ETSI TS 129 549 V18.8.0 (2025-03)

LTE;
5G;
Service Enabler Architecture Layer for Verticals (SEAL);
Application Programming Interface (API) specification;
Stage 3
(3GPP TS 29.549 version 18.8.0 Release 18)

Reference
RTS/TSGC-0329549vi80

Keywords
5G,LTE

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI IPR online database.

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found at 3GPP to ETSI numbering cross-referencing.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

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 related stage 2 architecture, functional requirements and information flows are specified in 3GPP TS 23.434 [2] and 3GPP TS 23.433 [34] (for SEAL Data Delivery).

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 9112: "HTTP/1.1".

[6] IETF RFC 9110: "HTTP Semantics".

[7] Void.

[8] Void.

[9] IETF RFC 9111: "HTTP Caching".

[10] Void.

[11] Void.

[12] IETF RFC 9113: "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: "OpenAPI Specification Version 3.0.0", https://spec.openapis.org/oas/v3.0.0.

[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".

[27] 3GPP TS 29.486: "V2X Application Enabler (VAE) Services; Stage 3".

[28] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[29] IEEE 802.1Qcc-2018: "IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks".

[30] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[31] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[32] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[33] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[34] 3GPP TS 23.433: "Service Enabler Architecture Layer for Verticals (SEAL); Data Delivery enabler for vertical applications".

[35] 3GPP TS 29.548: "Service Enabler Architecture Layer for Verticals (SEAL); SEAL Data Delivery (SEALDD) Server Services; Stage 3".

[36] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".

[37] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[38] 3GPP TS 23.436: "Functional architecture and information flows for Application Data Analytics Enablement Service".

[39] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[40] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace".

[41] 3GPP TS 23.435: "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service".

[42] 3GPP TS 29.435: "Service Enabler Architecture Layer for Verticals (SEAL); Network Slice Capability Exposure (NSCE) Server Services; Stage 3".

[43] 3GPP TS 29.558: "Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".

[44] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

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
ADAE	Application Data Analytics Enablement
A-ADRF	Application layer - Analytical Data Repository Function
A-DCCF	Application layer - Data Collection and Coordination Function
ADAES	ADAE Server
AEF	API Exposing Function
API	Application Programming Interface
BDT	Background Data Transfer
DS-TT	Device-Side TSN Translator
JSON	JavaScript Object Notation
NDS	Network Domain Security
NDS/IP	NDS for IP based protocols
NRM	Network Resource Management
NSCE	Network Slice Capability Enablement
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
SEALDD	SEAL Data Delivery
TMGI	Temporary Mobile Group Identity
TSC	Time Sensitive Communication
TSN	Time Sensitive Networking
UE	User Equipment
VAL	Vertical Application Layer

4 Overview

3GPP has considered in 3GPP TS 23.434 [2], 3GPP TS 23.433 [34] (for SEALDD) and 3GPP TS 23.435 [41] (for NSCE) 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, network

resource management, network slice capability enablement (NSCE), application data analytics enablement (ADAE) and data delivery management (SEALDD).

Clause 6 of 3GPP TS 23.434 [2] 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. 3GPP TS 29.548 [35] specifies the APIs needed for SEALDD. 3GPP TS 29.435 [42] specifies the APIs needed for NSCE.

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
	Notify_Trigger_Location_Reporting	Notify	VAL server
SS_LocationInfoEvent	Subscribe_Location_Info	Subscribe/Notify	VAL server
	Update_Location_Info_Subscription		VAL server
	Unsubscribe_Location_Info		VAL server
	Notify_Location_Info		VAL server
SS_LocationInfoRetrieval	Obtain_Location_Info	Request/ Response	VAL server
SS_LocationAreaInfoRetrieval	Obtain_UEs_Info	Request/ Response	VAL server
SS_LocationMonitoring	Subscribe_Location_Monitoring	Subscribe/Notify	VAL server
	Update_Location_Monitoring_Subscription		
	Unsubscribe_Location_Monitoring		
	Notify_Location_Monitoring_Events		
SS_LocationAreaMonitoring	Subscribe_Location_Area_Monitoring	Subscribe/Notify	VAL server
	Notify_Location_Area_Monitoring_Events		
	Update_Location_Area_Monitoring_Subscribe		
	Unsubscribe_Location_Area_Monitoring		
SS_VALServiceAreaConfiguration	Configure_VAL_Service_Area	Request/Response	VAL server
	Obtain_VAL_Service_Area	Request/Response	VAL server
	Update_VAL_Service_Area	Request/Response	VAL server
	Delete_VAL_Service_Area	Request/Response	VAL server
	Subscribe_VAL_Service_Area_Change_Event	Subscribe/Notify	SEAL server
	Update_Subscription_VAL_Service_Area_Change_Event		
	Unsubscribe_VAL_Service_Area_Change_Event		
	Notify_VAL_Service_Area_Change_Event		
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_VALServiceData	Obtain_VAL_Service_Data	Request/Response	SEAL server

