S can act as an AF and use the reference point N33 as shown in 3GPP TS 23.434 [2] to influence a VAL UE's URSP rules for the application traffic by providing a guidance on the route selection parameters S-NSSAI and DNN as described in clause 4.15.6.10 of 3GPP TS 23.502 [2A].

NOTE 3: Whether and how the SNSCE-S can update the network S-NSSAI for all VAL UEs for the VAL service, is out of the scope of this release.

2) shall send the updated network S-NSSAI and any DNN to the PCF, if the update is successful, 3GPP TS 23.434 [2]; and

3) shall send:

i) if the request is successfully processed, an HTTP 204 No Content response message indicating the successful status; or

ii) if errors occur when processing the request, request, an appropriate error response as specified in clause 8.1.1.7.

## 7.3 Retrieval of data and information

### 7.3.1 Service description

#### 7.3.1.1 Overview

The network slice capability enablement procedures is a SEAL service of providing slice capabilities based on 5GS management system services and 5GS network services, according to 3GPP TS 23.435 [13] e.g., retrieving the KQI data of services, the QoE data, the end user information and fault reports from NSCE client, notifying the slice modification and delivering slice information to NSCE client.

The procedures on how the NSCE server retrieves network and service related KQI or performance data, QoE data, and fault information from the NSCE client apply for the following NSCE procedures:

a) network slice related performance and analytics monitoring job creation request procedure specified in 3GPP TS 23.435 [13] clause 9.7.2.1;

b) information collection from NSCE server(s) subscribe request and response procedure specified in 3GPP TS 23.435 [13] clause 9.8.2.1;

c) network slice fault management capability exposure procedure specified in 3GPP TS 23.435 [13] clause 9.15.2.1; and

d) slice requirements verification and alignment capability exposure procedure specified in 3GPP TS 23.435 [13] clause 9.16.2.1.

The procedures at the SNSCE-Cand SNSCE-S side follow the mechanism specified in clause 5.5 of 3GPP TS 26.531 [15] and HTTP procedures specified in clause 4.3 and clause 7 of 3GPP TS 26.532 [16]. In the procedures, the SNSCE-C acts as the data collection client, and the SNSCE-S acts as data collection AF.

### 7.3.2 Service operations

#### 7.3.2.1 Introduction

The service operations, defined for the APIs of data collection and reporting service specified in 3GPP TS 26.532 [16], for retrieval of data and information, is shown in table 7.3.2.1-1.

Table 7.3.2.1-1: Operations for retrieval of data and information

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Ndcaf\_DataReporting\_CreateSession | This service operation is used by SNSCE-C to obtain the configuration the requested data and information for retrieval. | SNSCE-C |
| Ndcaf\_DataReporting\_RetrieveSession | This service operation is used by SNSCE-C to update the configuration of the requested data and information for retrieval. | SNSCE-C |
| Ndcaf\_DataReporting\_Report | This service operation is used by SNSCE-C to report the requested data and information for retrieval. | SNSCE-C |

#### 7.3.2.2 Ndcaf\_DataReporting\_CreateSession

##### 7.3.2.2.1 General

These clauses describe the procedures on the SNSCE-C and SNSCE-S side when a request for obtaining the configuration of the requested data and information for retrieval, is sent by the SNSCE-C to the SNSCE-S.

##### 7.3.2.2.2 Configuration of the requested data and information retrieval using Ndcaf\_DataReporting\_CreateSession service operation

In order to obtain the configuration of requested data and information for retrieval, the SNSCE-C shall send an HTTP POST request message to invoke Ndcaf\_DataReporting\_CreateSession service operation as described in clause 3.3.2.2 and clause 7.2.2.3.1 of 3GPP TS 26.532 [16].

Upon receipt an HTTP POST request message on Ndcaf\_DataReporting\_CreateSession service operation, the SNSCE-S shall send HTTP "201 Created" status code and provide the configuration of requested data and information for retrieval as described in clause 4.3.2.2 and clause 7.2.2.3.1 of 3GPP TS 26.532 [16].

#### 7.3.2.3 Ndcaf\_DataReporting\_RetrieveSession

##### 7.3.2.3.1 General

These clauses describe the procedures on the SNSCE-C and SNSCE-S side when a request for updating the configuration of the requested data and information for retrieval, is sent by the SNSCE-C to the SNSCE-S.

##### 7.3.2.3.2 Updated configuration of the requested data and information retrieval using Ndcaf\_DataReporting\_RetrieveSession service operation

In order to update the configuration of requested data and information for retrieval, the SNSCE-C may send an HTTP GET request message to invoke Ndcaf\_DataReporting\_RetrieveSession service operation as described in clause 4.3.2.3 and clause 7.2.3.3.1 of 3GPP TS 26.532 [16].

Upon receipt an HTTP GET request message on Ndcaf\_DataReporting\_RetrieveSession service operation, the SNSCE-S shall send HTTP "201 Created" status code and provide the updated configuration, if available, as described in clause 4.3.2.3 and clause 7.2.3.3.1 of 3GPP TS 26.532 [16].

