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| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Core Network and Terminals;  Service Enabler Architecture Layer for Verticals (SEAL);  Application Programming Interface (API) specification;  Stage 3  (Release 16) | |
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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 specification describes the APIs for the Service Enabler Architecture Layer for Verticals (SEAL). The SEAL and related stage 2 architecture, functional requirements and information flows are specified in 3GPP TS 23.434 [2].

# 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 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".

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

[4] IETF RFC 6455: "The Websocket Protocol".

[5] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

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

[7] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[8] IETF RFC 7233: "Hypertext Transfer Protocol (HTTP/1.1): Range Requests".

[9] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[10] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[11] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

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

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

[14] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[15] Open API Initiative, “OpenAPI 3.0.0 Specification”, <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[16] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3”.

[17] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2”.

[18] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

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

[20] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[21] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[22] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[23] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE\_LTE); MB2 reference point; Stage 3".

[24] 3GPP TR 21.900: "Technical Specification Group working methods".

[25] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

[26] 3GPP TS 33.434: "Service Enabler Architecture Layer for Verticals (SEAL); Security Aspects".

# 3 Definitions of terms 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].

**VAL service:** A generic name for any service offered by the VAL service provider to their VAL users.

**SEAL service:** A generic name for a common service (e.g. group management, configuration management, location management) that can be utilized by multiple vertical applications.

**SEAL provider:** Provider of SEAL service(s).

**VAL server:** A generic name for the server application function of a specific VAL service.

**SEAL server:** An entity that provides the server side functionalities corresponding to the specific SEAL service.

**VAL system:** The collection of applications, services, and enabling capabilities required to support a VAL service.

**VAL group:** A defined set of VAL UEs or VAL users configured for specific purpose in a VAL service.

NOTE: The set could be of either VAL UEs or VAL users depending on the specific VAL service.

**VAL group home system:** The VAL system where the VAL group is defined.

**VAL group member:** A VAL service user, whose VAL user ID is listed in a particular VAL group.

**Vertical application:** An application catering to a specific vertical.

## 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].

5GS 5G System

AEF API Exposing Function

API Application Programming Interface

JSON JavaScript Object Notation

NDS Network Domain Security

NDS/IP NDS for IP based protocols

PLMN Public Land Mobile Network

REST Representational State Transfer

SCEF Service Capability Exposure Function

SCS Service Capability Server

SEAL Service Enabler Architecture Layer for Verticals

TMGI Temporary Mobile Group Identity

UE User Equipment

VAL Vertical Application Layer

# 4 Overview

3GPP has considered in 3GPP TS 23.434 [2] the development of Service enabler architecture layer for verticals (SEAL) over 3GPP networks to support vertical applications (e.g. V2X applications). It specifies the functional architecture for SEAL and the procedures, information flows and APIs for each service within SEAL in order to support vertical applications over the 3GPP systems. To ensure efficient use and deployment of vertical applications over 3GPP systems, SEAL services includes, group management, configuration management, location management, identity management, key management and network resource management.

3GPP TS 23.434 [2], clause 6 specifies the functional entities and domains of the functional model, reference points descriptions and SEAL APIs for SEAL services.

The present document specifies the APIs needed to support SEAL.

# 5 Services offered by the SEAL servers

## 5.1 Introduction of SEAL services

The table 5.1-1 lists the SEAL server APIs below the service name. A service description clause for each API gives a general description of the related API.

Table 5.1-1: List of SEAL Service APIs

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | Operation Semantics | Consumer(s) |
| SS\_LocationReporting | Create\_Trigger\_Location\_Reporting | Request/ Response | VAL server |
| Fetch\_Location\_Report\_Trigger | Request/Response | VAL server |
| Update\_Trigger\_Location\_Reporting | Request/ Response | VAL server |
| Cancel\_Trigger\_Location\_Reporting | Request/ Response | VAL server |
| SS\_LocationInfoEvent | Subscribe\_Location\_Info | Subscribe/Notify | VAL server |
| Notify\_Location\_Info | VAL server |
| SS\_LocationInfoRetrieval | Obtain\_Location\_Info | Request/ Response | VAL server |
| SS\_GroupManagement | Query\_Group\_Info | Request/ Response | VAL server |
| Update\_Group\_Info | Request/ Response | VAL server |
| Create\_Group | Request/ Response | VAL server |
| Delete\_Group | Request/Response | VAL server |
| SS\_GroupManagementEvent | Subscribe\_Group\_Info\_Modification | Subscribe/Notify | VAL server |
| Notify\_Group\_Info\_Modification | VAL server |
| Notify\_Group\_Creation | VAL server |
| SS\_UserProfileRetrieval | Obtain\_User\_Profile | Request/ Response | VAL server |
| SS\_UserProfileEvent | Subscribe\_User\_Profile\_Update | Subscribe/Notify | VAL server |
| Notify\_User\_Profile\_Update | VAL server |
| SS\_NetworkResourceAdaptation | Reserve\_Network\_Resource | Request/Response | VAL server |
| Request\_Unicast\_Resource | Request/Response | VAL server |
| Update\_Unicast\_Resource | Request/Response | VAL server |
| Request\_Multicast\_Resource | Request/Response | VAL server |
| Notify\_UP\_Delivery\_Mode | Subscribe/Notify | VAL server |
| SS\_Events | Subscribe\_Event | Subscribe/Notify | VAL server |
| Notify\_Event | VAL server |
| Unsubscribe\_Event | VAL server |
| SS\_KeyInfoRetrieval | Obtain\_Key\_Info | Request/Response | VAL server |
| NOTE: The service operations of SS\_Events API are reused by the SS\_LocationInfoEvent, SS\_GroupManagementEvent and SS\_UserProfileEvent for events related services. | | | |

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

Table 5.1-2: API Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Service Name** | **Clause** | **Description** | **OpenAPI Specification File** | **apiName** | **Annex** |
| SS\_LocationReporting | 7.1 | Report Location Information Service. | TS29549\_SS\_LocationReporting.yaml | ss-lr | A.2 |
| SS\_GroupManagement | 7.2 | Group Management Service | TS29549\_SS\_GroupManagement.yaml | ss-gm | A.3 |
| SS\_UserProfileRetrieval | 7.3 | User Profile Retrieval Service | TS29549\_SS\_UserProfileRetrieval.yaml | ss-upr | A.4 |
| SS\_Network\_Resource\_Adaptation | 7.4 | Network Resource Adaptation Service | TS29549\_SS\_NetworkResourceAdaptation.yaml | ss-nra | A.5 |
| SS\_Events | 7.5 | Events Notify Service | TS29549\_SS\_Events.yaml | ss-events | A.6 |
| SS\_KeyInfoRetrieval | 7.6 | Key Information Retrieval Service | TS29549\_SS\_KeyInfoRetrieval.yaml | ss-kir | A.7 |

## 5.2 Location management APIs

### 5.2.1 SS\_LocationReporting API

#### 5.2.1.1 Service Description

##### 5.2.1.1.1 Overview

The SS\_LocationReporting API, as defined 3GPP TS 23.434 [2], allows VAL server via LM-S reference point to configure reporting trigger of location information to the location management server.

#### 5.2.1.2 Service Operations

##### 5.2.1.2.1 Introduction

The service operation defined for SS\_LocationReporting API is shown in the table 5.2.1.2.1-1.

Table 5.2.1.2.1-1: Operations of the SS\_LocationReporting API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Create\_Trigger\_Location\_Reporting | This service operation is used by VAL server to create the trigger to report location information. | VAL server |
| Fetch\_Location\_Report\_Trigger | This service operation is used by VAL server to retrieve the location reporting trigger information. | VAL server |
| Update\_Trigger\_Location\_Reporting | This service operation is used by VAL server to update the trigger to report location information. | VAL server |
| Cancel\_Trigger\_Location\_Reporting | This service operation is used by VAL server to cancel the trigger to report location information. | VAL server |

##### 5.2.1.2.2 Create\_Trigger\_Location\_Reporting

###### 5.2.1.2.2.1 General

This service operation is used by a VAL server to create the trigger to report location information.

###### 5.2.1.2.2.2 VAL server providing trigger configuration using Create\_Trigger\_Location\_Reporting service operation

To create the reporting trigger configuration, the VAL server shall send HTTP POST request message to location management server. The body of the HTTP POST message shall include the LocationReportConfiguration data type, as specified in the clause 7.1.1.2.2.3.1.

Upon receiving the HTTP POST message as described above, the location management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to provide the trigger;

2. if the VAL server is authorized to provide the triggers, the location management server shall;

a. create a new resource for Individual SEAL Location Reporting Configuration as specified in clause 7.1.1.2.1; and

b. return the SEAL Resource URI in the response message.

##### 5.2.1.2.3 Fetch\_Location\_Report\_Trigger

###### 5.2.1.2.3.1 General

This service operation is used by VAL server to retrieve an individual location reporting configuration information.

###### 5.2.1.2.3.2 VAL server fetching trigger configuration using Fetch\_Location\_Report\_Trigger service operation

To fetch the location report trigger configuration, the VAL server shall send HTTP GET request message to location management server on the resource URI representing the individual SEAL location reporting configuration, as specified in 7.1.1.2.3.3.1.

Upon receiving the HTTP GET message as described above, the location management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to fetch the trigger information;

2. if the VAL server is authorized to fetch the trigger information, the location management server shall;

a. return the location report trigger configuration in LocationReportConfiguration data type, as specified in clause 7.1.1.2.1.

##### 5.2.1.2.4 Update\_Trigger\_Location\_Reporting

###### 5.2.1.2.4.1 General

This service operation is used by a VAL server to update the trigger to report location information.

###### 5.2.1.2.4.2 VAL server providing trigger configuration using Update\_Trigger\_Location\_Reporting service operation

To modify the reporting trigger configuration, the VAL server shall send HTTP PUT message to the location management server to the Resource URI identifying the individual SEAL location reporting configuration resource representation, as specified in the clause 7.1.1.2.3.3.2. Upon receiving the HTTP PUT message, the location management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to modify the configuration information;

2. if the VAL server is authorized to modify the information, then the location management server shall;

a. if the configuration information in the request is valid, update the resource identified by the Resource URI of the configuration received in the request;

b. return the updated location reporting configuration information in the response

##### 5.2.1.2.5 Cancel\_Trigger\_Location\_Reporting

###### 5.2.1.2.5.1 General

This service operation is used by a VAL server to cancel the trigger to report location information.

###### 5.2.1.2.5.2 VAL server providing trigger configuration using Cancel\_Trigger\_Location\_Reporting service operation

To delete the reporting trigger configuration, the VAL server shall send an HTTP DELETE message to the resource representing Individual SEAL Location Reporting Configuration as specified in clause 7.1.1.2.3.3.3.

Upon receiving the HTTP DELETE message, the location management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to delete the configuration information; and

2. if the VAL server is authorized to delete the configuration information, the location management server shall delete the resource pointed by the Resource URI for Individual SEAL Location Reporting Configuration.

### 5.2.2 SS\_LocationInfoEvent API

The SS\_LocationInfoEvent API, as defined 3GPP TS 23.434 [2], allows a VAL server via LM-S reference point to subscribe for and receive notifications of location information from the location management server. The SS\_LocationInfoEvent API supports this via the event "LM\_LOCATION\_INFO\_CHANGE" of the SS\_Events API as specified in clause 7.5.

### 5.2.3 SS\_LocationInfoRetrieval API

The SS\_LocationInfoRetrieval API, as defined 3GPP TS 23.434 [2], enables the VAL server via LM-S reference point to obtain location information from the location management server. The SS\_LocationInfoRetrieval API supports this via the event "LM\_LOCATION\_INFO\_CHANGE" of the SS\_Events API by setting the "immRep" attribute to true and setting the "notifMethod" attribute to "ONE\_TIME" within the "eventReq" attribute, as specified in clause 7.5.

Upon receipt of the immediate reporting indication in the "immRep" attribute within the "eventReq" attribute sets to true in the HTTP POST request, the location management server shall ignore the "notificationDestination" attribute within the SEALEventSubscription data type and include the event details in the "eventDetails" attribute, if available, in the HTTP POST response.

## 5.3 Group management APIs

### 5.3.1 SS\_GroupManagement API

#### 5.3.1.1 Service Description

##### 5.3.1.1.1 Overview

The SS\_GroupManagement API, as defined 3GPP TS 23.434 [2], allows VAL server via GM-S reference point to create, fetch, update and delete VAL group membership and configuration information.

#### 5.3.1.2 Service Operations

##### 5.3.1.2.1 Introduction

The service operation defined for SS\_GroupManagement API is shown in the table 5.3.1.2.1-1.

Table 5.3.1.2.1-1: Operations of the SS\_GroupManagement API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Query\_Group\_Info | This service operation is used by VAL server to query for VAL group documents, group membership list and configuration information. | VAL Server |
| Update\_Group\_Info | This service operation is used by VAL server to modify group membership and configuration information. | VAL server |
| Create\_Group | This service operation is used by VAL server to configure new VAL group. | VAL server |
| Delete\_Group | This service operation is used by the VAL server to delete the VAL group. | VAL server |

##### 5.3.1.2.2 Query\_Group\_Info

###### 5.3.1.2.2.1 General

This service operation is used by a VAL server to obtain VAL group documents, group membership and configuration information.