SS_UserProfileEvent	Subscribe_User_Profile_Update	Subscribe/Notify	VAL server
	Notify_User_Profile_Update		VAL server
SS_NetworkResourceAdaptation (NOTE 3)	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
	Discover_TSC_Stream_Availability	Request/Response	VAL server
	Create_TSC_Stream	Request/Response	VAL server
	Delete_TSC_Stream	Request/Response	VAL server
	Create_MBS_Resource	Request/Response	VAL server
	Update_MBS_Resource	Request/Response	VAL server
	Delete_MBS_Resource	Request/Response	VAL server
	Activate_MBS_Resource	Request/Response	VAL server
	Deactivate_MBS_Resource	Request/Response	VAL server
	Reliable_Transmission_Request	Request/Response	e.g., SEALDD Server, VAL Server
	Subscribe_Unified_Traffic_Pattern_and_Monitoring_Management	Subscribe/Notify	VAL server
	Update_Unified_Traffic_Pattern_and_Monitoring_Management_Subscription		
	Unsubscribe_Unified_Traffic_Pattern_and_Monitoring_Management		
	Notify_Unified_Traffic_Pattern_Update		
SS_EventsMonitoring	Subscribe_Monitoring_Events	Subscribe/Notify	VAL server
	Notify_Monitoring_Events		
SS_Events	Subscribe_Event	Subscribe/Notify	VAL server
	Notify_Event		VAL server
	Unsubscribe_Event		VAL server
	Update_Subscription		VAL server
SS_KeyInfoRetrieval	Obtain_Key_Info	Request/Response	VAL server
SS_KMParametersProvisioning	Request	Request/Response	VAL server
SS_NetworkResourceMonitoring	Subscribe_Unicast_QoS_Monitoring_Data	Subscribe/Notify	VAL server
	Unsubscribe_Unicast_QoS_Monitoring_Data		VAL server
	Notify_Unicast_QoS_Monitoring_Data		VAL server
	Obtain_Unicast_QoS_Monitoring_Data	Request/Response	VAL server
	Update_Unicast_QoS_Monitoring_Subscription		VAL server
SS_IdmParameterProvisioning	Provide_Configuration	Request/Response	VAL server
	Get_Configuration		
	Update_Configuration		
	Delete_Configuration		
SS_ADAE_VALPerformanceAnalytics	Subscribe_VAL_Performance_Analytics	Subscribe/Notify	VAL server
	Notify_VAL_Performance_Analytics		

	Unsubscribe_VAL_Performance_Analytics		
SS_ADAE_SlicePerformanceAnalytics API	Subscribe_Slice_Performance_Analytics	Subscribe/Notify	VAL server
	Notify_Slice_Performance_Analytics		
	Unsubscribe_Slice_Performance_Analytics		
SS_ADAE_Ue2UePerformanceAnalytics	UE-to-UE_Performance_Analytics_Subscribe	Subscribe/Notify	VAL server
	UE-to-UE_Performance_Analytics_Notify		
	UE-to-UE_Performance_Analytics_Unsubscribe		
SS_ADAE_LocationAccuracyAnalytics	Subscribe_Location_Accuracy_Analytics	Subscribe/Notify	VAL server
	Notify_Location_Accuracy_Analytics		
	Unsubscribe_Location_Accuracy_Analytics		
SS_ADAE_ServiceApiAnalytics	Subscribe_Service_API_Analytics	Subscribe/Notify	VAL server
	Notify_Service_API_Analytics		
	Unsubscribe_Service_API_Analytics		
SS_ADAE_SliceUsagePatternAnalytics	Subscribe_Slice_Usage_Pattern_Analytics	Subscribe/Notify	VAL server, NSCE server
	Notify_Slice_Usage_Pattern_Analytics		
	Unsubscribe_Slice_Usage_Pattern_Analytics		
	Get_Slice_Usage_Stats	Request/Response	VAL server, NSCE server
SS_ADAE_EdgeLoadAnalytics	Subscribe_Edge_Load	Subscribe/Notify	VAL server, EAS, EES
	Notify_Edge_Load		VAL server, EAS, EES
	Unsubscribe_Edge_Load		VAL server, EAS, EES
	Get_Edge_Load_Data	Request/Response	VAL server, EAS, EES
SS_AADRF_DataManagement	SS_AADRF_DataManagement_Subscribe	Subscribe/Notify	ADAE server
	SS_AADRF_DataManagement_Unsubscribe		
	SS_AADRF_DataManagement_Notify		