#### 7.3.2.4 Ndcaf\_DataReporting\_Report

##### 7.3.2.4.1 General

These clauses describe the procedures on the SNSCE-C and SNSCE-S side when a request for reporting the configuration of the requested data and information for retrieval, is sent by the SNSCE-C to the SNSCE-S.

##### 7.3.2.4.2 Reporting the requested data and information retrieval using Ndcaf\_DataReporting\_Report service operation

After the configuration, the SNSCE-C shall send an HTTP POST request message in accordance with this configuration to invoke Ndcaf\_DataReporting\_Report service operation as described in clause 4.3.3 and clause 7.2.3.4.1 of 3GPP TS 26.532 [16].

Upon receipt an HTTP POST request message on Ndcaf\_DataReporting\_Report service operation, the SNSCE-S shall send HTTP "204 No Content" status code and may provide the updated configuration as described in clause 4.3.3 and clause 7.2.3.4.1 of 3GPP TS 26.532 [16].

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

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## 7.5 Network slice information delivery

### 7.5.1 Service description

Network slice information delivery is a SEAL service reusing the notification procedure to send the allocated network slice information to a VAL UE. The notification of the allocated network slice information is sent by the SNSCE-S to the SNSCE-C and is then forwarded to the VAL client by the SNSCE-C.

### 7.5.2 Service operations

#### 7.5.2.1 Introduction

The service operations, defined for SliceInfoDelivery API for notification of the allocated network slice information, is shown in table 7.5.2.1-1.

Table 7.5.2.1-1: Operations for slice information delivery

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Slice\_Info\_Delivery | This service operation is used by SNSCE-S to notify the SNSCE-C of the slice the allocated network slice information. | SNSCE-S |

#### 7.5.2.2 Slice\_Info\_Delivery

##### 7.5.2.2.1 General

These clauses describe the procedures after network slice allocation in NSaaS model, a notification of the allocated network slice information, is sent by the SNSCE-S to the SNSCE-C. The notification helps the VAL UE to obtain the allocated network slice information for the VAL application identified by VAL service ID.

##### 7.5.2.2.2 Network slice information delivery using Slice\_Info\_Delivery service operation

To send the allocated network slice information to the SNSCE-C, the SNSCE-S shall send an HTTP POST request message according to procedures specified in IETF RFC 9110 [8] and according to pattern Callback-URI, defined in clause A.1.2 of 3GPP TS 24.546 [3A] with a body containing the data type SliceInfoDelivery as defined in clause TBD, serialized into a JavaScript Object Notation (JSON) structure as specified in IETF RFC 8259 [10].

Upon receipt of the HTTP POST request, the SNSCE-C:

a) if the request is successfully processed, shall send an HTTP 204 No Content message indicating the successful response; or

b) if errors occur when processing the request, an appropriate error response as specified in clause 8.1.1.7.

## 7.6 Notify slice modification in edge based NSCE deployments

### 7.6.1 Service description

Notification for network slice modification in edge based NSCE deployments is a SEAL service, which may occur when a VAL UE moves into a target service area in edge based NSCE deployments. The notification of the slice modification is sent by the SNSCE-S to the SNSCE-C and is then forwarded to the VAL client by the SNSCE-C.

### 7.6.2 Service operations

#### 7.6.2.1 Introduction

The service operations, defined for NotifySliceModifiedEdge API for notification of slice modification in edge due to service area change, is shown in table 7.6.2.1-1.

Table 7.6.2.1-1: Operations for notification of slice modification in edge

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Notify\_Slice\_Modification\_Edge | This service operation is used by SNSCE-S to notify the SNSCE-C of the slice modification in edge based NSCE deployments due to service area change. | SNSCE-S |

#### 7.6.2.2 Notify\_Slice\_Modification\_Edge

##### 7.6.2.2.1 General

These clauses describe the procedures for edge based NSCE deployments, a notification of slice modification due to service area change, is sent by the SNSCE-S to the SNSCE-C. The notification helps the VAL UE to identify a slice modification related to a VAL application when moving into target service area in edge based NSCE deployments.

##### 7.6.2.2.2 Notification of slice modification using Notify\_Slice\_Modification\_Edge service operation

To notify the slice modification in edge based slice service continuity, the SNSCE-S shall send an HTTP POST request message according to procedures specified in IETF RFC 9110 [8] and according to pattern Callback-URI, defined in clause A.1.2 of 3GPP TS 24.546 [3A] with a body containing the data type NotifySliceModEdge as defined in clause TBD, serialized into a JavaScript Object Notation (JSON) structure as specified in IETF RFC 8259 [10].

Upon receipt of the HTTP POST request, the SNSCE-C:

a) if the request is successfully processed, shall send an HTTP 204 No Content message indicating the successful response; or

b) if errors occur when processing the request, an appropriate error response as specified in clause 8.1.1.7.

### 

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##### 

# 8 API Definitions

## 8.1 Event triggered network slice configuration APIs

### 8.1.1 ETN\_Configuration API

#### 8.1.1.1 Introduction

The information in this clause provides a description for the HTTP parameters transmitted by the SNSCE-C to the SNSCE-S to trigger a network slice configuration such as the network slice adaptation for one or more VAL UEs within a VAL service.