###### 5.3.1.2.2.2 VAL server fetching VAL group documents, group membership and configuration information using Query\_Group\_Info service operation

To obtain membership, configuration information of a VAL group, the VAL server shall send a HTTP GET message to the group management server, on VAL group document’s resource representation URI as specified in clause 7.2.1.2.3.3.1. The GET message may include the following query parameters: membership list, group configuration. To obtain VAL groups information, the VAL server shall send a HTTP GET message to the group management server, on VAL group documents collection resource representation URI as specified in clause 7.2.1.2.2.3.2. The GET message may include the following query parameters: VAL Group ID, VAL Service ID.

Upon receiving the HTTP GET message as described above, the group management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to fetch the VAL group information;

2. if the VAL server is authorized to obtain the group information, the group management server shall;

a. if the request to VAL group document’s resource representation URI includes query parameters, then, return in the response message with VAL group information which includes, group membership list information if the request includes membership list query, group configuration information if the request includes group configuration query and VAL group identifier;

b. if the request to VAL group document’s resource representation URI does not include query parameter, then, return the VAL group document resource in the response message;

c. in the request to VAL group documents collection resource representation URI, return the VAL group documents matching the query parameters in the response message.

##### 5.3.1.2.3 Update\_Group\_Info

###### 5.3.1.2.3.1 General

This service operation is used by a VAL server to modify group membership and configuration information.

###### 5.3.1.2.3.2 VAL server modifying group membership and configuration using Update\_Group\_Info service operation

To modify group information of a VAL group, the VAL server shall send HTTP PUT message to the group management server to the Resource URI identifying the VAL group document resource representation, as specified in the clause 7.2.1.2.3.3.2. This request shall not replace valGroupId property in the existing resource. Upon receiving the HTTP PUT message, the group management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to modify VAL group information;

2. verify that valGroupId in the request is same as valGroupId of the VAL group document resource;

3. if the VAL server is authorized to modify the group information and the valGroupId matches, then the group management server shall;

a. if the group configuration information in the request is valid, update the resource identified by the Resource URI of the group document with group members list and group configuration information received in the request;

b. return the updated VAL group document in the response

##### 5.3.1.2.4 Create\_Group

###### 5.3.1.2.4.1 General

This service operation is used by a VAL server to create VAL group.

###### 5.3.1.2.4.2 VAL server creating new group using Create\_Group service operation

To create a VAL group, the VAL server shall send a HTTP POST message to the group management server. The body of the POST message shall include VAL group document information as specified in clause 7.2.1.2.2.3.1. Upon receiving HTTP POST message, the group management server shall

1. verify the identity of the VAL server and check if the VAL server is authorized to create VAL group document;

2. if the VAL group document information in the request includes location criteria, shall obtain the list of VAL users or VAL UEs within the requested location criteria information from the Location Management server and include them in VAL group members of the new VAL group;

3. if the VAL server is authorized to create VAL group document, shall create a new resource as defined in 7.2.1.2.2.3.1 and return the VAL group document and its Resource URI in the response message.

##### 5.3.1.2.5 Delete\_Group

###### 5.3.1.2.5.1 General

This service operation is used by a VAL server to delete a VAL group.

###### 5.3.1.2.5.2 VAL server deleting VAL group using Delete\_Group service operation

To delete a VAL group, the VAL server shall send a HTTP DELETE message to the Group Management server to its resource representation in the Group Management server as specified in clause 7.2.1.2.3.3.3. Upon receiving HTTP DELETE message, the Group Management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to delete the VAL group document;

2. if the VAL server is authorized to delete the VAL group document, the Group Management server shall

a. delete the resource representation pointed by the group document resource identifier.

### 5.3.2 SS\_GroupManagementEvent API

The SS\_GroupManagementEvent API, as defined 3GPP TS 23.434 [2], allows a VAL server via GM-S reference point to subscribe for and receive notifications from Group Management server on new VAL group creations and on modifications to VAL Group membership and configuration information. The SS\_GroupManagementEvent API supports this via the "GM\_GROUP\_CREATE" and "GM\_GROUP\_INFO\_CHANGE" events of SS\_Events API as specified in clause 7.5. In order to authorize the VAL servers that have to be notified of a GM\_GROUP\_CREATE event, the Group Management server shall identify the VAL services (VAL Service IDs) allowed for the VAL server by the “subscriberId” attribute and shall notify the VAL server if the VAL services enabled for the created VAL group are allowed for the VAL server.

Upon the receipt of the VAL group document from the group management server during Create\_Group service operation, if the VAL server is interested in receiving the notifications about newly registered or de-registered VAL UE IDs to the VAL group, then the VAL server may subscribe to "GM\_GROUP\_INFO\_CHANGE" event using the SS\_Events API as specified in clause 7.5.1, to receive any VAL group membership update notifications.

## 5.4 Configuration management APIs

### 5.4.1 SS\_UserProfileRetrieval API

#### 5.4.1.1 Service Description

##### 5.4.1.1.1 Overview

The SS\_UserProfileRetrieval API, as defined in 3GPP TS 23.434 [2], allows VAL server via CM-S reference point to obtain user profile from the configuration management server.

#### 5.4.1.2 Service Operations

##### 5.4.1.2.1 Introduction

The service operation defined for SS\_UserProfileRetrieval API is shown in the table 5.4.1.2.1-1.

Table 5.4.1.2.1-1: Operations of the SS\_UserProfileRetrieval API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Obtain\_User\_Profile | This service operation is used by VAL server to obtain user profile. | VAL server |

##### 5.4.1.2.2 Obtain\_User\_Profile

###### 5.4.1.2.2.1 General

This service operation is used by a VAL server to obtain VAL user profile information.

###### 5.4.1.2.2.2 VAL server retrieving VAL user profile information using Obtain\_User\_Profile service operation

To obtain a VAL user’s profile, the VAL server shall send HTTP GET request message to configuration management server, on VAL service’s resource representation URI, with query parameters VAL user ID or VAL UE ID and optionally VAL service ID, as specified in 7.3.1.2.2.3.1.

Upon receiving the HTTP GET message as described above, the configuration management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to fetch the VAL user profile information;

2. if the VAL server is authorized to obtain the requested VAL user profile information, the configuration management server shall;

a. return in the response message with profile information corresponding to the query parameters that was sent in the request message.

### 5.4.2 SS\_UserProfileEvent API

The SS\_UserProfileEvent API, as defined in 3GPP TS 23.434 [2], allows a VAL server via CM-S reference point to subscribe for and receive notifications from the Configuration Management server on profile updates to VAL User or VAL UE. The SS\_UserProfileEvent API supports this via the "CM\_USER\_PROFILE\_CHANGE" event in SS\_Events API as specified in clause 7.5.

## 5.5 Network resource management APIs

### 5.5.1 SS\_Network\_Resource\_Adaptation API

#### 5.5.1.1 Service Description

##### 5.5.1.1.1 Overview

The SS\_NetworkResourceAdaptation API, as defined 3GPP TS 23.434 [2], allows VAL server via NRM-S reference point to communicate with the network resource management server for network resource adaptation including reserving network resource, requesting and subscribing for unicast and multicast resources.

#### 5.5.1.2 Service Operations

##### 5.5.1.2.1 Introduction

The service operation defined for SS\_NetworkResourceAdaptation API is shown in the table 5.5.1.2.1-1.

Table 5.5.1.2.1-1: Operations of the SS\_NetworkResourceAdaptation API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Reserve\_Network\_Resource | Requesting for network resource adaptation | VAL server |
| Request\_Unicast\_Resource | Requesting unicast resource | VAL server |
| Update\_Unicast\_Resource | Updating unicast resource | VAL server |
| Request\_Multicast\_Resource | Requesting multicast resource | VAL server |
| Notify\_UP\_Delivery\_Mode | Notifying the user plane delivery mode | NRM server |

##### 5.5.1.2.2 Reserve\_Network\_Resource

###### 5.5.1.2.2.1 General

This service operation is used by a VAL server to request for network resource adaptation.

###### 5.5.1.2.2.2 VAL server requesting for network resource adaptation using Reserve\_Network\_Resource service operation

The VAL server shall send a HTTP POST message to the NRM server. The body of the POST message shall include VAL UE(s) or VAL group information and the VAL service QoS requirement. Upon receiving HTTP POST message, the NRM server shall

1. verify the identity of the VAL server and check if the VAL server is authorized to request for network resource adaptation;

2. if the VAL server is authorized, the NRM server shall determine the QoS requirements for each VAL UE based on the VAL UE(s) or VAL group information;

3. for each VAL UE, the NRM server initiates the PCC procedures; and

4. the NRM server provides result and optionally includes the accepted value for the QoS requirements based on the outcome of the PCC procedure in the response message

##### 5.5.1.2.3 Request\_Unicast\_Resource

###### 5.5.1.2.3.1 General

This service operation is used by a VAL server to request for unicast resource.

###### 5.5.1.2.3.2 VAL server requesting for unicast resource using Request\_Unicast\_Resource service operation

The VAL server shall send a HTTP POST message to the NRM server. The body of the POST message shall include VAL user or UE information and the VAL service requirement. Upon receiving HTTP POST message, the NRM server shall

1. verify the identity of the VAL server and check if the VAL server is authorized to request for unicast resource;

2. if the VAL server is authorized, the NRM server evaluates the need for network resources and use of resource sharing;

3. for the VAL user or UE, the NRM server initiates interaction via SIP core;

4. the NRM server creates a unicast subscription as specified in clause 7.4.1.2.4.3.1; and

5. the NRM server provides result in the response message.

##### 5.5.1.2.4 Update\_Unicast\_Resource

###### 5.5.1.2.4.1 General

Void.

###### 5.5.1.2.4.2 VAL server requesting for updating the unicast resource using Update\_Unicast\_Resource service operation

Void.

##### 5.5.1.2.5 Request\_Multicast\_Resource

###### 5.5.1.2.5.1 General

This service operation is used by a VAL server to request for multicast resource.

###### 5.5.1.2.5.2 VAL server requesting for multicast resource using Request\_Multicast\_Resource service operation

The VAL server shall send a HTTP POST message to the NRM server. The body of the POST message shall include VAL group information, service announcement mode, QoS information, Broadcast area and VAL server notification endpoint address information. Upon receiving HTTP POST message, the NRM server shall

1. verify the identity of the VAL server and check if the VAL server is authorized to request for multicast resource;

2. if the VAL server is authorized, the NRM server decides to establish an MBMS bearer in EPS using the procedures defined in 3GPP TS 29.468 [23];

3. the NRM server creates a multicast subscription as specified in clause 7.4.1.2.2.3.1;

4. the NRM server provides the result in the response message.

##### 5.5.1.2.6 Notify\_UP\_Delivery\_Mode

###### 5.5.1.2.6.1 General

This service operation is used by the NRM server to send user plane notifications to the VAL server.

###### 5.5.1.2.6.2 Notifying user plane events using Notify\_UP\_Delivery\_Mode service operation

To notify the user plane events, the NRM server shall send an HTTP POST message using the Notification Destination URI received in the multicast resource request. The body of the HTTP POST message shall include an UserPlaneNotification as specified in clause 7.4.1.3.2.

Upon receiving the HTTP POST message, the VAL server shall process the Event Notification.

## 5.6 Events APIs

### 5.6.1 SS\_Events API

#### 5.6.1.1 Service Description

##### 5.6.1.1.1 Overview

The SS\_Events API, allows a VAL server via LM-S, GM-S, CM-S reference points to subscribe and unsubscribe from SEAL events and to receive notifications from the Location Management Server, Group Management Server and Configuration Management Server respectively.

#### 5.6.1.2 Service Operations

##### 5.6.1.2.1 Introduction

The service operations defined for the SS\_Events API are shown in the table 5.6.1.2.1-1.

Table 5.6.1.2.1-1: Operations of the SS\_Events API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Subscribe\_Event | This service operation is used by VAL server to subscribe for events from SEAL servers. | VAL Server |
| Unsubscribe\_Event | This service operation is used by VAL server to unsubscribe for events from SEAL servers. | VAL Server |
| Notify\_Event | This service operation is used by SEAL servers to send the notifications to the VAL server. | SEAL servers (Location Management, Group Management, Configuration Management). |

##### 5.6.1.2.2 Subscribe\_Event

###### 5.6.1.2.2.1 General

This service operation is used by a VAL server to subscribe to the SEAL events.

###### 5.6.1.2.2.2 Subscribing to SEAL events using Subscribe\_Event service operation

To subscribe to SEAL events, the VAL server shall send an HTTP POST message to the SEAL server. The body of the HTTP POST message shall include VAL Server Identifier, Event Type, Event Filters, Reporting Requirements and a Notification Destination URI as specified in clause 7.5.1.2.2.3.1.

Upon receiving the above described HTTP POST message, the SEAL server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to subscribe to the SEAL events mentioned in the HTTP POST message;

2. if the VAL server is authorized to subscribe to the SEAL events, the SEAL server shall:

a. create a new resource as specified in clause 7.5.1.2.1; and

b. return the SEAL Resource URI in the response message.

##### 5.6.1.2.3 Notify\_Event

###### 5.6.1.2.3.1 General

This service operation is used by the SEAL servers to send notifications to the VAL server.

###### 5.6.1.2.3.2 Notifying SEAL events using Notify\_Event service operation

To notify the SEAL events, the SEAL server shall send an HTTP POST message using the Notification Destination URI received in the subscription request. The body of the HTTP POST message shall include an Event Notification and SEAL Resource URI.

Upon receiving the HTTP POST message, the VAL server shall process the Event Notification.