NOTE 1: The service operations of SS_Events API are reused by the SS_LocationInfoEvent, SS_LocationMonitoring, SS_LocationAreaMonitoring, SS_GroupManagementEvent, SS_UserProfileEvent and SS_EventsMonitoring for events related services.
NOTE 2: The service APIs exposed by the SEALDD Server and the corresponding service operations, operation semantics and service consumers are specified in clause 5 of 3GPP TS 29.548 [35].
NOTE 3: The "Create_MBS_Resource", "Update_MBS_Resource", "Delete_MBS_Resource", "Activate_MBS_Resource" and "Deactivate_MBS_Resource" service operations correspond to the stage 2 "Request_Multicast/Broadcast_Resource", "Update_Multicast/Broadcast_Resource", "Delete_Multicast/Broadcast_Resource", "Activate_Multicast_Resource" and "Deactivate_Multicast_Resource" service operations defined in clause 14.4.2 of 3GPP TS 23.434 [2].
NOTE 4: The service APIs exposed by the NSCE Server and the corresponding service operations, operation semantics and service consumers are specified in clause 5 of 3GPP TS 29.435 [42].

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_NetworkResourceAdaptation	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 (NOTE 2)	7.6	Key Information Retrieval Service	TS29549_SS_KeyInfoRetrieval.yaml	ss-kir	A.7
SS_LocationAreaInfoRetrieval	7.1	Location Area Info Retrieval Service	TS29549_SS_LocationAreaInfoRetrieval.yaml	ss-lair	A.8
SS_NetworkResourceMonitoring	7.4	Network Resource Monitoring	TS29549_SS_NetworkResourceMonitoring.yaml	ss-nrm	A.10
SS_VALServiceData	7.3	VAL Service Data Service	TS29549_SS_VALServiceData.yaml	ss-vsd	A.11
SS_VALServiceAreaConfiguration	7.1	VAL Service Area Configuration Service	TS29549_SS_VALServiceAreaConfiguration.yaml	ss-vsac	A.12
SS_KMParametersProvisioning (NOTE 3)	7.6	Key Management Parameters Provisioning Service	TS29549_SS_KMParametersProvisioning.yaml	ss-kpp	A.14
SS_ADAE_VALPerformanceAnalytics	7.10	ADAE VAL performance analytics service	TS29549_SS_ADAE_VALPerformanceAnalytics.yaml	ss-adae-pa	A.15
SS_ADAE_SlicePerformanceAnalytics	7.10	ADAE slice specific application performance analytics service	TS29549_SS_ADAE_SlicePerformanceAnalytics.yaml	ss-adae-sspa	A.16
SS_ADAE_Ue2UePerformanceAnalytics	7.10	ADAE UE-to-UE PerformanceAnalytics Service	TS29549_SS_ADAE_Ue2UePerformanceAnalytics.yaml	ss-adae-uupa	A.17
SS_ADAE_LocationAccuracyAnalytics	7.10	ADAE location accuracy performance analytics service	TS29549_SS_ADAE_LocationAccuracyAnalytics.yaml	ss-adae-laa	A.18
SS_ADAE_ServiceApiAnalytics	7.10	ADAE service API analytics service	TS29549_SS_ADAE_ServiceApiAnalytics.yaml	ss-adae-sa	A.19
SS_ADAE_SliceUsagePatternAnalytics	7.10	ADAE slice usage pattern analytics service	TS29549_SS_ADAE_SliceUsagePatternAnalytics.yaml	ss-adae-sup	A.20
SS_ADAE_EdgeLoadAnalytics	7.10.7	Edge load analytics service	TS29549_SS_ADAE_EdgeLoadAnalytics.yaml	ss-adae-el	A.21
SS_AADRF_DataManagement	7.10.8	A-ADRF Data Management Service	TS29549_SS_AADRF_DataManagement.yaml	ss-aadrf-datamanagement	A.22

NOTE 1: The APIs exposed by the SEALDD Server are specified in clause 5 of 3GPP TS 29.548 [35].
NOTE 2: The stage 2 requirements for this API are defined in clause 5.3 of 3GPP TS 33.434 [26].
NOTE 3: The stage 2 requirements for this API are defined in clause 5.8 of 3GPP TS 33.434 [26].
NOTE 4: The APIs exposed by the NSCE Server are specified in clause 5 of 3GPP TS 29.435 [42].

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
Notify_Trigger_Location_Reporting	This service operation is used by LM Server to send the notifications to the VAL Server.	LM 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 within the response message body the created resource representation within the LocationReportConfiguration data structure, and within an HTTP Location header the created resource URI in the response message. and
3. if errors occur when processing the request, the LM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.1.1.5.

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. If the "PatchUpdate" feature defined in clause 7.1.1.6 is supported, the VAL server may send an HTTP PATCH request message to the Individual SEAL Location Reporting Configuration resource URI as specified in clause 7.1.1.2.3.3.4. The body of the HTTP PATCH request message shall include the requested modifications as specified in clause 7.1.1.2.3.3.4.

When HTTP PUT is used, the "valServerId" attribute within the LocationReportConfiguration data structure shall not be updated.