The HTTP URIs used in HTTP protocol for the event triggered network (ETN) slice configuration service shall have the resource URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [18]:

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

where:

a) {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [18];

b) <apiName>shall be "su\_nsc";

c) <apiVersion> shall be "v1"; and

d) <apiSpecificSuffixes> shall be set as described in clause 8.1.1.3.

#### 8.1.1.2 Usage of HTTP

##### 8.1.1.2.1 General

For SNSCE service configuration API, support of HTTP/1.1 (IETF RFC 9110 [8], IETF RFC 9111 [8A] and IETF RFC 9112 [8B]) over TLS is mandatory and support of HTTP/2 (IETF RFC 9113 [8C]) over TLS is recommended.

A functional entity desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [8C].

##### 8.1.1.2.2 Content type

The bodies of HTTP request and successful HTTP responses shall be encoded in JSON format (see IETF RFC 8259 [10]).

The MIME media type that shall be used within the related Content-Type header field is "application/json", as defined in IETF RFC 8259 [10].

#### 8.1.1.3 Resources

##### 8.1.1.3.1 Overview

The Resource URI structure of the ETN\_Configuration API is as shown in Figure 8.1.1.3.1-1:



Figure 8.1.1.3.1-1: Resource URI structure of the ETN\_Configuration API

Table 8.1.1.3.1-1 provides an overview of the resources and applicable HTTP method.

Table 8.1.1.3.1-1: Resources and method overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description |
| Configuration | /val-services/{valServiceId}/configurations/{configurationId} | PUT (NOTE) | Performs configuration. |
| NOTE: In this release, the only configuration is the slice adaptation as described in 3GPP TS 23.434 [2]. | | | |

##### 8.1.1.3.2 Resource: Configuration

###### 8.1.1.3.2.1 Description

The Configuration resource allows an SNSCE-C a specific configuration identified by the identity "configurationId".

###### 8.1.1.3.2.2 Resource definition

Resource URI: **{apiRoot}/su\_nsc/<apiVersion>/val-services/{valServiceId}/configurations/{configurationId}**

This resource shall support the resource URI variables defined in the table 8.1.1.3.2.2-1.

Table 8.1.1.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 5.2.4 of 3GPP TS 29.122 [18]. |
| apiVersion | string | See clause 5.2.4 of 3GPP TS 29.122 [18]. |
| valServiceId | string | Identifier of a VAL service. |
| configurationId | string | Identifier of a configuration |

###### 8.1.1.3.2.3 Resource standard methods

8.1.1.3.2.3.1 PUT

This operation is for triggering network slice adaptation event and shall support the URI query parameters specified in table 8.1.1.3.2.3.1-1.

Table 8.1.1.3.2.3.1-1: URI query parameters supported by the PUT method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 8.1.1.3.2.3.1-2and the response data structures and response codes specified in table 8.1.1.3.2.3.1-3.

Table 8.1.1.3.2.3.1-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| NwSliceAdptEvent | M | 1 | Triggering the network slice adaptation event. |

Table 8.1.1.3.2.3.1-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a | M | 1 | 204 No Content | The configuration of the VAL UEs with VAL UE List within the VAL service identified by the value "valServiceId" and for the network slice configuration identified by the value "configurationId", was successful. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection. The response shall include a Location header field containing an alternative URI representing an alternative SNSCE-S to which the request should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [18]. |
| n/a |  |  | 308 Permanent Redirect | Permanent redirection. The response shall include a Location header field containing an alternative URI representing an alternative SNSCE-S to which the request should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [18]. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [18] shall also apply. | | | | |

Table 8.1.1.3.2.3.1-3: Headers supported by 307 Response Code for this operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing an alternative NSCE server to which the request should be redirected. |

Table 8.1.1.3.2.3.1-4: Headers supported by 308 Response Code for this operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI representing an alternative NSCE server to which the request should be redirected. |

###### 8.1.1.3.2.4 Resource Custom Operations

None.

#### 8.1.1.4 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

#### 8.1.1.5 Notifications

None.

#### 8.1.1.6 Data model

##### 8.1.1.6.1 General

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

Table 8.1.1.6.1-1 specifies the data types defined for the ETN\_Configuration API.

Table 8.1.1.6.1-1: ETN\_Configuration API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| NwSliceAdptEvent | 8.1.1.6.2.2 | Event triggered network slice adaptation |  |

Table 8.1.1.6.1-2 specifies data types re-used by the ETN\_Configuration API service.