##### 5.6.1.2.4 Unsubscribe\_Event

###### 5.6.1.2.4.1 General

This service operation is used by a VAL server to un-subscribe from the SEAL events.

###### 5.6.1.2.4.2 Unsubscribing from SEAL events using Unsubscribe\_Event service operation

To unsubscribe from SEAL events, the VAL server shall send an HTTP DELETE message to the resource representing the event in the SEAL server as specified in clause 7.5.1.2.3.3.1.

Upon receiving the HTTP DELETE message, the SEAL sever shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to Unsubscribe from the SEAL event associated with the SEAL Resource URI; and

2. if the VAL server is authorized to unsubscribe from the SEAL events, the SEAL server shall delete the resource pointed by the SEAL Resource URI

## 5.7 Key management APIs

### 5.7.1 SS\_KeyInfoRetrieval API

#### 5.7.1.1 Service Description

##### 5.7.1.1.1 Overview

As specified in 3GPP TS 33.434 [26], the SS\_KeyInfoRetrieval API, allows the VAL server via KM-S reference point to obtain the VAL service specific key management information from the key management server.

#### 5.7.1.2 Service Operations

##### 5.7.1.2.1 Introduction

The service operation defined for SS\_KeyInfoRetrieval API is shown in the table 5.7.1.2.1-1.

Table 5.7.1.2.1-1: Operations of the SS\_ KeyInfoRetrieval API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Obtain\_Key\_Info | This service operation is used by VAL server to obtain key management information. | VAL server |

##### 5.7.1.2.2 Obtain\_Key\_Info

###### 5.7.1.2.2.1 General

This service operation is used by the VAL server to obtain VAL service specific key management information.

###### 5.7.1.2.2.2 VAL server obtaining VAL service specific key material using Obtain\_Key\_Info service operation

To obtain key management information specific to VAL service, the VAL server shall send HTTP GET request message to key management server, on Key records resource collection URI, with query parameters VAL service ID and optionally VAL user ID or VAL UE ID, as specified in 7.6.1.2.2.3.1.

Upon receiving the HTTP GET message as described above, the key management server shall:

1. verify the identity of the VAL server and check if the VAL server is authorized to obtain key management information specific to VAL service, VAL user or VAL UE, the URI in the request is of target SEAL KMS and date/time of the request is in recent time window;

2. if the VAL server is authorized to obtain the requested key management information, the key management server shall;

a. return in the response message with key management information corresponding to the query parameters that were sent in the request message.

# 6 SEAL Design Aspects Common for All APIs

## 6.1 General

SEAL APIs allow secure access to the capabilities provided by SEAL.

This document specifies the procedures triggered at different functional entities as a result of API invocation requests and event notifications. The stage-2 level requirements and signalling flows are defined in 3GPP TS 23.434 [2].

Several design aspects, as mentioned in the following clauses, are specified in 3GPP TS 29.122 [3] and referenced by this specification.

## 6.2 Data Types

### 6.2.1 General

This clause defines structured data types, simple data types and enumerations that are applicable to several APIs defined in the present specification and can be referenced from data structures defined in the subsequent clauses.

In addition, data types that are defined in OpenAPI 3.0.0 Specification [15] can also be referenced from data structures defined in the subsequent clauses.

NOTE: As a convention, data types names in the present specification are with an upper-case letter in the beginning. Parameters are with a lower-case letter in the beginning. As an exception, data types that are also defined in OpenAPI 3.0.0 Specification [15] can use a lower-case case letter in the beginning for consistency.

Table 6.2.1-1 specifies data types re-used by the SEAL from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the SEAL.

Table 6.2.1-1: Re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| Uri | 3GPP TS 29.122 [3] |  |
| TestNotification | 3GPP TS 29.122 [3] | Following clarifications apply:  - The SCEF is the SEAL server; and  - The SCS/AS is the VAL server. |
| WebsockNotifConfig | 3GPP TS 29.122 [3] | Following clarifications apply:  - The SCEF is the SEAL server; and  - The SCS/AS is the VAL server. |

### 6.2.2 Referenced structured data types

Table 6.2.2-1 lists structured data types defined in this specification referenced by multiple services:

Table 6.2.2-1: Referenced Structured Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Description |
| VALGroupDocument | Clause 7.2.1.4.2.2 | VAL Group document information. |
| ProfileDoc | Clause 7.3.1.4.2.2 | VAL User or VAL UE profile information. |

### 6.2.3 Referenced Simple data types and enumerations

Following simple data types defined in Table 6.2.3-1 are applicable to several APIs in this document:

Table 6.2.3-1: Simple data types applicable to several APIs

|  |  |  |
| --- | --- | --- |
| Type name | Reference | Description |
|  |  |  |

## 6.3 Usage of HTTP

For SEAL APIs, support of HTTP/1.1 (IETF RFC 7230 [5], IETF RFC 7231 [6], IETF RFC 7232 [7], IETF RFC 7233 [8], IETF RFC 7234 [9] and IETF RFC 7235 [10]) over TLS (IETF RFC 5246 [11]) is mandatory and support of HTTP/2 (IETF RFC 7540 [12]) over TLS (IETF RFC 5246 [11]) 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 7540 [12].

Usage of HTTP over TLS and the TLS profiles shall be as specified in clause 5.1.1.4 of 3GPP TS 33.434 [26].

## 6.4 Content type

The bodies of HTTP request and successful HTTP responses shall be encoded in JSON format (see IETF RFC 8259 [13]).

The MIME media type that shall be used within the related Content-Type header field is "application/json", as defined in IETF RFC 8259 [13].

NOTE: This release only supports the content type JSON.

## 6.5 URI structure

6.5.1 Resource URI structure

All API URIs of SEAL APIs shall be:

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

"apiRoot" is configured by means outside the scope of the present document. It includes the scheme ("https"), host and optional port, and an optional prefix string. "apiName" and "apiVersion" shall be set dependent on the API, as defined in the corresponding clauses below.

All resource URIs in the clauses below are defined relative to the above root API URI.

NOTE 1: The "apiVersion" will only be increased if the new API version contains backward incompatible changes. Otherwise, the supported feature mechanism defined in clause 6.8 can be used to negotiate extensions.

NOTE 2: A different root structure can be used when the resource URI is preconfigured in the API invoking entity.

The root structure may be followed by "apiSpecificSuffixes" that are dependent on the API and are defined separately for each API as resource URI where they apply:

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

6.5.2 Custom operations URI structure

The custom operation definition is in Annex C of 3GPP TS 29.501 [14].

The URI of a custom operation which is associated with a resource shall have the following structure:

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

Custom operations can also be associated with the service instead of a resource. The URI of a custom operation which is not associated with a resource shall have the following structure:

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

In the above URI structures, "apiRoot", "apiName", "apiVersion" and "apiSpecificResourceUriPart" are as defined in clause 6.5.1 and "custOpName" represents the name of the custom operation as defined in clause 5.1.3.2 of 3GPP TS 29.501 [14]

## 6.6 Notifications

The functional entities

- shall support the delivery of notifications using a separate HTTP connection towards an address;

- may support testing delivery of notifications; and

- may support the delivery of notification using WebSocket protocol (see IETF RFC 6455 [4]),

as described in 3GPP TS 29.122 [3], with the following clarifications:

- the SCEF is the SEAL server; and

- the SCS/AS is the Subscriber.

## 6.7 Error Handling

Response bodies for error handling, as described in 3GPP TS 29.122 [3], are applicable to all APIs in the present specification unless specified otherwise, with the following clarifications:

- the SCEF is the SEAL server; and

- the SCS/AS is the functional entity invoking an API.

## 6.8 Feature negotiation

The functional entity invoking an API (i.e. the VAL server) and the SEAL server use feature negotiation procedures defined in 3GPP TS 29.122 [3] to negotiate the supported features, with the following clarifications:

- description of the SCEF applies to the SEAL server; and

- description of the SCS/AS applies to the functional entity invoking an API.

## 6.9 HTTP headers

The HTTP headers described in 3GPP TS 29.122 [3] are applicable to all APIs in this document.

## 6.10 Conventions for Open API specification files

The conventions for Open API specification files as specified in clause 5.2.9 of 3GPP TS 29.122 [3] shall be applicable for all APIs in this document.

# 7 SEAL API Definitions

## 7.1 Location management APIs

### 7.1.1 SS\_LocationReporting API

#### 7.1.1.1 API URI

The SS\_LocationReporting service shall use the SS\_LocationReporting API.

The request URIs used in HTTP requests from the VAL server towards the location management server shall have the Resource URI structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-lr".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.1.1.2.

#### 7.1.1.2 Resources

##### 7.1.1.2.1 Overview



Figure 7.1.1.2.1-1: Resource URI structure of the SS\_LocationReporting API

Table 7.1.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.1.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| SEAL Location Reporting Configurations | /trigger-configurations | POST | Creates a new Individual SEAL Location Reporting Configuration information. |
| Individual SEAL Location Reporting Configuration | /trigger-configurations/{configurationId} | GET | Retrieves an Individual SEAL Location Reporting Configuration information identified by {configurationId}. |
| PUT | Updates an Individual SEAL Location Reporting Configuration information identified by {configurationId}. |
| DELETE | Delete an Individual SEAL Location Reporting Configuration information identified by {configurationId}. |

##### 7.1.1.2.2 Resource: SEAL Location Reporting Configurations

###### 7.1.1.2.2.1 Description

The resource allows the VAL server to request to create a new individual SEAL location reporting configuration information at the location management server.

###### 7.1.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-lr/<apiVersion>/trigger-configurations**

This resource shall support the resource URI variables defined in the table 7.1.1.2.2.2-1.

Table 7.1.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.1.1.1 |

###### 7.1.1.2.2.3 Resource Standard Methods

7.1.1.2.2.3.1 POST

Table 7.1.1.2.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 7.1.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.1.1.2.2.3.1-3.

Table 7.1.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| LocationReportConfiguration | M | 1 | Location reporting configuration information. |

Table 7.1.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| LocationReportConfiguration | M | 1 | 201 Created | Location reporting configuration is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

Table 7.1.1.2.2.3.1-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/ss-lr/<apiVersion>/trigger-configurations/{configurationId} |

###### 7.1.1.2.2.4 Resource Custom Operations

None.

##### 7.1.1.2.3 Resource: Individual SEAL Location Reporting Configuration

###### 7.1.1.2.3.1 Description

The resource represents an individual SEAL location reporting configuration that is created at the location management server.

###### 7.1.1.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-lr/<apiVersion>/trigger-configurations/{configurationId}**

This resource shall support the resource URI variables defined in the table 7.1.1.2.3.2-1.

Table 7.1.1.2.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.1.1.1 |
| configurationId | string | Represents an individual SEAL location reporting configuration resource. |

###### 7.1.1.2.3.3 Resource Standard Methods

7.1.1.2.3.3.1 GET

This operation retrieves an individual SEAL location reporting configuration information. This method shall support the URI query parameters specified in table 7.1.1.2.3.3.1-1.

Table 7.1.1.2.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 7.1.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.1.1.2.3.3.1-3.

Table 7.1.1.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 7.1.1.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| LocationReportConfiguration | M | 1 | 200 OK | The location reporting configuration information. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

7.1.1.2.3.3.2 PUT

This operation updates the individual SEAL location reporting configuration. This method shall support the URI query parameters specified in table 7.1.1.2.3.3.2-1.

Table 7.1.1.2.3.3.2-1: URI query parameters supported by the PUT method on this resource

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

This method shall support the request data structures specified in table 7.1.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.1.1.2.3.3.2-3.

Table 7.1.1.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| LocationReportConfiguration | M | 1 | Updated details of the location reporting configuration. |

Table 7.1.1.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| LocationReportConfiguration | M | 1 | 200 OK | The configuration is updated successfully and the updated configuration information returned in the response. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

7.1.1.2.3.3.3 DELETE

This operation deletes the individual SEAL location reporting configuration. This method shall support the URI query parameters specified in table 7.1.1.2.3.3.3-1.

Table 7.1.1.2.3.3.3-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 7.1.1.2.3.3.3-2 and the response data structures and response codes specified in table 7.1.1.2.3.3.3-3.

Table 7.1.1.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 7.1.1.2.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | The individual configuration matching the configurationId is deleted. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.1.1.2.3.4 Resource Custom Operations

None.

#### 7.1.1.3 Notifications

None.

#### 7.1.1.4 Data Model

##### 7.1.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API.

Table 7.1.1.4.1-1 specifies the data types defined specifically for the SS\_LocationReporting API service.

Table 7.1.1.4.1-1: SS\_LocationReporting API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| LocationReportConfiguration | 7.1.1.4.2.2 |  |  |

Table 7.1.1.4.1-2 specifies data types re-used by the SS\_LocationReporting API service.