Upon receiving the HTTP PUT or PATCH request 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/modify the resource identified by the Resource URI of the configuration received in the request;
    b. return a 200 OK status code with the updated location reporting configuration information in the response or a 204 No Content status code.

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.

5.2.1.2.6 Notify_Trigger_Location_Reporting

5.2.1.2.6.1 General

This service operation is used by a LM Server to notify of the location trigger event.

5.2.1.2.6.2 LM Server notifies the VAL Server on the location trigger event using Notify_Trigger_Location_Reporting

In order to notify the VAL Server about location event, the LM Server shall send an HTTP POST request message to the VAL Server targeting the notification URI provided during location trigger configuration (see clause 5.2.1.2.2.2) as specified in clause 5.2.7.2.6.

Upon receiving the HTTP POST request message, the VAL Server shall:

1. process the location trigger event notification;
2. upon success, respond to the LM Server with a "204 No Content" status code; and
3. if errors occur when processing the request, the VAL Server shall respond to the LM Server with an appropriate error response as specified in clause 7.1.1.5.

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. If the event subscription includes an indication for supplementary location information, then the location management server obtains the UE location information from the 3GPP core network and/or a 3rd party location management server.

NOTE: How the location management server obtains the UE location from a 3rd party location management server is out of scope of this specification.

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.

5.2.4 SS_LocationAreaInfoRetrieval API

5.2.4.1 Service Description

5.2.4.1.1 Overview

The SS_LocationAreaInfoRetrieval API, as defined 3GPP TS 23.434 [2], enables the VAL server via LM-S reference point to obtain UE(s) information in an application defined proximity range of a location.

5.2.4.2 Service Operations

5.2.4.2.1 Introduction

The service operation defined for SS_LocationAreaInfoRetrieval API is shown in the table 5.2.4.2.1-1.

Table 5.2.4.2.1-1: Operations of the SS_LocationAreaInfoRetrieval API

Service operation name	Description	Initiated by
Obtain_UEs_Info	This service operation is used by VAL server to obtain UE(s) information in an application defined proximity range of a location.	VAL server

5.2.4.2.2 Obtain_UEs_Info

5.2.4.2.2.1 General

This service operation is used by a VAL server to obtain UE(s) information in an application defined proximity range of a location.

5.2.4.2.2.2 VAL server obtains UE(s) information in an application defined proximity range of a location using Obtain_UEs_Info service operation

To obtain the UE(s) information in an application defined proximity range of a location, the VAL server shall send HTTP GET message to the location management server, on location information collection resource representation URI as specified in the clause 7.1.2.2.2.3.1. The GET message shall include the query parameters: Location information or VAL service area identifier and proximity range.

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 UE(s) information;
2. if the VAL server is authorized to fetch the UE(s) information, the location management server shall;
   a. determine the VAL UE(s) information that are in the proximity range of the location as per the query parameters in the request message from the VAL server;
   b. return HTTP "200 OK" status code with the determined VAL UE(s) information in the LMInformation data type to the VAL server.

5.2.5 SS_LocationMonitoring API

The SS_LocationMonitoring API, as defined 3GPP TS 23.434 [2], allows a VAL server via the LM-S reference point to monitor the VAL UE(s) in relation to a given area of interest. The VAL server subscribes to the LM server to receive notifications of deviation of VAL UE(s) / User(s) location from a given location information. The SS_LocationMonitoring API supports this via the event "LM_LOCATION_DEVIATION_MONITOR" of the SS_Events API as specified in clause 7.5.

Upon the receipt of "LM_LOCATION_DEVIATION_MONITOR" event subscription request from the VAL server, in order to notify the location deviation events to the VAL server, the location management server shall:

1. verify the VAL user(s) / VAL UE(s) identifier(s) provided in the "tgtUes" attribute within the MonitorLocationInterestFilter structure as specified in steps 2a and 2b of clause 5.6.1.2.2.2;

2. periodically obtain the VAL UE location information using the SEAL location information procedures as per the SS_LocationReporting and SS_LocationAreaInfoRetrieval APIs as specified in clauses 5.2.1 and 5.2.4;

3. using the MonitoringEvent API as specified in 3GPP TS 29.122 [3] and 3GPP TS 29.522 [28], periodically obtain the VAL UE location information from the 3GPP core network using the relevant location related monitoring event(s) and subscribe to the service for area of interest monitoring via the "AREA_OF_INTEREST" monitoring event, and may optionally obtain VAL UE location information from the 3rd party location management server;

NOTE: How the location management server obtains the UE location from a 3rd party location management server is out of scope of this specification.