Table 8.1.1.6.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Dnn | 3GPP TS 29.571 [14] | Used to Identify a DNN. |  |
| DurationSec | 3GPP TS 29.122 [18] | Represents a period of time in units of seconds. |  |
| LocationArea | 3GPP TS 29.122 [18] | Represents location information. |  |
| RatType | 3GPP TS 29.571 [14] | Identifies the RAT Type. |  |
| Snssai | 3GPP TS 29.571 [14] | Used to Identify the S-NSSAI. |  |
| ValTargetUe | 3GPP TS 29.549 [20] | Used to indicate either VAL User ID or VAL UE ID. |  |

##### 8.1.1.6.2 Structured data types

###### 8.1.1.6.2.1 Introduction

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

###### 8.1.1.6.2.2 Type: NwSliceAdptEvent

Table 8.1.1.6.2.2-1: Definition of type NwSliceAdptEvent

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valUeIds | array(ValTargetUe) | M | 1..N | One or more VAL UEs, for which a given event triggered network slice configuration applies. The VAL service is identified by the value "valServiceId" and the network slice configuration is identified by the value "configurationId". |  |
| sliceId | Snssai | M | 1 | The identifier of the slice or slice instance, to which the event triggered network slice adaptation is applied. |  |
| dnn | Dnn | O | 0..1 | Requested DNN |  |
| appReqs | AppReqs | O | 0..1 | Requirement related to the requested application |  |

###### 8.1.1.6.2.3 Type: AppReqs

Table 8.1.1.6.2.3-1: Definition of type AppReqs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| timeIntervals | array(DurationSec) | O | 1..N | The requested time intervals as the start time and end time. |  |
| area | LocationArea | O | 0..1 | The requested geographical or service area. |  |
| ratType | RatType | O | 0..1 | The requested access type. |  |
| preservIpAdd | boolean | O | 0..1 | Indication to preserve the UE IP address. If it is not requested, it is included as set to "false". Otherwise, the UE IP address is preserved. |  |

Editor’s note [CR#0017, WID: NSCALE]: Whether to contain the UE IP address preservation indicator depends on the clarification from SA6.

##### 8.1.1.6.3 Simple data types and enumerations

None.

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

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

##### 8.1.1.6.5 Binary data

###### 8.1.1.6.5.1 Binary Data Types

Table 8.1.1.6.5.1-1: Binary Data Types

|  |  |  |
| --- | --- | --- |
| Name | Clause defined | Content type |
|  |  |  |

#### 8.1.1.7 Error Handling

##### 8.1.1.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [18].

In addition, the requirements in the following clauses shall apply.

##### 8.1.1.7.2 Protocol Errors

In this release of the specification, there are no additional protocol errors applicable for the ETN\_Configuration API.

##### 8.1.1.7.3 Application Errors

The application errors defined for ETN\_Configuration API are listed in table 8.1.1.7.3-1.

Table 8.1.1.7.3-1: Application errors

|  |  |  |  |
| --- | --- | --- | --- |
| Application Error | HTTP status code | Description | Applicability |
|  |  |  |  |

#### 8.1.1.8 Feature Negotiation

General feature negotiation procedures are defined in clause 5.2.7 of 3GPP TS 29.122 [18]. Table 8.1.1.8-1 lists the supported features for ETN\_ServiceConfiguration API.

Table 8.1.1.8-1: Supported Features

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

#### 8.1.1.9 Security

##### 8.1.1.9.1 General

Usage of HTTP over TLS and the TLS profiles shall be as specified in clause 5.1.1.4 of 3GPP TS 33.434 [21].

## 8.2 Data collection and reporting APIs

### 8.2.1 Ndcaf\_DataReporting API

3GPP TS 26.532 [16] specifies Ndcaf\_DataReporting API for Ndcaf\_DataReporting service which includes:

- Ndcaf\_DataReporting\_CreateSession service operation;

- Ndcaf\_DataReporting\_RetrieveSession service operation; and

- Ndcaf\_DataReporting\_Report service operation.























## 8.3 Service continuity notification APIs

## 8.3.1 NSCE\_SliceInfo API

### 8.3.1.1 Introduction

The NSCE\_SliceInfo service shall use the NSCE\_SliceInfo API.

The API URI of the NSCE\_SliceInfo API shall have the resource URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [18]:

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

where:

a) {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [18];

b) <apiName>shall be "nsce\_sliceinfo";

c) <apiVersion> shall be "v1"; and

d) <apiSpecificSuffixes> shall be set as described in clause 8.3.1.3.

### 8.3.1.2 Usage of HTTP

#### 8.3.1.2.1 General

For NSCE\_SliceInfo API, support of HTTP/1.1 (IETF RFC 9110 [8], IETF RFC 9111 [8A] and IETF RFC 9112 [8B]) over TLS is mandatory and support of HTTP/2 (IETF RFC 9113 [8C]) over TLS is recommended.

A functional entity desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [8C].

#### 8.3.1.2.2 Content type

The bodies of HTTP request and successful HTTP responses shall be encoded in JSON format (see IETF RFC 8259 [10]).

The MIME media type that shall be used within the related Content-Type header field is "application/json", as defined in IETF RFC 8259 [10].

### 8.3.1.3 Resources

#### 8.3.1.3.1 Overview

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

The structure of the Resource URIs of the NSCE\_SliceInfo API is shown in Figure 8.3.1.3.1-1.



Figure 8.3.1.3.1-1: Resource URIs structure of the NSCE\_SliceInfo API

Table 8.3.1.3.1-1 provides an overview of resources and applicable HTTP methods defined for the NSCE\_SliceInfo API.