Table 7.1.1.4.1-2: SS\_LocationReporting API Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Accuracy | 3GPP TS 29.122 [3] |  |  |
| DateTime | 3GPP TS 29.571 [21] |  |  |
| DurationSec | 3GPP TS 29.571 [21] |  |  |
| SupportedFeatures | 3GPP TS 29.571 [21] | Used to negotiate the applicability of optional features defined in table 7.1.1.6-1. |  |
| ValTargetUe | Clause 7.3.1.4.2.3 | Used to indicate either VAL User ID or VAL UE ID, to which location reporting applies. |  |

##### 7.1.1.4.2 Structured data types

###### 7.1.1.4.2.1 Introduction

###### 7.1.1.4.2.2 Type: LocationReportConfiguration

Table 7.1.1.4.2.2-1: Definition of type LocationReportConfiguration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valServerId | string | M | 1 | Represents the VAL server identifier. |  |
| valTgtUe | ValTargetUe | M | 1 | Represents the VAL User ID or VAL UE ID to which the location reporting applies. |  |
| immRep | boolean | O | 0..1 | Indication of immediate reporting. If included, when it is set to true it indicates immediate reporting of the subscribed events, if available. Otherwise, reporting will occur when the event is met. |  |
| monDur | DateTime | O | 0..1 | Represents the time at which the subscription ceases to exist (i.e the reporting trigger becomes invalid). If omitted, there is no time limit. |  |
| repPeriod | DurationSec | O | 0..1 | Indicates the time interval between successive location reports. |  |
| accuracy | Accuracy | O | 0..1 | Represents the desired level of accuracy of the requested location information. |  |
| suppFeat | SupportedFeatures | O | 0..1 | Used to negotiate the supported features of the API as defined in clause 7.1.1.6.  This attribute shall be provided in the HTTP POST request and in the response of successful resource creation. |  |

##### 7.1.1.4.3 Simple data types and enumerations

#### 7.1.1.5 Error Handling

General error responses are defined in clause 6.7.

#### 7.1.1.6 Feature negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.1.1.6-1: Supported Features

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

## 7.2 Group management APIs

### 7.2.1 SS\_GroupManagement API

#### 7.2.1.1 API URI

The SS\_GroupManagement service shall use the SS\_GroupManagement API.

The request URIs used in HTTP requests from the VAL server towards the Group management server shall have the Resource URI structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-gm".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.2.1.2

#### 7.2.1.2 Resources

##### 7.2.1.2.1 Overview



Figure 7.2.1.2.1-1: Resource URI structure of the SS\_GroupManagement API

Table 7.2.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.2.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| VAL Group Documents | /group-documents | POST | Create a new VAL group document. |
| GET | Retrieve VAL group documents according to the query parameters. If there are no query parameters, do not fetch any VAL group document. |
| Individual VAL Group Document | /group-documents/{groupDocId} | GET | Retrieve an individual VAL group’s membership and configuration information according to query parameter on the resource identified by {groupDocId}. If there are no query parameter, fetch the whole VAL group document resource identified by {groupDocId}. |
| PUT | Update an individual VAL group’s membership and configuration information identified by {groupDocId}. |

##### 7.2.1.2.2 Resource: VAL Group Documents

###### 7.2.1.2.2.1 Description

The VAL Group Documents resource represents all the VAL group documents that are created at a given group management server.

###### 7.2.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-gm/<apiVersion>/group-documents**

This resource shall support the resource URI variables defined in the table 7.2.1.2.2.2-1.

Table 7.2.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.2.1.1 |

###### 7.2.1.2.2.3 Resource Standard Methods

7.2.1.2.2.3.1 POST

This method shall support the URI query parameters specified in table 7.2.1.2.2.3.1-1.

Table 7.2.1.2.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 7.2.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.2.1.2.2.3.1-3.

Table 7.2.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VALGroupDocument | M | 1 | Details of the VAL group that needs to be created, |

Table 7.2.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VALGroupDocument | M | 1 | 201 Created | VAL group created successfully.  The URI of the created resource shall be returned in the “Location” HTTP header. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

Table 7.2.1.2.2.3.1-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/ss-gm/<apiVersion>/group-documents/{groupDocId} |

7.2.1.2.2.3.2 GET

This operation retrieves VAL group documents satisfying filter criteria. This method shall support the URI query parameters specified in table 7.2.1.2.2.3.2-1.

Table 7.2.1.2.2.3.2-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| val-group-id | string | O | 0..1 | String identifying the VAL group. |
| val-service-id | string | O | 0..1 | String identifying the VAL service. |

This method shall support the request data structures specified in table 7.2.1.2.2.3.2-2 and the response data structures and response codes specified in table 7.2.1.2.2.3.2 -3.

Table 7.2.1.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 7.2.1.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| array(VALGroupDocument) | M | 0..N | 200 OK | List of VAL group documents. This response shall include VAL group documents matching the query parameters provided in the request. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.2.1.2.2.4 Resource Custom Operations

None.

##### 7.2.1.2.3 Resource: Individual VAL Group Document

###### 7.2.1.2.3.1 Description

The Individual VAL Group Document resource represents an individual group document that is created at a given group management server.

###### 7.2.1.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-gm/<apiVersion>/group-documents/{groupDocId}**

This resource shall support the resource URI variables defined in the table 7.2.1.2.3.2-1.

Table 7.2.1.2.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.2.1.1 |
| groupDocId | string | Represents an individual group document resource. |

###### 7.2.1.2.3.3 Resource Standard Methods

7.2.1.2.3.3.1 GET

This operation retrieves VAL group information satisfying filter criteria. This method shall support the URI query parameters specified in table 7.2.1.2.3.3.1-1.

Table 7.2.1.2.3.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| group-members | boolean | O | 0..1 | When set to 'true', it indicates the group management server to send the members list information of the VAL group. Set to false or omitted otherwise. |
| group-configuration | boolean | O | 0..1 | When set to 'true', it indicates the group management server to send the configuration information of the VAL group. Set to false or omitted otherwise. |

This method shall support the request data structures specified in table 7.2.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.2.1.2.3.3.1-3.

Table 7.2.1.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 7.2.1.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VALGroupDocument | M | 1 | 200 OK | The VAL group information based on the request from the VAL server.  This response shall include VAL group members list if group-members flag is set to true in the request, VAL group configuration information if the group-configuration flag is set to true in the request, VAL group identifier, whole VAL group document resource if both group-members and group-configuration flags are omitted/set to false in the request. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

7.2.1.2.3.3.2 PUT

This operation updates the VAL group document. This method shall support the URI query parameters specified in table 7.2.1.2.3.3.2-1.

Table 7.2.1.2.3.3.2-1: URI query parameters supported by the PUT method on this resource

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

This method shall support the request data structures specified in table 7.2.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.2.1.2.3.3.2-3.

Table 7.2.1.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VALGroupDocument | M | 1 | Updated details of the VAL group document. |

Table 7.2.1.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VALGroupDocument | M | 1 | 200 OK | The VAL group document updated successfully and the updated VAL group document returned in the response. |
| NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

7.2.1.2.3.3.3 DELETE

This operation deletes the VAL group document. This method shall support the URI query parameters specified in table 7.2.1.2.3.3.3-1.

Table 7.2.1.2.3.3.3-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 7.2.1.2.3.3.3-2 and the response data structures and response codes specified in table 7.2.1.2.3.3.3-3.

Table 7.2.1.2.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 7.2.1.2.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | The individual VAL group document matching the groupDocId is deleted. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.2.1.2.3.4 Resource Custom Operations

None.

#### 7.2.1.3 Notifications

None.

#### 7.2.1.4 Data Model

##### 7.2.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API

Table 7.2.1.4.1-1 specifies the data types defined specifically for the SS\_GroupManagement API service.

Table 7.2.1.4.1-1: SS\_GroupManagement API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| VALGroupDoument | 7.2.1.4.2.2 | VAL group document details. |  |

Table 7.2.1.4.1-2 specifies data types re-used by the SS\_GroupManagement API service.

Table 7.2.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| SupportedFeatures | 3GPP TS 29.571 [21] | Used to negotiate the applicability of optional features defined in table 7.2.1.6-1. |  |
| LocationInfo | 3GPP TS 29.122 [3] | The location information related to VAL group. |  |
| ValTargetUe | Clause 7.3.1.4.2.3 | Used to indicate either VAL User ID or VAL UE ID, to which location reporting applies. |  |
| LocationArea5G | 3GPP TS 29.122 [3] | The locations information related to the VAL group. |  |

##### 7.2.1.4.2 Structured data types

###### 7.2.1.4.2.1 Introduction

###### 7.2.1.4.2.2 Type: VALGroupDocument

Table 7.2.1.4.2.2-1: Definition of type VALGroupDocument

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valGroupId | string | M | 1 | This is VAL group identity (VAL group ID) as per TS 23.434 [2], which is a unique identifier within the VAL service that represents a VAL group, set of VAL users or VAL UEs according to the VAL service. |  |
| grpDesc | string | O | 0..1 | Text description of the VAL group. |  |
| members | array(ValTargetUe) | O | 1..N | List of VAL User IDs or VAL UE IDs, which are members of the VAL group. |  |
| valGrpConf | string | O | 0..1 | Configuration data for the VAL group.  Shall be present in HTTP POST request message from VAL server to Group Management server. |  |
| valServiceIds | array(string) | O | 1..N | List of VAL services whose communications enabled on the group. |  |
| suppFeat | SupportedFeatures | O | 0..1 | Used to negotiate the supported optional features of the API as described in clause 6.8.  This attribute shall be provided in the HTTP POST request and in the response of successful resource creation. |  |
| resUri | Uri | O | 0..1 | The URI for individual VAL group document resource. (NOTE) |  |
| locInfo | LocationInfo | O | 0..1 | The location information related to the VAL group. This information is used to determine the members of the group. |  |
| addLocInfo | LocationArea5G | O | 0..1 | The additional location information related to the VAL group. This information is used to determing the members of the group. |  |
| NOTE: The “resUri” attribute is not modifiable by the VAL server. | | | | | |

##### 7.2.1.4.3 Simple data types and enumerations

None.

#### 7.2.1.5 Error Handling

General error responses are defined in clause 6.7.

#### 7.2.1.6 Feature negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.2.1.6-1: Supported Features

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

## 7.3 Configuration management APIs

### 7.3.1 SS\_UserProfileRetrieval API

#### 7.3.1.1 API URI

The SS\_UserProfileRetrieval service shall use the SS\_UserProfileRetrieval API.

The request URIs used in HTTP requests from the VAL server towards the Configuration management server shall have the Resource URI structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-upr".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.3.1.2.

#### 7.3.1.2 Resources

##### 7.3.1.2.1 Overview



Figure 7.3.1.2.1-1: Resource URI structure of the SS\_UserProfileRetrieval API

Table 7.3.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.3.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| VAL Services | /val-services | GET | Retrieve VAL User or VAL UE's profile information. |

##### 7.3.1.2.2 Resource: VAL Services

###### 7.3.1.2.2.1 Description

The VAL Services resource represents all the VAL services that are created at a given configuration management server.

###### 7.3.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-upr/<apiVersion>/val-services**

This resource shall support the resource URI variables defined in the table 7.3.1.2.2.2-1.

Table 7.3.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.3.1.1 |

###### 7.3.1.2.2.3 Resource Standard Methods

7.3.1.2.2.3.1 GET

This operation retrieves VAL User or VAL UE profile information satisfying the filter criteria. This method shall support the URI query parameters specified in table 7.3.1.2.2.3.1-1.

Table 7.3.1.2.2.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| val-tgt-ue | ValTargetUe | M | 1 | Identifying a VAL target UE. |
| val-service-id | string | O | 0..1 | String identifying a VAL service. |

This method shall support the request data structures specified in table 7.3.1.2.2.3.2-2 and the response data structures and response codes specified in table 7.3.1.2.2.3.2 -3.

Table 7.3.1.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 7.3.1.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| array(ProfileDoc) | M | 0..N | 200 OK | List of VAL User / VAL UE profile documents. This response shall include user profile information matching the query parameters provided in the request. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.3.1.2.2.4 Resource Custom Operations

None.

#### 7.3.1.3 Notifications

None.

#### 7.3.1.4 Data Model

##### 7.3.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API

Table 7.3.1.4.1-1 specifies the data types defined specifically for the SS\_UserProfileRetrieval API service.

Table 7.3.1.4.1-1: SS\_UserProfileRetrieval API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| ProfileDoc | 7.3.1.4.2.2 | Profile information associated with VAL user ID or VAL UE ID. |  |
| ValTargetUe | 7.3.1.4.2.3 | Information identifying a VAL user ID or VAL UE ID. |  |

Table 7.3.1.4.1-2 specifies data types re-used by the SS\_UserProfileRetrieval API service.

Table 7.3.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| n/a |  |  |  |

##### 7.3.1.4.2 Structured data types

###### 7.3.1.4.2.1 Introduction

###### 7.3.1.4.2.2 Type: ProfileDoc

Table 7.3.1.4.2.2-1: Definition of type ProfileDoc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| profileInformation | string | M | 1 | Profile information associated with valTgtUe. |  |
| valTgtUe | ValTargetUe | M | 1 | Unique identifier of a VAL user or a VAL UE. |  |

###### 7.3.1.4.2.3 Type: ValTargetUe

Table 7.3.1.4.2.3-1: Definition of type ValTargetUe

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valUserId | string | O | 0..1 | Unique identifier of a VAL user. |  |
| valUeId | string | O | 0..1 | Unique identifier of a VAL UE. |  |
| NOTE: Either "valUserId" or "valUeId" shall be provided. | | | | | |

##### 7.3.1.4.3 Simple data types and enumerations

None.

#### 7.3.1.5 Error Handling

General error responses are defined in clause 6.7.

#### 7.3.1.6 Feature negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.3.1.6-1: Supported Features

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

## 7.4 Network resource management APIs

### 7.4.1 SS\_Network\_Resource\_Adaptation API

#### 7.4.1.1 API URI

The SS\_Network\_Resource\_Adaptation service shall use the SS\_Network\_Resource\_Adaptation API.