4. process the location information received in steps 2 and 3 above and continue as follows:

   a. if the location information from the location management client, the 3GPP core network and from the 3rd party location management server (if available) do not match, or when the result of the presence status in the area of interest based on the location information collected from the location management client and the result of the presence status in the area of interest reported by the NEF do not match, then notify the VAL server with the "NOTIFY_MISMATCH_LOCATION" value in the event report;

   b. if the location information from the location management client, the 3GPP core network and from the 3rd party location management server (if available) match and is not within the area of interest of the VAL server, and such result is also aligned with the NEF reported area of interest monitoring result, then notify the VAL server with the "NOTIFY_ABSENCE" value in the event report; or

   c. if the location information from the location management client, the 3GPP core network and from the 3rd party location management server (if available) match and is within the area of interest of the VAL server, and such result is also aligned with the NEF reported area of interest monitoring result, then notify to the VAL server with the "NOTIFY_PRESENCE" value in the event report, based on the notification interval parameter in VAL server's event subscription;

and

5. if the SEAL location management server is unable to satisfy the request, the SEAL location management server shall respond to the VAL server with an appropriate error status code as defined in clause 7.5.1.5.

5.2.6 SS_LocationAreaMonitoring API

The SS_LocationAreaMonitoring API, as defined 3GPP TS 23.434 [2], allows a VAL server via the LM-S reference point to subscribe for and receive notifications of list of UE(s) moving in or out of a given area of interest from the location management server. The SS_LocationAreaMonitoring API supports this via the event "LM_LOCATION_AREA_MONITOR" of the SS_Events API as specified in clause 7.5. The VAL server may indicate the periodic time interval in which the LM server needs to notify the VAL UE's location information in the Reporting Requirements, during the Subscribe_Event service operation of SS_Events API.

5.2.7 SS_VALServiceAreaConfiguration API

5.2.7.1 Service Description

5.2.7.1.1 Overview

The SS_VALServiceAreaConfiguration API, as defined 3GPP TS 23.434 [2], enables a VAL Server to configure and manage VAL service area(s) via the LM-S reference point.

5.2.7.2 Service Operations

5.2.7.2.1 Introduction

The service operations defined for the SS_VALServiceAreaConfiguration API are shown in the table 5.2.7.2.1-1.

Table 5.2.7.2.1-1: Service operations of the SS_VALServiceAreaConfiguration API

Service operation name	Description	Initiated by
Configure_VAL_Service_Area	This service operation is used by a VAL Server to configure VAL service area(s).	VAL Server
Obtain_VAL_Service_Area	This service operation is used by a VAL Server to obtain VAL service area(s) related information.	VAL Server
Update_VAL_Service_Area	This service operation is used by a VAL Server to request the update of VAL service area(s).	VAL Server
Delete_VAL_Service_Area	This service operation is used by a VAL Server to request the deletion of VAL service area(s).	VAL Server
Subscribe_VAL_Service_Area_Change_Event	This service operation is used by a SEAL Server to subscribe to the VAL service area(s) change event(s) reporting.	SEAL Server
Update_Subscription_VAL_Service_Area_Change_Event	This service operation is used by a SEAL Server to update the VAL service area(s) change event(s) subscription.	SEAL Server
Unsubscribe_VAL_Service_Area_Change_Event	This service operation is used by a SEAL Server to unsubscribe from the VAL service area(s) change event(s) reporting.	SEAL Server
Notify_VAL_Service_Area_Change_Event	This service operation is used by a LM Server to notify for the VAL service area(s) change event(s).	SEAL Server

5.2.7.2.2 Configure_VAL_Service_Area

5.2.7.2.2.1 General

This service operation is used by a VAL Server to configure VAL service area(s) with VAL service area ID(s).

5.2.7.2.2.2 VAL Server configures VAL service area(s) using the Configure_VAL_Service_Area service operation

In order to configure VAL service area(s), the VAL Server shall send an HTTP POST request message (i.e., custom operation "Configure") to the LM Server as specified in clause 7.1.3.2.2.4.2. The request body shall include the ValServiceAreaReq data structure defined in clause 7.1.3.4.2.3.

Upon reception of the HTTP POST request message, the LM Server shall:

1. verify the identity of the VAL Server and whether the VAL Server is authorized to configure the VAL service area(s) at the LM Server;
2. if the VAL Server is authorized, the LM Server shall configure the requested VAL service area(s) and respond to the VAL Server with an HTTP "200 OK" status code with the response body including the ValServiceAreaResp data structure defined in clause 7.1.3.4.2.5; and
3. if the LM server is unable to satisfy the request, the LM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.3 Obtain_VAL_Service_Area

5.2.7.2.3.1 General

This service operation is used by a VAL Server to obtain the VAL service area(s) based on the corresponding VAL service area ID(s).

5.2.7.2.3.2 VAL Server obtains VAL service area(s) using the Obtain_VAL_Service_Area service operation

In order to obtain VAL service area(s) and the corresponding information, the VAL Server shall send an HTTP GET request message to the LM Server targeting the URI of the "VAL Service Areas" resource as specified in clause 7.1.3.2.2.3.1. The request URI may include the requested VAL service identifier(s) as defined in clause 7.1.3.2.2.3.1.