Table 8.3.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource purpose/name | Resource URI (relative path after API URI) | HTTP method or custom operation | Description (service operation) |
| EDN Slice Subscriptions  (Collection) | /edn-slice-subscriptions | POST | This is a pseudo resource. |
| PLMN Slice Subscriptions  (Collection) | /plmn-slice-subscriptions | POST | This is a pseudo resource. |

#### 8.3.1.3.2 Resource: EDN Slice Subscriptions

##### 8.3.1.3.2.1 Description

This is a pseudo resource.

##### 8.3.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/nsce\_sliceinfo/<apiVersion>/edn-slice-subscriptions**

This resource shall support the resource URI variables defined in table 8.3.1.3.2.2-1.

Table 8.3.1.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 8.3.1.1 |

##### 8.3.1.3.2.3 Resource Standard Methods

###### 8.3.1.3.2.3.1 POST

This method shall support the URI query parameters specified in table 8.3.1.3.2.3.1-1.

Table 8.3.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 8.3.1.3.2.3.1-2 and the response data structures and response codes specified in table 8.3.1.3.2.3.1-3.

Table 8.3.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| Any |  |  |  |

Table 8.3.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  |  |  |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [18] shall also apply. | | | | |

##### 8.3.1.3.2.4 Resource Custom Operations

None.

#### 8.3.1.3.3 Resource: PLMN Slice Subscriptions

##### 8.3.1.3.3.1 Description

This is a pseudo resource.

##### 8.3.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/nsce\_sliceinfo/<apiVersion>/plmn-slice-subscriptions**

This resource shall support the resource URI variables defined in table 8.3.1.3.3.2-1.

Table 8.3.1.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 8.3.1.1 |

##### 8.3.1.3.3.3 Resource Standard Methods

###### 8.3.1.3.3.3.1 POST

This method shall support the URI query parameters specified in table 8.3.1.3.3.3.1-1.

Table 8.3.1.3.3.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| n/a |  |  |  |  |  |

This method shall support the request data structures specified in table 8.3.1.3.3.3.1-2 and the response data structures and response codes specified in table 8.3.1.3.3.3.1-3.

Table 8.3.1.3.3.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| Any |  |  |  |

Table 8.3.1.3.3.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  |  |  |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [18] shall also apply. | | | | |

##### 8.3.1.3.3.4 Resource Custom Operations

None.

#### 8.3.1.3.4 Custom Operations without associated resources

None in this release of the specification.

#### 8.3.1.3.5 Notifications

##### 8.3.1.3.5.1 General

Table 8.3.1.3.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method | Description  (service operation) |
| EDN slice notification | callbackUri  (NOTE) | POST | Notification on slice modification information for service continuity of a VAL application in the target EDN service area. |
| PLMN slice notification | callbackUri  (NOTE) | POST | Notification on slice modification information for service continuity of a VAL application in the target PLMN. |
| NOTE: The callbackURI is not provided by NF service consumer via NSCE\_SliceInfo API. The value of the callbackURI is set to the value of the Callback-URI parameter that is provided during the configuration update event subscription message specified in 3GPP TS 24.546 [3A] clause 6.2.2.1.2 and clause A.1.2. | | | |

##### 8.3.1.3.5.2 EDN slice notification

###### 8.3.1.3.5.2.1 Description

EDN slice notification is by the SNSCE-S to notify the SNSCE-C about the modified slice configuration for VAL service continuity in the target EDN service area.

###### 8.3.1.3.5.2.2 Notification definition

The POST method shall be used for the EDN slice notification and the callback URI configured by SNSCE-S.

Callback URI: **{callbackUri}**

This method shall support the URI query parameters specified in table 8.3.1.3.5.2.2-1.

Table 8.3.1.3.5.2.2-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| n/a |  |  |  |  |

If the notification is for EDN slice modifiction information, this method shall support the request data structures specified in table 8.3.1.3.5.2.2-2 and the response data structures and response codes specified in table 8.3.1.3.5.2.2-3.

Table 8.3.1.3.5.2.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| EdgeSCRequirementNotif | M | 1 | Notification on slice modification information for a VAL service continuity in the target EDN service area. |

Table 8.3.1.3.5.2.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful case. Notification for the slice modification information was successfully received. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [18] shall also apply. | | | | |

##### 8.3.1.3.5.3 PLMN slice notification

###### 8.3.1.3.5.3.1 Description

EDN slice notification is by the SNSCE-S to notify the SNSCE-C about the modified slice configuration for VAL service continuity during the inter PLMN mobility.

###### 8.3.1.3.5.3.2 Notification definition

The POST method shall be used for the EDN slice notification and the callback URI configured by SNSCE-S.

Callback URI: **{callbackUri}**

This method shall support the URI query parameters specified in table 8.3.1.3.5.3.2-1.

Table 8.3.1.3.5.3.2-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| n/a |  |  |  |  |

If the notification is for inter-PLMNslice modification information, this method shall support the request data structures specified in table 8.3.1.3.5.3.2-2 and the response data structures and response codes specified in table 8.3.1.3.5.3.2-3.