The request URIs used in HTTP requests from the VAL server towards the NRM server shall have the Resource URI structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-nra".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.4.1.2

#### 7.4.1.2 Resources

##### 7.4.1.2.1 Overview



Figure 7.4.1.2.1-1: Resource URI structure of the SS\_NetworkResourceAdaptation API

Table 7.4.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.4.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Multicast Subscriptions | /multicast-subscriptions | POST | Create a new Individual Multicast Subscription resource. |
| Individual Multicast Subscription | /multicast-subscriptions/{multiSubId} | GET | Read an Individual Multicast Subscription resource. |
| DELETE | Remove an Individual Multicast Subscription resource. |
| Unicast Subscriptions | /unicast-subscriptions | POST | Create a new Individual Unicast Subscription resource. |
| Individual Unicast Subscription | /unicast-subscriptions/{uniSubId} | GET | Read an Individual Unicast Subscription resource. |
| DELETE | Remove an Individual Unicast Subscription resource. |

##### 7.4.1.2.2 Resource: Multicast Subscriptions

###### 7.4.1.2.2.1 Description

###### 7.4.1.2.2.2 Resource Definition

Resource URI: {apiRoot}/ss-nra/<apiVersion>/multicast-subscriptions

This resource shall support the resource URI variables defined in table 7.4.1.2.2.2-1.

Table 7.4.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 7.4.1.1 |
| apiVersion | string | See clause 7.4.1.1 |

###### 7.4.1.2.2.3 Resource Standard Methods

7.4.1.2.2.3.1 POST

Table 7.4.1.2.2.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures specified in table 7.4.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.2.3.1-3.

Table 7.4.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| MulticastSubscription | M | 1 |  |

Table 7.4.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| MulticastSubscription | M | 1 | 201 Created |  |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

Table 7.4.1.2.2.3.1-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/ss-nra/<apiVersion>/multicast-subscriptions/{multiSubId} |

###### 7.4.1.2.2.4 Resource Custom Operations

None.

##### 7.4.1.2.3 Resource: Individual Multicast Subscription

###### 7.4.1.2.3.1 Description

###### 7.4.1.2.3.2 Resource Definition

Resource URI: {apiRoot}/ss-nra/<apiVersion>/multicast-subscriptions/{multiSubId}

This resource shall support the resource URI variables defined in table 7.4.1.2.3.2-1.

Table 7.4.1.2.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 7.4.1.1. |
| apiVersion | string | See clause 7.4.1.1. |
| multiSubId | string | The multicast subscription identifier. |

###### 7.4.1.2.3.3 Resource Standard Methods

7.4.1.2.3.3.1 GET

Table 7.4.1.2.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 7.4.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.3.3.1-3.

Table 7.4.1.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 7.4.1.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| MulticastSubscription | M | 1 | 200 OK |  |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

7.4.1.2.3.3.2 DELETE

Table 7.4.1.2.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 7.4.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.4.1.2.3.3.2-3.

Table 7.4.1.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 7.4.1.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The Individual Multicast Subscription resource was deleted. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

###### 7.4.1.2.3.4 Resource Custom Operations

None.

##### 7.4.1.2.4 Resource: Unicast Subscriptions

###### 7.4.1.2.4.1 Description

###### 7.4.1.2.4.2 Resource Definition

Resource URI: {apiRoot}/ss-nra/<apiVersion>/unicast-subscriptions

This resource shall support the resource URI variables defined in table 7.4.1.2.4.2-1.

Table 7.4.1.2.4.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 7.4.1.1 |
| apiVersion | string | See clause 7.4.1.1 |

###### 7.4.1.2.4.3 Resource Standard Methods

7.4.1.2.4.3.1 POST

Table 7.4.1.2.4.3.1-1: URI query parameters supported by the POST method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
|  |  |  |  |  |

This method shall support the request data structures specified in table 7.4.1.2.4.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.4.3.1-3.

Table 7.4.1.2.4.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| UnicastSubscription | M | 1 |  |

Table 7.4.1.2.4.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| UnicastSubscription | M | 1 | 201 Created |  |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

Table 7.4.1.2.4.3.1-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/ss-nra/<apiVersion>/unicast-subscriptions/{uniSubId} |

###### 7.4.1.2.4.4 Resource Custom Operations

None.

##### 7.4.1.2.5 Resource: Individual Unicast Subscription

###### 7.4.1.2.5.1 Description

###### 7.4.1.2.5.2 Resource Definition

Resource URI: {apiRoot}/ss-nra/<apiVersion>/unicast-subscriptions/{uniSubId}

This resource shall support the resource URI variables defined in table 7.4.1.2.5.2-1.

Table 7.4.1.2.5.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 7.4.1.1. |
| apiVersion | string | See clause 7.4.1.1. |
| uniSubId | string | The unicast subscription identifier. |

###### 7.4.1.2.5.3 Resource Standard Methods

7.4.1.2.5.3.1 GET

Table 7.4.1.2.5.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 7.4.1.2.5.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.5.3.1-3.

Table 7.4.1.2.5.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 7.4.1.2.5.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| UnicastSubscription | M | 1 | 200 OK |  |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

7.4.1.2.5.3.2 DELETE

Table 7.4.1.2.5.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 7.4.1.2.5.3.2-2 and the response data structures and response codes specified in table 7.4.1.2.5.3.2-3.

Table 7.4.1.2.5.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 7.4.1.2.5.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The Individual Unicast Subscription resource was deleted. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] shall also apply. | | | | |

###### 7.4.1.2.5.4 Resource Custom Operations

None.

#### 7.4.1.3 Notifications

##### 7.4.1.3.1 General

Table 7.4.1.3.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| Notify\_UP\_Delivery\_Mode | {notifUri} | POST | Report User Plane notification |

##### 7.4.1.3.2 Notify\_UP\_Delivery\_Mode

###### 7.4.1.3.2.1 Description

###### 7.4.1.3.2.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.4.1.3.2.2-1.

Table 7.4.1.3.2.2-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 7.4.1.3.2.2-2 and the response data structures and response codes specified in table 7.4.1.3.2.2-3.

Table 7.4.1.3.2.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| UserPlaneNotification | M | 1 |  |

Table 7.4.1.3.2.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | The receipt of the Notification is acknowledged. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [22] also apply. | | | | |

#### 7.4.1.4 Data Model

##### 7.4.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API

Table 7.4.1.4.1-1 specifies the data types defined specifically for the SS\_NetworkResourceAdaptation API service.

Table 7.4.1.4.1-1: SS\_NetworkResourceAdaptation API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| DeliveryMode | 7.4.1.4.3.2 |  |  |
| MulticastSubscription | 7.4.1.4.2.2 |  |  |
| NrmEvent | 7.4.1.4.3.3 |  |  |
| NrmEventNotification | 7.4.1.4.2.5 |  |  |
| ServiceAnnoucementMode | 7.4.1.4.3.1 |  |  |
| UserPlaneNotification | 7.4.1.4.2.4 |  |  |
| UnicastSubscription | 7.4.1.4.2.3 |  |  |

Table 7.4.1.4.1-2 specifies data types re-used by the SS\_NetworkResourceAdaptation API service.

Table 7.4.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| DateTime | 3GPP TS 29.571 [21] |  |  |
| MbmsLocArea | 3GPP TS 29.122 [3] |  |  |
| SupportedFeatures | 3GPP TS 29.571 [21] |  |  |
| Uint32 | 3GPP TS 29.571 [21] |  |  |
| Uri | 3GPP TS 29.571 [21] |  |  |
| WebsockNotifConfig | 3GPP TS 29.122 [3] |  |  |
| ValTargetUe | 7.3.1.4.2.3 | Used to identify either a VAL User ID or a VAL UE ID. |  |
| Ipv4Addr | 3GPP TS 29.571 [21] |  |  |
| Ipv6Addr | 3GPP TS 29.571 [21] |  |  |
| Port | 3GPP TS 29.122 [3] |  |  |

##### 7.4.1.4.2 Structured data types

###### 7.4.1.4.2.1 Introduction

###### 7.4.1.4.2.2 Type: MulticastSubscription

Table 7.4.1.4.2.2-1: Definition of type MulticastSubscription

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valGroupId | string | M | 1 | The identity of the group that the MBMS bearer is requested for. |  |
| anncMode | ServiceAnnoucementMode | M | 1 | Indicates whether the service announcement is sent by NRM server or by the VAL server. |  |
| multiQosReq | string | M | 1 | The QoS requirement for the multicast. |  |
| locArea | MbmsLocArea | O | 0..1 | Indicate the area where the MBMS bearer is requested for. |  |
| duration | DateTime | O | 0..1 | Identifies the absolute time at which the subscription resource is considered to expire. When omitted in the request, it indicates the resource is requested to be valid forever by the VAL server. When omitted in the response, it indicates the resource is set to valid forever by the VAL server. |  |
| tmgi | Uint32 | O | 0..1 | TMGI.  Shall be provided by the NRM server if announcement mode is set to VAL. |  |
| notifUri | Uri | M | 1 | Identifies the notification URI where the NRM notification shall be sent to. |  |
| reqTestNotif | boolean | O | 0..1 | Set to true by the NF service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| wsNotifCfg | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Used to negotiate the applicability of optional features defined in table 7.4.1.6-1.  This parameter may be supplied by the VAL server in the POST request that requests the creation of a Multicast Subscription resource and shall be supplied in the corresponding POST response if it was present in the request. |  |
| upIpv4Addr | Ipv4Addr | O | 0..1 | Ipv4address of the user plane. (NOTE) |  |
| upIpv6Addr | Ipv6Addr | O | 0..1 | Ipv6address of the user plane. (NOTE) |  |
| upPortNum | Port | O | 0..1 | UDP port number of the user plane. |  |
| radioFreqs | array(Uint32) | O | 1..N | The radio frequencies which may be provided by the NRM server. |  |
| NOTE: At least one of upIpv4Addr or upIpv6Addr shall be provided by the NRM server. | | | | | |

###### 7.4.1.4.2.3 Type: UnicastSubscription

Table 7.4.1.4.2.3-1: Definition of type UnicastSubscription

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valTgtUe | ValTargetUe | M | 1 | The identity of the VAL user or VAL UE that the unicast bearer is requested for. |  |
| uniQosReq | string | O | 0..1 | The QoS requirement for the unicast. |  |
| duration | DateTime | O | 0..1 | Identifies the absolute time at which the subscription resource is considered to expire. When omitted in the request, it indicates the resource is requested to be valid forever by the VAL server. When omitted in the response, it indicates the resource is set to valid forever by the VAL server. |  |
| notifUri | Uri | M | 1 | Identifies the notification URI where the NRM notification shall be sent to. |  |
| reqTestNotif | Boolean | O | 0..1 | Set to true by the NF service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| wsNotifCfg | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | O | 1 | This parameter may be supplied by VAL server in the POST request that request the creation of a Unicast Subscription resource and may be supplied in the reply of corresponding request. |  |

###### 7.4.1.4.2.4 Type: UserPlaneNotification

Table 7.4.1.4.2.4-1: Definition of type UserPlaneNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| notifId | Uri | M | 1 | The subscription resource Uri to which this notification is related. |  |
| eventNotifs | array(NrmEventNotification) | M | 1..N | Notifications about Individual Events |  |

###### 7.4.1.4.2.5 Type: NrmEventNotification

Table 7.4.1.4.2.5-1: Definition of type NrmEventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| event | NrmEvent | M | 1 | Event that is notified. |  |
| ts | DateTime | M | 1 | Time at which the event is observed. |  |
| deliveryMode | DeliveryMode | C | 0..1 | Indicates delivery of the user data to the UE(s) via unicast mode or multicast mode.  Shall be present if event is UP\_DELIVERY\_MODE. |  |
| streamIds | array(string) | O | 1..N | Indicates the media streams (unicast or multicast) to be used.  May be present if event is UP\_DELIVERY\_MODE and NRM already has the streams available. |  |

##### 7.4.1.4.3 Simple data types and enumerations

###### 7.4.1.4.3.1 Enumeration: ServiceAnnoucementMode

Table 7.4.1.4.3.1-1: Enumeration ServiceAnnoucementMode

|  |  |  |
| --- | --- | --- |
| **Enumeration value** | **Description** | **Applicability** |
| NRM | NRM server performs the service announcement. |  |
| VAL | VAL server performs the service announcement. |  |

###### 7.4.1.4.3.2 Enumeration: DeliveryMode

Table 7.4.1.4.3.2-1: Enumeration DeliveryMode

|  |  |  |
| --- | --- | --- |
| **Enumeration value** | **Description** | **Applicability** |
| UNICAST | Unicast delivery |  |
| MULTICAST | Multicast delivery |  |

###### 7.4.1.4.3.3 Enumeration: NrmEvent

Table 7.4.1.4.3.3-1: Enumeration NrmEvent

|  |  |  |
| --- | --- | --- |
| **Enumeration value** | **Description** | **Applicability** |
| UP\_DELIVERY\_MODE | User Plane delivery mode. |  |

#### 7.4.1.5 Error Handling

#### 7.4.1.6 Feature negotiation

Table 7.4.1.6-1: Supported Features

|  |  |  |
| --- | --- | --- |
| **Feature number** | **Feature Name** | **Description** |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.6. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.6. This feature requires that the Notification\_test\_event feature is also supported. |

## 7.5 Event APIs

### 7.5.1 SS\_Events API

#### 7.5.1.1 API URI

The SS\_Events service shall use the SS\_Events API.