Upon reception of the HTTP GET request message, the LM Server shall:

1. verify the identity of the VAL Server and whether the VAL Server is authorized to obtain the requested VAL service area(s) information from the LM Server;
2. if the VAL Server is authorized, the LM server shall respond to the VAL Server with an HTTP "200 OK" status code with the response body including the ValServiceAreaData data structure defined in clause 7.1.3.2.2.3.1; and
3. if the LM Server is unable to satisfy the request, the LM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.4 Update_VAL_Service_Area

5.2.7.2.4.1 General

This service operation is used by a VAL Server to update a VAL service area(s) with the corresponding VAL service area ID(s).

5.2.7.2.4.2 VAL Server updates VAL service area(s) using the Update_VAL_Service_Area service operation

In order to update existing VAL service area(s) related information, the VAL Server shall send an HTTP POST request message (i.e., custom operation "Update") to the LM Server as specified in clause 7.1.3.2.2.4.3. The request body shall include the ValServiceAreaReq data structure specified in clause 7.1.3.2.2.4.3.

Upon reception of the HTTP POST request message, the LM Server shall:

1. verify the identity of the VAL Server and whether the VAL Server is authorized to update the requested VAL service area(s) related information at the LM Server;
2. if the VAL Server is authorized, the LM server shall check whether the VAL service area(s) exist and then update the VAL service area(s) information of each VAL service area ID(s), and respond to the VAL Server with an HTTP "200 OK" status code with the response body including the ValServiceAreaResp data structure defined in clause 7.1.3.4.2.5; and
3. if the LM Server is unable to satisfy the request, the LM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.5 Delete_VAL_Service_Area

5.2.7.2.5.1 General

This service operation is used by a VAL Server to delete VAL service area(s) with the given VAL service area ID(s).

5.2.7.2.5.2 VAL Server deletes service area(s) using the Delete_VAL_Service_Area service operation

In order to delete existing VAL service area(s) and the related information, the VAL Server shall send an HTTP POST request message (i.e., custom operation "Delete") to the LM Server as specified in clause 7.1.3.2.2.4.4.

Upon reception of the HTTP POST request message, the LM Server shall:

1. verify the identity of the VAL Server and whether the VAL Server is authorized to delete the requested VAL service area(s) related information at the LM Server;

2. if the VAL Server is authorized, the LM server shall check whether the target VAL service area(s) exist(s), then delete the corresponding VAL service area(s) information, and respond to the VAL Server with an HTTP "200 OK" status code with the response body including the ValServiceAreaResp data structure defined in clause 7.1.3.4.2.5; and

3. if the LM Server is unable to satisfy the request, the LM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.6 Subscribe_VAL_Service_Area_Change_Event

5.2.7.2.6.1 General

This service operation is used by a SEAL Server to subscribe to the VAL service area(s) change event(s) reporting.

5.2.7.2.6.2 SEAL Server subscribes for the VAL service area(s) change event(s) reporting using the Subscribe_VAL_Service_Area_Change_Event service operation

In order to subscribe to the VAL service area(s) change event(s) reporting, the SEAL Server shall send an HTTP POST request message targeting the URI of the "VAL Service Area Change Subscriptions" resource as specified in clause 7.1.3.2.3.3.1. The request body shall include the ValServiceAreaSubsc data structure defined in clause 7.1.3.4.2.6.

Upon reception of the HTTP POST request message, the LM Server shall:

1. verify the identity of the SEAL Server and whether the SEAL Server is authorized to subscribe to the VAL service area(s) change event(s) reporting at the LM Server;

2. if the SEAL Server is authorized, the LM Server shall create a new "Individual VAL Service Area Change Subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual VAL Service Area Change Subscription" resource and the response body including the ValServiceAreaSubsc data structure containing a representation of the created resource as defined in clause 7.1.3.4.2.6; and

3. if errors occur when processing the request, the LM Server shall respond to the SEAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.7 Update_Subscription_VAL_Service_Area_Change_Event

5.2.7.2.7.1 General

This service operation is used by a SEAL Server to update the subscription for the VAL service area(s) change event(s) reporting.

5.2.7.2.7.2 SEAL Server updates the subscription for the VAL service area(s) change event(s) reporting using the Update_Subscription_VAL_Service_Area_Change_Event service operation

In order to update an existing individual VAL service area change event subscription reporting, the SEAL Server shall send an HTTP PUT request message including the ValServiceAreaSubsc data structure to the LM Server, targeting the corresponding "Individual VAL Service Area Change Subscription" resource URI as specified in clause 7.1.3.2.4.3.2.

In order to modify an existing individual VAL service area change event subscription reporting, the SEAL Server shall send an HTTP PATCH request message including the ValServiceAreaSubscPatch data structure targeting the "Individual VAL Service Area Change Subscription" resource URI as specified in clause 7.1.3.2.4.3.3.