Table 8.3.1.3.5.3.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| InterPlmnServContNotif | M | 1 | Notification on slice modification information for a VAL service continuity in the target PLMN. |

Table 8.3.1.3.5.3.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful case. Notification for the slice information was successfully received. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [18] shall also apply. | | | | |

#### 8.3.1.3.6 Data Model

##### 8.3.1.3.6.1 General

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

Table 8.3.1.3.6.1-1 specifies the data types defined for the NSCE\_SliceInfo API.

Table 8.3.1.3.6.1-1: NSCE\_SliceInfo API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| n/a |  |  |  |

Table 8.3.1.3.6.1-2 specifies data types re-used by the NSCE\_SliceInfo API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the NSCE\_SliceInfo API.

Table 8.3.1.3.6.1-2: NSCE\_SliceInfo API re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| EdgeSCRequirementNotif | 3GPP TS 29.435 [17] | Represents the slice information which is used and/or modified to extend slice availability to the target service area. (NOTE 1) |  |
| InterPlmnServContNotif | 3GPP TS 29.435 [17] | Represents the slice information which is used and/or modified to extend slice availability to the target PLMN. (NOTE 2) |  |
| NOTE 1: The slice information is sent to the VAL UEs which are impacted by the modification of the network slice, thus the related optional information element "ueIds" of the EdgeSCRequirementNotif data structure shall not be used when the EdgeSCRequirementNotif data structure is sent to the SNSCE-C by the SNSCE-S.  NOTE 2: The slice information is sent to the VAL UEs which are impacted by the modification of the network slice, thus the related optional information element "ueIds" of the InterPlmnServContNotif data structure shall not be used when the InterPlmnServContNotif data structure is sent to the SNSCE-C by the SNSCE-S. | | | |

##### 8.3.1.3.6.2 Structured data types

###### 8.3.1.3.6.2.1 Introduction

There are no new structures to be defined in resource representations.

#### 8.3.1.3.7 Error Handling

##### 8.3.1.3.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [18].

In addition, the requirements in the following clauses shall apply.

##### 8.3.1.3.7.2 Protocol Errors

In this release of the specification, there are no additional protocol errors applicable for the NSCE\_SliceInfo API.

##### 8.3.1.3.7.3 Application Errors

The application errors defined for NSCE\_EdnSliceInfo API are listed in table 8.3.1.3.7.3-1.

Table 8.3.1.3.7.3-1: Application errors

|  |  |  |  |
| --- | --- | --- | --- |
| Application Error | HTTP status code | Description | Applicability |
|  |  |  |  |

#### 8.3.1.3.8 Feature Negotiation

General feature negotiation procedures are defined in clause 5.2.7 of 3GPP TS 29.122 [18]. Table 8.3.1.3.8-1 lists the supported features for NSCE\_SliceInfo API.

Table 8.3.1.3.8-1: Supported Features

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

#### 8.3.1.3.9 Security

##### 8.3.1.3.9.1 General

Usage of HTTP over TLS and the TLS profiles shall be as specified in clause 5.1.1.4 of 3GPP TS 33.434 [21].

# 8.4 Inter-PLMN Service Continuity Notification APIs

## 8.4.1 NotifySliceModified API

### 8.4.1.1 Introduction

The Nsnsce\_NotifySliceModified service shall use the NotifySliceModified API.

The API URI of the NotifySliceModified API shall have the resource URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [18]:

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

where:

a) {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [18];

b) <apiName>shall be "su\_nsc";

c) <apiVersion> shall be "v1"; and

d) <apiSpecificSuffixes> shall be set as described in clause 8.x.1.3.

#### 8.4.1.2 Usage of HTTP

##### 8.4.1.2.1 General

For NotifySliceModified API, support of HTTP/1.1 (IETF RFC 9110 [8], IETF RFC 9111 [8A] and IETF RFC 9112 [8B]) over TLS is mandatory and support of HTTP/2 (IETF RFC 9113 [8C]) over TLS is recommended.

A functional entity desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [8C].

##### 8.4.1.2.2 Content type

The bodies of HTTP request and successful HTTP responses shall be encoded in JSON format (see IETF RFC 8259 [10]).

The MIME media type that shall be used within the related Content-Type header field is "application/json", as defined in IETF RFC 8259 [10].

#### 8.4.1.3 Resources

There are no resources defined for this API in this release of the specification.

#### 8.4.1.4 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

#### 8.4.1.5 Notifications

##### 8.4.1.5.1 Overview

Table 8.3.1.5.1-1 provides an overview of the notificiation and applicable HTTP method.

Table 8.4.1.5.1-1: Notification overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method | Description |
| Notify\_Slice\_Modification | {Callback-URI}  (NOTE) | POST | This service operation enables a NSCE Server to notify a previously subscribed service consumer on inter-PLMN application service continuity event(s) |
| NOTE: The Callback-URI is not provided by NF service consumer via NotifySliceModified API, it is provided during the the configuration update event subscription message specified in 3GPP TS 24.546 [3A] clause 6.2.2.1.2 and clause A.1.2; | | | |

##### 8.4.1.5.2 Notify\_Slice\_Modification

###### 8.4.1.5.2.1 Description

The Notify\_Slice\_Modification is used by the SNSCE-S to notify the SNSCE-C VAL UE to identify a slice modification related to a VAL application when moving into target service area of target PLMN.