The request URIs use in HTTP requests from the VAL server towards the SEAL server shall have the Resource URI structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-events".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.5.1.2.

#### 7.5.1.2 Resources

##### 7.5.1.2.1 Overview



Figure 7.5.1.2.1-1: Resource URI structure of the SS\_Events API

Table 7.5.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.5.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| SEAL Events Subscriptions | /subscriptions | POST | Creates a new individual SEAL Event Subscription. |
| Individual SEAL Events Subscription | /subscriptions/{subscriptionId} | DELETE | Deletes an individual SEAL Event Subscription identified by the subscriptionId. |

##### 7.5.1.2.2 Resource: SEAL Events Subscriptions

###### 7.5.1.2.2.1 Description

The SEAL Events Subscriptions represents all event subscriptions on the SEAL server.

###### 7.5.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-events/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in the table 7.5.1.2.2.2-1.

Table 7.5.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.5.1.1 |

###### 7.5.1.2.2.3 Resource Standard Methods

7.5.1.2.2.3.1 POST

This method shall support the URI query parameters specified in the table 7.5.1.2.2.3.1-1.

Table 7.5.1.2.2.3.1-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 7.5.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.5.1.2.2.3.1-3.

Table 7.5.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| SEALEventSubscription | M | 1 | Create a new individual SEAL Events Subscription resource. |

Table 7.5.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| SEALEventSubscription | M | 1 | 201 Created | SEAL Events Subscription resource created successfully.  The URI of the created resource shall be returned in the "Location" HTTP header |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

Table 7.5.1.2.2.3.1-4: Headers supported by the 201 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains the URI of the newly created resource, according to the structure: {apiRoot}/ss-events/<apiVersion>/subscriptions/{subscriptionId} |

###### 7.5.1.2.2.4 Resource Custom Operations

None.

##### 7.5.1.2.3 Resource: Individual SEAL Events Subscription

###### 7.5.1.2.3.1 Description

The Individual SEAL Events Subscription resource represents an individual event subscription of a VAL server.

###### 7.5.1.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-events/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in the table 7.5.1.2.3.2-1.

Table 7.5.1.2.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.5.1.1 |
| SubscriptionId | string | Identifies an Individual Events Subscription |

###### 7.5.1.2.3.3 Resource Standard Methods

7.5.1.2.3.3.1 DELETE

This method shall support the URI query parameters specified in table 7.5.1.2.3.3.1-1.

Table 7.5.1.2.3.3.1-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 7.5.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.5.1.2.3.3.1-3.

Table 7.5.1.2.3.3.1-2: Data structures supported by the DELETE Request Body on this resource

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

Table 7.5.1.2.3.3.1-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | The individual SEAL Events Subscription matching the subscriptionId is deleted. |
| NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.5.1.2.3.4 Resource Custom Operations

None.

#### 7.5.1.3 Notifications

##### 7.5.1.3.1 General

The delivery of notifications shall conform to clause 6.6.

Table 7.5.1.3.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| SEAL Event Notification | {notificationDestination} | POST | Notifies subscriber of a SEAL Event |

##### 7.5.1.3.2 SEAL Event Notification

###### 7.5.1.3.2.1 Description

SEAL Event Notification is used by the SEAL server notify a VAL server of an Event. The VAL server shall be subscribed to such SEAL Event Notifications via the Individual SEAL Events Subscription Resource.

###### 7.5.1.3.2.2 Notification definition

The POST method shall be used for the event notification and the callback URI shall be the one provided by the VAL server during the subscription to the event.

Callback URI: **{notificationDestination}**

This method shall support the URI query parameters specified in table 7.5.1.3.2.2-1.

Table 7.5.1.3.2.2-1: URI query parameters supported by the POST method on this resource

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

This method shall support the request data structures specified in table 7.5.1.3.2.2-2 and the response data structures and response codes specified in table 7.5.1.3.2.2-3.

Table 7.5.1.3.2.2-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| SEALEventNotification | M | 1 | Notification information of a SEAL Event |

Table 7.5.1.3.2.2-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | The receipt of the Notification is acknowledged. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

#### 7.5.1.4 Data Model

##### 7.5.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API.

Table 7.5.1.4.1-1 specifies the data types defined specifically for the SS\_Events API service.

Table 7.5.1.4.1-1: SS\_Events API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| SEALEventSubscription | 7.5.1.4.2.2 | Represents an individual SEAL Event Subscription resource |  |
| SEALEventNotification | 7.5.1.4.2.3 | Represents an individual SEAL Event Subscription Notification |  |
| EventSubscription | 7.5.1.4.2.4 | Represents the subscription to a single SEAL event. |  |
| SEALEventDetail | 7.5.1.4.2.5 | Represents the SEAL event detail |  |
| VALGroupFilter | 7.5.1.4.2.6 | Represents a filter of VAL group identifiers belonging to a VAL service. |  |
| IdentityFilter | 7.5.1.4.2.7 | Represents a filter of VAL User / UE identities belonging to a VAL service. |  |
| SEALEvent | 7.5.1.4.3.3 | Represents the type of SEAL events that can be subscribed. |  |
| LMInformation | 7.5.1.4.2.8 | The location information for a VAL User ID or a VAL UE ID. |  |

Table 7.5.1.4.1-2 specifies data types re-used by the SS\_Events API service:

Table 7.5.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| ReportingInformation | 3GPP TS 29.523 [20] | Used to indicate the reporting requirement, only the following information are applicable for SEAL:  - immRep  - notifMethod  - maxReportNbr  - monDur  - repPeriod |  |
| SupportedFeatures | 3GPP TS 29.571 [21] | Used to negotiate the applicability of optional features defined in table 7.5.1.6-1. |  |
| TestNotification | 3GPP TS 29.122 [3] | Following differences apply:  - The SCEF is the SEAL server; and  - The SCS/AS is the subscribing VAL server. |  |
| Uri | 3GPP TS 29.122 [3] |  |  |
| WebsockNotifConfig | 3GPP TS 29.122 [3] | Following differences apply:  - The SCEF is the CAPIF core function; and  - The SCS/AS is the Subscribing functional entity. |  |
| VALGroupDocument | Clause 7.2.1.4.2.2 | Used to send VAL group document as part of event detail in the event notification. |  |
| ProfileDoc | Clause 7.3.1.4.2.2 | Used to send VAL User or VAL UE profile information as part of event detail in the event notification. |  |
| LocationInfo | 3GPP TS 29.122 [3] | Location information |  |
| ValTargetUe | 7.3.1.4.2.3 | Used to identify a VAL user ID or a VAL UE ID. |  |

##### 7.5.1.4.2 Structured data types

###### 7.5.1.4.2.1 Introduction

###### 7.5.1.4.2.2 SEALEventSubscription

Table 7.5.1.4.2.2-1: Definition of type SEALEventSubscription

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscriberId | string | M | 1 | String identifying the subscriber of the event. |  |
| eventSubs | array(EventSubscription) | M | 1..N | Subscribed events. |  |
| eventReq | ReportingInformation | M | 1 | Represents the reporting requirements of the event subscription. |  |
| notificationDestination | Uri | M | 1 | URI where the notification should be delivered to. |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by Subscriber to request the SEAL server to send a test notification as defined in clause 6.6. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.6. | Notification\_websocket |
| eventDetails | array(SEALEventDetail) | C | 1..N | Detailed information of individual Events.  Shall only be present in the response from the server if the immediate reporting indication in the "immRep" attribute within the "eventReq" attribute is set to true, and the reports are available. |  |
| suppFeat | SupportedFeatures | O | 0..1 | Used to negotiate the supported optional features of the API as described in clause 6.8.  This attribute shall be provided in the HTTP POST request and in the response of successful resource creation. |  |

###### 7.5.1.4.2.3 SEALEventNotification

Table 7.5.1.4.2.3-1: Definition of type SEALEventNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscriptionId | string | M | 1 | Identifier of the subscription resource to which the notification is related – SEAL resource identifier |  |
| eventDetails | array(SEALEventDetail) | M | 1..N | Detailed notifications of individual Events. |  |

###### 7.5.1.4.2.4 EventSubscription

Table 7.5.1.4.2.4-1: Definition of type EventSubscription

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| eventId | SEALEvent | M | 1 | Subscribed event |  |
| valGroups | array(VALGroupFilter) | C | 1..N | Each element of the array represents the VAL group identifier(s) of a VAL service that the subscriber wants to know in the interested event.  This parameter shall be present only if the event subscribed is “GM\_GROUP\_INFO\_CHANGE”. | GM\_GroupInfoChange |
| Identities | array(IdentityFilter) | C | 1..N | Each element of the array represents the VAL User / UE IDs of a VAL service that the event subscriber wants to know in the interested event.  This parameter shall be present only if the event subscribed is “CM\_USER\_PROFILE\_CHANGE” or “LM\_LOCATION\_INFO\_CHANGE”. (NOTE) | CM\_UserProfileChange, LM\_LocationInfoChange |
| NOTE:      The "valSvcId" attribute within IdentityFilter is not applicable for the event “LM\_LOCATION\_INFO\_CHANGE”. | | | | | |

###### 7.5.1.4.2.5 SEALEventDetail

Table 7.5.1.4.2.5-1: Definition of type SEALEventDetail

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| eventId | SEALEvent | M | 1 | Event that is notified |  |
| lmInfos | array(LMInformation) | C | 1..N | The location information for the interested VAL User IDs or VAL UE IDs.  This parameter shall be present only if the event in event notification is “LM\_LOCATION\_INFO\_CHANGE”. | LM\_LocationInfoChange |
| valGroupDocuments | array(VALGroupDocument) | C | 1..N | Newly created VAL group documents or the VAL groups documents with modified membership and configuration information. This parameter shall be present only if the event in event notification is “GM\_GROUP\_INFO\_CHANGE” or “GM\_GROUP\_CREATE”. | GM\_GroupInfoChange, GM\_GroupCreate |
| profileDocs | array(ProfileDoc) | C | 1..N | Updated profile information associated with VAL Users or VAL UEs.  This parameter shall be present only if the event in event notification is “CM\_USER\_PROFILE\_CHANGE”. | CM\_UserProfileChange |

###### 7.5.1.4.2.6 VALGroupFilter

Table 7.5.1.4.2.6-1: Definition of type VALGroupFilter

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valSvcId | string | O | 0..1 | Identity of the VAL Service that the subscriber is interested in. |  |
| valGrpIds | array(string) | M | 1..N | VAL Group identifiers that the event subscriber wants to know in the interested event. |  |

###### 7.5.1.4.2.7 IdentityFilter

Table 7.5.1.4.2.7-1: Definition of type IdentityFilter

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valSvcId | string | O | 0..1 | Identity of the VAL Service that the subscriber is interested in. |  |
| valTgtUes | array(ValTargetUe) | C | 1..N | VAL User IDs or VAL UE IDs that the event subscriber wants to know in the interested event. This parameter shall be present if the event subscribed is “CM\_USER\_PROFILE\_CHANGE” or “LM\_LOCATION\_INFO\_CHANGE”. |  |

###### 7.5.1.4.2.8 LMInformation

Table 7.5.1.4.2.8-1: Definition of type LMInformation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| valTgtUe | ValTargetUe | M | 1 | VAL User ID or UE ID that the event subscriber wants to know in the interested event. |  |
| locInfo | LocationInfo | M | 1 | The location information associated with the valTgtUe. |  |

##### 7.5.1.4.3 Simple data types and enumerations

###### 7.5.1.4.3.1 Introduction

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

###### 7.5.1.4.3.2 Simple data types

None.

###### 7.5.1.4.3.3 Enumeration: SEALEvent

Table 7.5.1.4.3.3-1: Enumeration SEALEvent

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| LM\_LOCATION\_INFO\_CHANGE | Events related to the location information of VAL Users or VAL UEs from the Location Management Server. | LM\_LocationInfoChange |
| GM\_GROUP\_INFO\_CHANGE | Events related to the modification of VAL group membership and configuration information from the Group Management Server. | GM\_GroupInfoChange |
| CM\_USER\_PROFILE\_CHANGE | Events related to update of user profile information from the Configuration Management Server. | CM\_UserProfileChange |
| GM\_GROUP\_CREATE | Events related to creation of new VAL groups from the Group Management Server. | GM\_GroupCreate |

#### 7.5.1.5 Error Handling

General error responses are defined in clause 6.7.

#### 7.5.1.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.5.1.6-1 lists the supported features for SS\_Events API.

Table 7.5.1.6-1: Supported Features

|  |  |  |
| --- | --- | --- |
| **Feature number** | **Feature Name** | **Description** |
| 1 | Notification\_test\_event | Testing of notification connection is supported according to clause 6.6. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.6. This feature requires that the Notification\_test\_event feature is also supported. |
| 3 | LM\_LocationInfoChange | This feature supports the location information change event. |
| 4 | GM\_GroupInfoChange | This feature supports the group information change event. |
| 5 | CM\_UserProfileChange | This feature supports the user profile change event. |
| 6 | GM\_GroupCreate | This feature supports the group creation event. |

## 7.6 Key management APIs

### 7.6.1 SS\_KeyInfoRetrieval API

#### 7.6.1.1 API URI

The request URI used in each HTTP request from the VAL server towards the Key management server shall have the structure as defined in clause 6.5 with the following clarifications:

- The <apiName>shall be "ss-kir".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.6.1.2.