Upon receiving the HTTP PUT or HTTP PATCH request message, the LM Server shall:

1. verify the identity of the SEAL Server and check if the SEAL Server is authorised to update or modify the "Individual VAL Service Area Change Subscription" resource;

2. if the SEAL Server is authorized, then the LM Server shall:

   a. update/modify the resource identified by the Resource URI of the configuration received in the request; and

b. respond to the SEAL server with an HTTP "200 OK" with the response body containing the updated "Individual VAL Service Area Change Subscription" resource within the ValServiceAreaSubsc data structure or "204 No Content" status code;

and

3. if errors occur when processing the request, the LM Server shall respond to the SEAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.8 Unsubscribe_VAL_Service_Area_Change_Event

5.2.7.2.8.1 General

This service operation is used by a SEAL Server to unsubscribe from the VAL service area(s) change event(s) reporting.

5.2.7.2.8.2 SEAL server unsubscribes from the VAL service area(s) change event(s) using Unsubscribe_VAL_Service_Area_Change_Event

In order to terminate an individual VAL service area change event subscription reporting, the SEAL server shall send an HTTP DELETE request message to the LM Server, on the corresponding "Individual VAL Service Area Change Subscription" resource URI as specified in clause 7.1.3.2.4.3.4.

Upon reception of the HTTP DELETE request message, the LM server shall:

1. verify the identity of the SEAL Server and check if the SEAL Server is authorised to terminate the targeted "Individual VAL Service Area Change Subscription" associated with the resource URI;

2. if the SEAL Server is authorized to unsubscribe from VAL service area(s) change event(s), the LM Server shall delete the related "Individual VAL Service Area Change Subscription" subscription resource at the LM Server;

3. upon success, respond to the SEAL server with a "204 No Content" status code; and

4. if errors occur when processing the request, the LM Server shall respond to the SEAL Server with an appropriate error response as specified in clause 7.1.3.5.

5.2.7.2.9 Notify_VAL_Service_Area_Change_Event

5.2.7.2.9.1 General

This service operation is used by a LM Server to notify for the VAL service area(s) change event(s).

5.2.7.2.9.2 LM server notifies the SEAL Server on VAL service area(s) change event(s) using Notify_VAL_Service_Area_Change_Event

In order to notify the SEAL server about VAL service area(s) change event(s), the LM Server shall send an HTTP POST request message to the SEAL Server targeting the notification URI provided during subscription creation as specified in clause 5.2.7.2.6.

Upon receiving the HTTP POST request message, the SEAL Server shall:

1. process the VAL service area change event(s) notification; and

2. upon success, respond to the LM Server with a "204 No Content" status code; and

3. if errors occur when processing the request, the SEAL Server shall respond to the LM Server with an appropriate error response as specified in clause 7.1.3.5.

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;

and

3. if the group management server is unable to satisfy the request, the group management server shall respond to the VAL server with an appropriate error status code as specified in clause 7.2.1.5.

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. If the "PatchUpdate" feature defined in clause 7.2.1.6 is supported, then the VAL server may send an HTTP PATCH request message to the Individual VAL Group Document resource URI as specified in clause 7.2.1.2.3.3.4, to partially update the VAL group document. The body of the HTTP PATCH request message shall include the requested modifications as specified in clause 7.2.1.2.3.3.4. 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. for the HTTP PUT request message, 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/update 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/modify the resource identified by the Resource URI of the group document with group members list, group configuration information, description, VAL service identifiers, external group identifier and location information received in the request;

   b. if the group document information in the request includes 5G LAN-Type communication, invoke the 5GLANParameterProvision API towards the NEF via an HTTP PUT/PATCH message as defined in clause 4.4.15.3 of 3GPP TS 29.522 [28];

   c. return a 200 OK status code with the updated VAL group document in the response or a 204 No Content status code;

and

4. if the group management server is unable to satisfy the request, the group management server shall respond to the VAL server with an appropriate error status code as specified in clause 7.2.1.5.

NOTE: The group management server maintains a mapping between DNN and S-NSSAI of the 5GVN group and the VAL server requester identity based on operator policy. How such mapping is configured is implementation specific and out of the scope of this specification.

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. The VAL server shall use this service operation to create the location-based VAL group as specified for Create_LocationBasedGroup_Info service operation of SS_GroupManagement API, in 3GPP TS 23.434 [2].

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, then 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;
    a. if the "valServiceIds" attribute within VALGroupDocument structure was present in the received VAL group document information and the received response from the location management server does not include the identical list of the VAL service IDs as defined in the "valServiceIds" attribute within VALGroupDocument structure, the group management server shall retrieve the VAL service data from the configuration management server for the missed VAL service IDs and include the relevant VAL users or VAL UEs in the VAL group members of the new VAL group;
3. if the VAL group document information in the request includes 5G LAN-Type communication, invoke the 5GLANParameterProvision API towards the NEF via an HTTP POST message as defined in clause 4.4.15.2 of 3GPP TS 29.522 [28];
4. 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; and
5. if the group management server is unable to satisfy the request, the group management server shall respond to the VAL server with an appropriate error status code as defined in clause 7.2.1.5.