###### 8.4.1.5.2.2 Target URI

The Callback URI **"{**Callback-URI**}"** shall be used with the callback URI variables defined in table 8.x.1.5.2.2-1.

Table 8.4.1.5.2.2-1: Callback URI variables

|  |  |
| --- | --- |
| Name | Definition |
| Callback-URI | The Callback-URI of SNSCE-C VAL UE to identify a slice modification related to a VAL application when moving into target service area of target PLMN. The Callback-URI is not provided by NF service consumer via NotifySliceModified API, it is provided during the the configuration update event subscription message specified in 3GPP TS 24.546 [3A] clause 6.2.2.1.2 and clause A.1.2; |

###### 8.4.1.5.2.3 Standard Methods

8.4.1.5.2.3.1 POST

This method shall support the request data structures specified in table 8.x.1.5.2.3.1-1 and the response data structures and response codes specified in table 8.x.1.5.2.3.1-2.

Table 8.4.1.5.2.3.1-1: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| NotifySliceMod | M | 1 | Client side parameters for Inter-PLMN Service Continuity Notification. |

Table 8.4.1.5.2.3.1-2: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | The notification is treated successfully. |

#### 8.4.1.6 Data model

#### 8.4.1.7 Error Handling

##### 8.4.1.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [18].

In addition, the requirements in the following clauses shall apply.

##### 8.4.1.7.2 Protocol Errors

In this release of the specification, there are no additional protocol errors applicable for the NotifySliceModified API.

##### 8.4.1.7.3 Application Errors

The application errors defined for NotifySliceModified API are listed in table 8.x.1.7.3-1.

Table 8.4.1.7.3-1: Application errors

|  |  |  |  |
| --- | --- | --- | --- |
| Application Error | HTTP status code | Description | Applicability |
|  |  |  |  |

#### 8.4.1.8 Feature Negotiation

General feature negotiation procedures are defined in clause 5.2.7 of 3GPP TS 29.122 [18]. Table 8.x.1.8-1 lists the supported features for NotifySliceModified API.

Table 8.4.1.8-1: Supported Features

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

#### 8.4.1.9 Security

##### 8.4.1.9.1 General

Usage of HTTP over TLS and the TLS profiles shall be as specified in clause 5.1.1.4 of 3GPP TS 33.434 [21].

# 9 Usage of common API framework

## 9.1 General

Usage of common API framework shall be supported by the event triggered network slice configuration service API as described in clause 8 in 3GPP TS 29.549 [20].































Annex A (normative):  
VoidAnnex B (normative):  
Annex C (normative):  
OpenAPI specification

# C.1 General

This annex is based on the OpenAPI Specification [V] and provides corresponding representations of all APIs defined in the present specification in YAML format.

This Annex shall take precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API.

NOTE: 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 file contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5B of the 3GPP TR 21.900 [1A] and clause 5.3.1 of the 3GPP TS 29.501 [19] for further information).

# C.2 ETC\_Configuration API

openapi: 3.0.0

info:

title: ETC\_Configuration

version: 1.0.0

description: |

API for event triggered network slice adaptation configuration.

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externalDocs:

description: >

3GPP TS 24.549 V18.2.0 Application Data Analytics Enablement Service; Stage 3.

url: https://www.3gpp.org/ftp/Specs/archive/24\_series/24.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/su\_nsc/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 5.2.4 of 3GPP TS 29.122.

paths:

/configurations/{configurationId}:

put:

description: >

Perfomrs event triggered network slice adaptation.

operationId: EventTriggeredNetworkAdaptation

tags:

- Event triggered network adaptation (Document)

parameters:

- name: configurationId

description: String identifying the resource.

in: path

required: true

schema:

type: string

requestBody:

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/NwSliceAdptEvent'

responses:

'204':

description: >

No Content. The requested network slice adaptation is successfullyprocessed.

'307':

$ref: 'TS29122\_CommonData.yaml#/components/responses/307'

'308':

$ref: 'TS29122\_CommonData.yaml#/components/responses/308'

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

NwSliceAdptEvent:

description: >

Represents the event associated with triggered network slice adaptation

with the underlying network.

type: object

properties:

valUeIds:

type: array

minItems: 1

items:

$ref: 'TS29549\_SS\_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'

sliceId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Snssai'

dnn:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnn'

appReqs:

$ref: '#/components/schemas/AppReqs'

required:

- valUeIds

- sliceId

AppReqs:

description: Represents requirements for the requested application.

type: object

properties:

timeIntervals:

type: array

minItems: 1

items:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/DurationSec'

area:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/LocationArea'

ratType:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/RatType'

preservIpAdd:

description: >

Indication whether to preserve the UE IP address (true) or not (false).