#### 7.6.1.2 Resources

##### 7.6.1.2.1 Overview



Figure 7.6.1.2.1-1: Resource URI structure of the SS\_KeyInfoRetrieval API

Table 7.6.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.6.1.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Key records | /key-records | GET | Retrieve key management information uniquely applicable to VAL service, VAL user or VAL UE. |

##### 7.6.1.2.2 Resource: Key Records

###### 7.6.1.2.2.1 Description

The Key Records resource represents the key management information of all VAL services that are created at a given key management server.

###### 7.6.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-kir/<apiVersion>/key-records**

This resource shall support the resource URI variables defined in the table 7.6.1.2.2.2-1.

Table 7.6.1.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.5 |
| apiVersion | string | See clause 7.6.1.1 |

###### 7.6.1.2.2.3 Resource Standard Methods

7.6.1.2.2.3.1 GET

This operation retrieves VAL service key management information satisfying the filter criteria. This method shall support the URI query parameters specified in table 7.6.1.2.2.3.1-1.

Table 7.6.1.2.2.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| val-tgt-ue | ValTargetUe | O | 0..1 | Identifying a VAL user or a VAL UE. |
| val-service-id | string | M | 1 | String identifying a VAL service. |

This method shall support the request data structures specified in table 7.6.1.2.2.3.2-2 and the response data structures and response codes specified in table 7.6.1.2.2.3.2 -3.

Table 7.6.1.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

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

Table 7.6.1.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ValKeyInfo | M | 1 | 200 OK | Key management information specific to VAL service, VAL user or VAL UE. This response shall include key management information matching the query parameters provided in the request. |
| NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

###### 7.6.1.2.2.4 Resource Custom Operations

None.

#### 7.6.1.3 Notifications

None.

#### 7.6.1.4 Data Model

##### 7.6.1.4.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 6.2 apply to this API.

Table 7.6.1.4.1-1 specifies the data types defined specifically for the SS\_KeyInfoRetrieval API service.

Table 7.6.1.4.1-1: SS\_KeyInfoRetrieval API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| ValKeyInfo | 7.6.1.4.2.3 | Key management information associated with VAL server, VAL user or VAL UE. |  |

Table 7.6.1.4.1-2 specifies data types re-used by the SS\_KeyInfoRetrieval API service.

Table 7.6.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| ValTargetUe | Clause 7.3.1.4.2.3 | Used to identify a VAL User ID or VAL UE ID applicable to key management information. |  |

##### 7.6.1.4.2 Structured Data Types

###### 7.6.1.4.2.1 Introduction

###### 7.6.1.4.2.2 ValKeyInfo

Table 7.6.1.4.2.3-1: Definition of type ValKeyInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| userUri | Uri | M | 1 | URI of the user for which the response is intended. |  |
| skmsId | string | O | 0..1 | String identifying the SEAL key management server, sending the response. |  |
| valService | string | M | 1 | String identifying the VAL service. This attribute shall be same as in the HTTP GET request. |  |
| valTgtUe | ValTargetUe | O | 0..1 | String identifying a VAL user or VAL UE. This value depends on the value that was in the HTTP GET request. |  |
| keyInfo | string | M | 1 | Key management information uniquely applicable to the requested VAL service, VAL user or VAL UE or VAL client. |  |

##### 7.6.1.4.3 Simple data types and enumerations

None.

#### 7.6.1.5 Error Handling

General error responses are defined in clause 6.7.

#### 7.6.1.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.6.1.6-1: Supported Features

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

# 8 Using Common API Framework

## 8.1 General

When CAPIF is used with a SEAL service, the SEAL server shall support the following as defined in 3GPP TS 29.222 [16]:

- the API exposing function and related APIs over CAPIF-2/2e and CAPIF-3/3e reference points;

- the API publishing function and related APIs over CAPIF-4/4e reference point;

- the API management function and related APIs over CAPIF-5/5e reference point; and

- at least one of the security methods for authentication and authorization, and related security mechanisms.

In a centralized deployment as defined in 3GPP TS 23.222 [17], where the CAPIF core function and API provider domain functions are co-located, the interactions between the CAPIF core function and API provider domain functions may be independent of CAPIF-3/3e, CAPIF-4/4e and CAPIF-5/5e reference points.

When CAPIF is used with a SEAL service, the SEAL server shall register all the features for northbound APIs in the CAPIF Core Function.

## 8.2 Security

When CAPIF is used for external exposure, before invoking the API exposed by the SEAL server, the VAL server as API invoker shall negotiate the security method (PKI, TLS-PSK or OAUTH2) with CAPIF core function and ensure the SEAL server has enough credential to authenticate the VAL server (see 3GPP TS 29.222 [16], clause 5.6.2.2 and clause 6.2.2.2).

If PKI or TLS-PSK is used as the selected security method between the VAL server and the SEAL server, upon API invocation, the SEAL server shall retrieve the authorization information from the CAPIF core function as described in 3GPP TS 29.222 [16], clause 5.6.2.4.

As indicated in 3GPP TS 33.122 [18], the access to the SEAL APIs may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [19]), using the "Client Credentials" authorization grant, where the CAPIF core function (see 3GPP TS 29.222 [16]) plays the role of the authorization server.

NOTE 1: In this release, only "Client Credentials" authorization grant is supported.

If OAuth2 is used as the selected security method between the VAL server and the SEAL server, the VAL server, prior to consuming services offered by the SEAL APIs, shall obtain a "token" from the authorization server, by invoking the Obtain\_Authorization service, as described in 3GPP TS 29.222 [16], clause 5.6.2.3.2.

The SEAL APIs do not define any scopes for OAuth2 authorization. It is the SEAL server responsibility to check whether the VAL server is authorized to use an API based on the "token". Once the SEAL server verifies the "token", it shall check whether the SEAL server identifier in the "token" matches its own published identifier, and whether the API name in the "token" matches its own published API name. If those checks are passed, the VAL server has full authority to access any resource or operation for the invoked API

NOTE 2: For aforementioned security methods, the SEAL server needs to apply admission control according to access control policies after performing the authorization checks.

# 9 Security

## 9.1 General

The security aspects of SEAL reference points are specified in 3GPP TS 33.434 [26].

## 9.2 SEAL-S security

As specified in clause 5.1.1.8 of 3GPP TS 33.434 [26], the protection of SEAL-S reference point shall be supported according to NDS/IP as specified in 3GPP TS 33.210 [25].

When CAPIF is used, the security mechanisms described in clause 8.2 shall be applied.

Annex A (normative):  
OpenAPI specification

# A.1 General

This annex is based on the OpenAPI 3.0.0 specification [15] 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 [24] and clause 5.3.1 of the 3GPP TS 29.501 [14] for further information).

# A.2 SS\_LocationReporting API

openapi: 3.0.0

info:

title: SS\_LocationReporting

description: |

API for SEAL Location Reporting Configuration.

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version: "1.0.0"

externalDocs:

description: 3GPP TS 29.549 V16.0.0 Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-lr/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:

/trigger-configurations:

post:

description: Creates a new location reporting configuration.

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: location reporting confirguation resource is created sucessfully.

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the newly created resource'

required: true

schema:

type: string

'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'

/trigger-configurations/{configurationId}:

get:

description: Retrieves an individual SEAL location reporting configuration information

parameters:

- name: configurationId

in: path

description: String identifying an individual configuration resource

required: true

schema:

type: string

responses:

'200':

description: The location reporting configuration information.

content:

application/json:

schema:

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

'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'

'406':

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

'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'

put:

description: Updates an individual SEAL location reporting configuration.

parameters:

- name: configurationId

in: path

description: String identifying an individual configuration resource

required: true

schema:

type: string

requestBody:

description: configuration information to be updated in location management server.

required: true

content:

application/json:

schema:

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

responses:

'200':

description: the configuration is updated successfully

content:

application/json:

schema:

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

'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'

delete:

description: Deletes an individual SEAL location reporting configuration.

parameters:

- name: configurationId

in: path

description: String identifying an individual configuration resource

required: true

schema:

type: string

responses:

'204':

description: The individual configuration matching configurationId is deleted.

'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'

'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:

LocationReportConfiguration:

type: object

properties:

valServerId:

type: string

valTgtUe:

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

immRep:

type: boolean

monDur:

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

repPeriod:

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

accuracy:

$ref: 'TS29122\_MonitoringEvent.yaml#/components/schemas/Accuracy'

suppFeat:

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

required:

- valServerId

- valTgtUe

# A.3 SS\_GroupManagement API

openapi: 3.0.0

info:

title: SS\_GroupManagement

description: |

API for SEAL Group management.

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version: "1.0.1"

externalDocs:

description: 3GPP TS 29.549 V16.2.0 Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-gm/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:

/group-documents:

post:

description: Creates a new VAL group document.

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: VAL group created sucessfully.

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the newly created resource'

required: true

schema:

type: string

'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'

get:

description: Retrieves VAL group documents satisfying filter criteria

parameters:

- name: val-group-id

in: query

description: String identifying the VAL group.

schema:

type: string

- name: val-service-id

in: query

description: String identifying the Val service.

schema:

type: string

responses:

'200':

description: List of VAL group documents matching the query parameters in the request.

content:

application/json:

schema:

type: array

items:

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

minItems: 0

'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'

'406':

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

'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'

/group-documents/{groupDocId}:

get:

description: Retrieves VAL group information satisfying filter criteria

parameters:

- name: groupDocId

in: path

description: String identifying an individual VAL group document resource

required: true

schema:

type: string

- name: group-members

in: query

description: When set to true indicates the group management server to send the members list information of the VAL group.

schema:

type: boolean

- name: group-configuration

in: query

description: When set to true indicates the group management server to send the group configuration information of the VAL group.

schema:

type: boolean

responses:

'200':

description: The VAL group information based on the request from the VAL server. Includes VAL group members list if group-members flag is set to true in the request, VAL group configuration information if the group-configuration flag is set to true in the request, VAL group identifier, whole VAL group document resource if both group-members and group-configuration flags are omitted/set to false in the request.

content:

application/json:

schema:

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

'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'

'406':

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

'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'

put:

description: Updates an individual VAL group document.

parameters:

- name: groupDocId

in: path

description: String identifying an individual VAL group document resource

required: true

schema:

type: string

requestBody:

description: VAL group document to be updated in Group management server.

required: true

content:

application/json:

schema:

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

responses:

'200':

description: VAL group document updated successfully

content:

application/json:

schema:

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

'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'

delete:

description: Deletes a VAL Group.

parameters:

- name: groupDocId

in: path

description: String identifying an individual VAL group document resource

required: true

schema:

type: string

responses:

'204':

description: The individual VAL group matching groupDocId was deleted.

'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'

'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:

VALGroupDocument:

type: object

properties:

valGroupId:

type: string

description: The VAL group idenitity.

grpDesc:

type: string

description: The text description of the VAL group.

members:

type: array

description: The list of VAL User IDs or VAL UE IDs, which are members of the VAL group.

items:

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

minItems: 1

valGrpConf:

type: string

description: Configuration data for the VAL group.

valServiceIds:

type: array

description: The list of VAL services enabled on the group.

items:

type: string

minItems: 1

suppFeat:

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

resUri:

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

locInfo:

$ref: 'TS29122\_MonitoringEvent.yaml#/components/schemas/LocationInfo'

addLocInfo:

$ref: 'TS29122\_CommonData.yaml#/components/schemas/LocationArea5G'

required:

- valGroupId

# A.4 SS\_UserProfileRetrieval API

openapi: 3.0.0

info:

title: SS\_UserProfileRetrieval

description: |

API for SEAL User Profile Retrieval.

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version: "1.0.0"

externalDocs:

description: 3GPP TS 29.549 V16.0.0 Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-upr/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:

/val-services:

get:

description: Retrieve VAL User or VAL UE profile information.

parameters:

- name: val-service-id

in: query

description: String identifying an individual VAL service

required: false

schema:

type: string

- name: val-tgt-ue

in: query

description: Identifying a VAL target UE.

required: true

schema:

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

responses:

'200':

description: The Profile information of the VAL User or VAL UE.

content:

application/json:

schema:

type: array

items:

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

minItems: 0

'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'

'406':

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

'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:

ProfileDoc:

type: object

properties:

profileInformation:

type: string

description: Profile information associated with the valUserId or valUeId.

valTgtUe:

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

required:

- profileInformation

- valTgtUe

ValTargetUe:

type: object

properties:

valUserId:

type: string

description: Unique identifier of a VAL user.

valUeId:

type: string

description: Unique identifier of a VAL UE.

oneOf:

- required: [valUserId]

- required: [valUeId]

# A.5 SS\_NetworkResourceAdaptation API

openapi: 3.0.0

info:

version: 1.0.1

title: SS\_NetworkResourceAdaptation

description: |

SS Network Resource Adaptation Service.