type: boolean

default: false

Annex C (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2021-08 | CT1#131-e | [C1-214994](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_131e/Docs/C1-214994.zip) |  |  |  | TS skeleton for Network slice capability management - Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification | 0.0.0 |
| 2021-08 | CT1#131-e | [C1-214983](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_131e/Docs/C1-214983.zip) |  |  |  | Network slice capability management procedures | 0.1.0 |
| 2021-08 | CT1#131-e | [C1-214993](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_131e/Docs/C1-214993.zip) |  |  |  | Requirements for functional entities | 0.1.0 |
| 2021-10 | CT1#132-e | [C1-216124](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_132e/Docs/C1-216124.zip) |  |  |  | Correction of event triggered network slice adaptation procedure | 0.2.0 |
| 2021-12 | CT#94e |  |  |  |  | Creation of version 1.0.0 for CT#94 for information | 1.0.0 |
| 2022-01 | CT1#133-bis-e | [C1-220187](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220187.zip) |  |  |  | Definitions of terms and symbols for network slice capability enablement Spec. | 1.1.0 |
| 2022-01 | CT1#133 | [C1-220578](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220578.zip) |  |  |  | Network slice adaptation | 1.1.0 |
| 2022-01 | CT1#133 | [C1-220579](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220579.zip) |  |  |  | Resolving EN | 1.1.0 |
| 2022-01 | CT1#133 | [C1-220580](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220580.zip) |  |  |  | General description for network slice capability enablement Spec | 1.1.0 |
| 2022-01 | CT1#133 | [C1-220581](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220581.zip) |  |  |  | Scope for network slice capability enablement Spec | 1.1.0 |
| 2022-01 | CT1#133 | [C1-220618](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_133e-bis/Docs/C1-220618.zip) |  |  |  | Replace management with enablement | 1.1.0 |
| 2022-02 | CT1#134 | [C1-221253](https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_134e/Docs/C1-221253.zip) |  |  |  | Clarification on route selection descriptors | 1.2.0 |
| 2022-03 | CT1#95e | CP-220315 |  |  |  | Specification presented for approval, v2.0.0 | 2.0.0 |
| 2022-03 | CT#95e |  |  |  |  | TS 24.549 v17.0.0 created after CT#95e by MCC | 17.0.0 |
| 2022-06 | CT#96 | CP-221217 | 0001 | 2 | B | Authenticate of SNSCE-C identity | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0002 | 3 | B | CoAP encoding | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0003 | 2 | B | CoAP requirements for SNSCE-C | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0004 | 1 | B | CoAP requirements for SNSCE-S | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0005 | 1 | F | Re-order the reference | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0006 | 2 | B | SNSCE client CoAP procedure | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0007 | 3 | B | SNSCE server CoAP procedure | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0008 | 1 | F | HTTP parameters | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0009 | 1 | F | Modification of general descriptions | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0010 | 1 | F | SNSCE client HTTP procedure | 17.1.0 |
| 2022-06 | CT#96 | CP-221217 | 0011 | 1 | F | SNSCE server HTTP procedure | 17.1.0 |
| 2022-09 | CT#97e | CP-222150 | 0012 | 1 | F | Added description and overview | 17.2.0 |
| 2023-03 | CT#99 | CP-230233 | 0013 |  | F | Requirements alignment and miscellaneous corrections | 17.3.0 |
| 2023-12 | CT#102 | CP-233190 | 0015 | 2 | F | Update to the obsoleted IETF HTTP RFCs | 18.0.0 |
| 2024-03 | CT#103 | CP-240118 | 0016 | 1 | B | Update the general description | 18.1.0 |
| 2024-03 | CT#103 | CP-240118 | 0017 | 1 | B | Add parameters to network slice adaptation trigger | 18.1.0 |
| 2024-03 | CT#103 | CP-240118 | 0018 | 2 | B | Update APIs for event triggered network slice configuration | 18.1.0 |
| 2024-03 | CT#103 | CP-240118 | 0019 | 2 | B | Retrieve data and information from NSCE client | 18.1.0 |
| 2024-03 | CT#103 | CP-240118 | 0020 | 2 | B | Notify slice modification in Inter-PLMN based slice service continuity | 18.1.0 |
| 2024-06 | CT#104 | CP-241188 | 0025 | 1 | B | Notify slice modification in edge based NSCE deployments | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0026 | 1 | B | Network slice information delivery after network slice allocation in NSaaS model | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0028 | 2 | B | Update APIs for slice modification in Inter-PLMN based slice service continuity | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0023 | 3 | F | CoAP resource representation and encoding for network slice configuration | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0035 | 1 | F | Scope and General description | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0029 | 1 | B | EDN based service continuity service | 18.2.0 |
| 2024-06 | CT#104 | CP-241188 | 0030 | 1 | B | EDN based service continuity APIs definition | 18.2.0 |
| 2024-06 | CT#104 | CP-241232 | 0021 | 3 | F | Network slice capability enablement services | 18.2.0 |
| 2024-06 | CT#104 | CP-241233 | 0031 | 2 | F | NSCE\_EdnSliceInfo API (YAML) | 18.2.0 |
| 2024-06 | CT#104 | CP-241237 | 0022 | 3 | F | HTTP resource representation and encoding for network slice configuration | 18.2.0 |
| 2024-06 | CT#104 | CP-241236 | 0024 | 2 | F | ETC\_Configuration API | 18.2.0 |