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externalDocs:

description: 3GPP TS 29.549 V16.1.0; Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-nra/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

paths:

/multicast-subscriptions:

post:

summary: Creates a new Individual Multicast Subscription resource

operationId: CreateMulticastSubscription

tags:

- Multicast Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Success

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the created individual multicast subscription resource'

required: true

schema:

type: string

'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'

callbacks:

UserPlaneNotification:

'{$request.body#/notifUri}':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'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'

/multicast-subscriptions/{multiSubId}:

get:

summary: "Reads an existing Individual Multicast Subscription"

operationId: GetMulticastSubscription

tags:

- Individual Multicast Subscription (Document)

parameters:

- name: multiSubId

in: path

description: Multicast Subscription ID

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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'

'406':

$ref: 'TS29122\_CommonData.yaml#/components/responses/406'

'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'

delete:

summary: "Delete an existing Individual Multicast Subscription"

operationId: DeleteMulticastSubscription

tags:

- Individual Multicast Subscription (Document)

parameters:

- name: multiSubId

in: path

description: Multicast Subscription ID

required: true

schema:

type: string

responses:

'204':

description: No Content. Resource was succesfully deleted

'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'

'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'

/unicast-subscriptions:

post:

summary: Creates a new Individual Unicast Subscription resource

operationId: CreateUnicastSubscription

tags:

- Unicast Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: Success

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the created individual unicast subscription resource'

required: true

schema:

type: string

'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'

callbacks:

UserPlaneNotification:

'{$request.body#/notifUri}':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'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'

/unicast-subscriptions/{uniSubId}:

get:

summary: "Reads an existing Individual Unicast Subscription"

operationId: GetUnicastSubscription

tags:

- Individual Unicast Subscription (Document)

parameters:

- name: uniSubId

in: path

description: Unicast Subscription ID

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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'

'406':

$ref: 'TS29122\_CommonData.yaml#/components/responses/406'

'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'

delete:

summary: "Delete an existing Individual Unicast Subscription"

operationId: DeleteUnicastSubscription

tags:

- Individual Unicast Subscription (Document)

parameters:

- name: uniSubId

in: path

description: Unicast Subscription ID

required: true

schema:

type: string

responses:

'204':

description: No Content. Resource was succesfully deleted

'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'

'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:

MulticastSubscription:

type: object

properties:

valGroupId:

type: string

anncMode:

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

multiQosReq:

type: string

locArea:

$ref: 'TS29122\_GMDviaMBMSbyMB2.yaml#/components/schemas/MbmsLocArea'

duration:

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

tmgi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uint32'

notifUri:

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

reqTestNotif:

type: boolean

wsNotifCfg:

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

suppFeat:

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

upIpv4Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

upIpv6Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

upPortNum:

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

radioFreqs:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uint32'

minItems: 1

required:

- valGroupId

- anncMode

- multiQosReq

- notifUri

UnicastSubscription:

type: object

properties:

valTgtUe:

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

uniQosReq:

type: string

duration:

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

notifUri:

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

reqTestNotif:

type: boolean

wsNotifCfg:

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

suppFeat:

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

required:

- valTgtUe

- notifUri

UserPlaneNotification:

type: object

properties:

notifId:

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

eventNotifs:

type: array

items:

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

minItems: 1

required:

- notifId

- eventNotifs

NrmEventNotification:

type: object

properties:

event:

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

ts:

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

deliveryMode:

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

streamIds:

type: array

items:

type: string

minItems: 1

required:

- event

- ts

# Simple data types and Enumerations

ServiceAnnoucementMode:

anyOf:

- type: string

enum:

- NRM

- VAL

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- NRM: NRM server performs the service announcement.

- VAL: VAL server performs the service announcement.

DeliveryMode:

anyOf:

- type: string

enum:

- UNICAST

- MULTICAST

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- UNICAST: Unicast delivery.

- MULTICAST: Multicast delivery.

NrmEvent:

anyOf:

- type: string

enum:

- UP\_DELIVERY\_MODE

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- UP\_DELIVERY\_MODE: User Plane delivery mode.

# A.6 SS\_Events API

openapi: 3.0.0

info:

title: SS\_Events

description: |

API for SEAL Events management.

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version: "1.0.1"

externalDocs:

description: 3GPP TS 29.549 V16.2.0 Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-events/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:

/subscriptions:

post:

description: Creates a new individual SEAL Event Subscription.

requestBody:

required: true

content:

application/json:

schema:

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

callbacks:

notificationDestination:

'{request.body#/notificationDestination}':

post:

requestBody: # contents of the callback message

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content (successful notification)

'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'

responses:

'201':

description: SEAL Events subscription resource created successfully.

content:

application/json:

schema:

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

headers:

Location:

description: 'Contains the URI of the newly created resource'

required: true

schema:

type: string

'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'

/subscriptions/{subscriptionId}:

delete:

description: Deletes an individual SEAL Event Subscription.

parameters:

- name: subscriptionId

in: path

description: Identifier of an individual Events Subscription

required: true

schema:

type: string

responses:

'204':

description: The individual SEAL Events Subscription matching the subscriptionId is deleted.

'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'

'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:

SEALEventSubscription:

type: object

properties:

subscriberId:

type: string

description: String identifying the subscriber of the event.

eventSubs:

type: array

items:

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

minItems: 1

description: Subscribed events.

eventReq:

$ref: 'TS29523\_Npcf\_EventExposure.yaml#/components/schemas/ReportingInformation'

notificationDestination:

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

requestTestNotification:

type: boolean

description: Set to true by Subscriber to request the SEAL server to send a test notification. Set to false or omitted otherwise.

websockNotifConfig:

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

eventDetails:

type: array

items:

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

minItems: 1

suppFeat:

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

required:

- subscriberId

- eventSubs

- eventReq

- notificationDestination

SEALEventNotification:

type: object

properties:

subscriptionId:

type: string

description: Identifier of the subscription resource.

eventDetails:

type: array

items:

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

minItems: 1

description: Detailed notifications of individual events.

required:

- subscriptionId

- eventDetails

EventSubscription:

type: object

properties:

eventId:

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

valGroups:

type: array

items:

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

minItems: 1

description: Each element of the array represents the VAL group identifier(s) of a VAL service that the subscriber wants to know in the interested event.

identities:

type: array

items:

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

minItems: 1

description: Each element of the array represents the VAL User / UE IDs of a VAL service that the event subscriber wants to know in the interested event.

required:

- eventId

SEALEventDetail:

type: object

properties:

eventId:

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

lmInfos:

type: array

items:

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

minItems: 1

valGroupDocuments:

type: array

items:

$ref: 'TS29549\_SS\_GroupManagement.yaml#/components/schemas/VALGroupDocument'

minItems: 1

description: The VAL groups documents with modified membership and configuration information.

profileDocs:

type: array

items:

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

minItems: 1

description: Updated profile information associated with VAL Users or VAL UEs.

required:

- eventId

VALGroupFilter:

type: object

properties:

valSvcId:

type: string

description: Identity of the VAL service

valGrpIds:

type: array

items:

type: string

minItems: 1

description: VAL group identifiers that event subscriber wants to know in the interested event.

required:

- valGrpIds

IdentityFilter:

type: object

properties:

valSvcId:

type: string

description: Identity of the VAL service

valTgtUes:

type: array

items:

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

minItems: 1

description: VAL User IDs or VAL UE IDs that the event subscriber wants to know in the interested event.

LMInformation:

type: object

properties:

valTgtUe:

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

locInfo:

$ref: 'TS29122\_MonitoringEvent.yaml#/components/schemas/LocationInfo'

required:

- locInfo

- valTgtUe

SEALEvent:

anyOf:

- type: string

enum:

- LM\_LOCATION\_INFO\_CHANGE

- GM\_GROUP\_INFO\_CHANGE

- CM\_USER\_PROFILE\_CHANGE

- GM\_GROUP\_CREATE

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Possible values are

- LM\_LOCATION\_INFO\_CHANGE: Events related to the location information of VAL Users or VAL UEs from the Location Management Server.

- GM\_GROUP\_INFO\_CHANGE: Events related to the modification of VAL group membership and configuration information from the Group Management Server.

- CM\_USER\_PROFILE\_CHANGE: Events related to update of user profile information from the Configuration Management Server.

- GM\_GROUP\_CREATE: Events related to creation of new VAL groups from the Group Mananagement Server.

# A.7 SS\_KeyInfoRetrieval API

openapi: 3.0.0

info:

title: SS\_KeyInfoRetrieval

description: |

API for SEAL Key Information Retrieval.

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version: "1.0.1"

externalDocs:

description: 3GPP TS 29.549 V16.1.0 Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3.

url: http://www.3gpp.org/ftp/Specs/archive/29\_series/29.549/

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/ss-kir/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:

/key-records:

get:

description: Retrieve Key mamangement information specific to VAL service.

parameters:

- name: val-service-id

in: query

description: String identifying an individual VAL service

required: true

schema:

type: string

- name: val-tgt-ue

in: query

description: Identifying a VAL target.

required: false

schema:

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

responses:

'200':

description: The key management information of the VAL service, VAL User or VAL UE.

content:

application/json:

schema:

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

'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'

'406':

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

'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:

ValKeyInfo:

type: object

properties:

userUri:

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

skmsId:

type: string

description: String identifying the key management server.

valService:

type: string

description: Unique identifier of a VAL Service.

valTgtUe:

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

keyInfo:

type: string

description: Key management information specific to VAL service, VAL User or VAL UE.

required:

- userUri

- valService

- keyInfo

Annex B (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2019-10 | CT3#106 |  |  |  |  | TS skeleton for Services Enabler Architecture Layer for Verticals Application Programming Interface specification. | 0.0.0 |
| 2019-10 | CT3#106 | C3-194418 |  |  |  | Inclusion of TS skeleton document with clauses reflecting SEAL service APIs, agreed in the meeting CT3#106: C3-194418 | 0.1.0 |
| 2019-10 | CT3#106 | C3-194314 |  |  |  | Inclusion of documents agreed in CT3#106:  C3-194297, C3-194298, C3-194299, C3-194300 | 0.2.0 |
| 2019-11 | CT3#107 | C3-195307 |  |  |  | Inclusion of documents agreed in CT3#107:  C3-195157, C3-195260, C3-195441, C3-195262, C3-195263, C3-195264, C3-195185 | 0.3.0 |
| 2019-12 | CT#86 | CP-193176 |  |  |  | Sent to plenary for Information | 1.0.0 |
| 2020-03 | CT3#108e |  |  |  |  | Inclusion of documents agreed in CT3#108-e meeting:  C3-201346, C3-201347, C3-201348, C3-201349, C3-201350, C3-201456, C3-201457, C3-201351, C3-201352, C3-201271 | 1.1.0 |
| 2020-04 | CT3#109e | C3-202444 |  |  |  | Inclusion of documents agreed in CT3#109e meeting:  C3-202241, C3-202275, C3-202334, C3-202335, C3-202336, C3-202337, C3-202338, C3-202339, C3-202340, C3-202341, C3-202342, C3-202343, C3-202481 | 1.2.0 |
| 2020-06 | CT3#110e | C3-203459 |  |  |  | Inclusion of documents agreed in CT3#110e meeting:  C3-203233, C3-203317, C3-203409, C3-203411, C3-203412, C3-203413, C3-203414, C3-203415, C3-203416, C3-203417, C3-203418, C3-203419, C3-203530, C3-203587, C3-203634 | 1.3.0 |
| 2020-06 | CT#88e | CP-201209 |  |  |  | TS sent to plenary for approval | 2.0.0 |
| 2020-06 | CT#88e | CP-201334 |  |  |  | Implementation errors fixed. TS sent to plenary for approval | 2.0.1 |
| 2020-06 | CT#88e | CP-201334 |  |  |  | TS approved by plenary | 16.0.0 |
| 2020-09 | CT#89e | CP-202074 | 0001 |  | F | Correct apiVersion notation | 16.1.0 |
| 2020-09 | CT#89e | CP-202074 | 0002 | 1 | F | Corrections to API and Event names | 16.1.0 |
| 2020-09 | CT#89e | CP-202074 | 0003 |  | F | Correct Identity filter in Events API | 16.1.0 |
| 2020-09 | CT#89e | CP-202087 | 0004 | 1 | F | SS\_KeyInfoRetrieval API correction | 16.1.0 |
| 2020-09 | CT#89e | CP-202074 | 0005 |  | F | Key Management API description | 16.1.0 |
| 2020-09 | CT#89e | CP-202074 | 0006 | 1 | F | UnicastSubscription attribute presence correction | 16.1.0 |
| 2020-09 | CT#89e | CP-202084 | 0009 |  | F | Update of OpenAPI version and TS version in externalDocs field | 16.1.0 |
| 2020-12 | CT#90e | CP-203139 | 0010 | 1 | F | Essential corrections and alignments | 16.2.0 |
| 2020-12 | CT#90e | CP-203142 | 0011 | 1 | F | Immediate reporting | 16.2.0 |
| 2020-12 | CT#90e | CP-203139 | 0012 | 1 | F | Storage of YAML files in 3GPP Forge | 16.2.0 |
| 2020-12 | CT#90e | CP-203142 | 0013 | 1 | F | SEAL Group configuration corrections | 16.2.0 |
| 2020-12 | CT#90e | CP-203152 | 0014 |  | F | Update of OpenAPI version and TS version in externalDocs field | 16.2.0 |
| 2021-06 | CT#92e | CP-211235 | 0024 |  | F | Notification URI | 16.3.0 |
| 2021-12 | CT#94e | CP-213240 | 0053 |  | F | Remove procedure lacking API support | 16.4.0 |
| 2022-06 | CT#96 | CP-221156 | 0086 |  | F | SEAL-S security update | 16.5.0 |
| 2022-06 | CT#96 | CP-221156 | 0090 |  | F | Correcting the ValTargetUe data type name in two occurrences | 16.5.0 |
| 2022-12 | CT#98e | CP-223193 | 0126 |  | F | Correction of the presence and cardinality of the “suppFeat” attribute within the MulticastSubscription data structure in the SS\_NetworkResourceAdaptation API | 16.6.0 |