NOTE: The group management server maintains a mapping between DNN and S-NSSAI of the 5GVN group and the VAL server requester identity based on operator policy. How such mapping is configured is implementation specific and out of the scope of this specification.

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. if the group communication type is 5GLAN communication, invoke the 5GLANParameterProvision API towards the NEF via an HTTP DELETE message as defined in clause 4.4.15.4 of 3GPP TS 29.522 [28];

b. delete the resource representation pointed by the group document resource identifier;

and

3. if the group management server is unable to satisfy the request, the group management server shall respond to the VAL server with an appropriate error status code as specified in clause 7.2.1.5.

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, on modifications to VAL Group membership and configuration information, on temporary VAL group formation and on VAL group deletion. The SS_GroupManagementEvent API supports this via the "GM_GROUP_CREATE", "GM_GROUP_INFO_CHANGE", "GM_TEMP_GROUP_FORMATION" and "GM_GROUP_DELETION" events of the 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.

Upon the receipt of the message filters information in the "GM_GROUP_INFO_CHANGE" event notification from the group management server, the VAL server shall consider the message filters in VAL specific communication.

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.

5.4.3 SS_VALServiceData API

5.4.3.1 Service Description

5.4.3.1.1 Overview

The SS_VALServiceData API, as defined in 3GPP TS 23.434 [2], allows SEAL Server (e.g., GM Server via SEAL-X3 reference point) to obtain the VAL service data from the CM Server.

5.4.3.2 Service Operations

5.4.3.2.1 Introduction

The service operation defined for SS_VALServiceData API is shown in the table 5.4.3.2.1-1.

Table 5.4.3.2.1-1: Operations of the SS_VALServiceData API

Service operation name	Description	Initiated by
Obtain_VAL_Service_Data	This service operation is used by SEAL Server to obtain VAL service data.	SEAL Server (e.g., GM Server)

5.4.3.2.2 Obtain_VAL_Service_Data

5.4.3.2.2.1 General

This service operation is used by a SEAL Server to retrieve VAL service data.

5.4.3.2.2.2 SEAL Server retrieving VAL service data using the Obtain_VAL_Service_Data service operation

To obtain a VAL service data, the SEAL Server shall send an HTTP GET request message to CM Server targeting the URI of the "VAL Service Data Sets" collection resource, including optionally one or several of the query parameter(s) defined in clause 7.3.2.2.2.3.1.

Upon reception of the HTTP GET request message, the CM Server shall:

1. verify the identity of the SEAL Server and check whether it is authorized to obtain the VAL service data;
2. if the SEAL Server is authorized to obtain the requested VAL service data and upon successful processing of the request, the CM Server shall respond with an HTTP "200 OK" status code with the response body including the ValServDataResp data structure containing the requested VAL service data set(s) corresponding to the received query parameters. If the request message includes both the "val-tgt-ues" and "val-service-ids" query parameters, the response message shall include the VAL service data set(s) for only the VAL service(s) (the identifiers of which are provided within the "val-service-ids" query parameter) that are common to the VAL user(s)/VAL UE(s) provided within the "val-tgt-ues" query parameter; and
3. if errors occur when processing the request, the CM Server shall take proper error handling actions, as specified in clause 7.3.2.6, and respond with an appropriate error status code.

5.5 Network resource management APIs

5.5.1 SS_NetworkResourceAdaptation 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/broadcast 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
Discover_TSC_Stream_Availability	Requesting the NRM server to discover the connectivity and available QoS characteristics between the source and the destination DS-TT ports.	VAL server
Create_TSC_Stream	Requesting the NRM server to create a TSC stream.	VAL server
Delete_TSC_Stream	Requesting the NRM server to delete a TSC stream.	VAL server
Create_MBS_Resource	Request the creation of a new MBS Resource.	VAL server
Update_MBS_Resource	Request the update of an existing "Individual MBS Resource" resource.	VAL server
Delete_MBS_Resource	Request the deletion of an existing "Individual MBS Resource" resource.	VAL server
Activate_MBS_Resource	Request the activation of an existing MBS Resource.	VAL server
Deactivate_MBS_Resource	Request the deactivation of an existing MBS Resource.	VAL server
BDT_Configuration_Request	Request the creation of a BDT policy configuration.	VAL server
BDT_Negotiation_Notification	Notify about negotiated BDT policy configuration related event(s).	NRM server
BDT_Configuration_Get	Request to retreive an existing "Individual BDT Policy Configuration" resource.	VAL server
BDT_Configuration_Update	Request to update an existing "Individual BDT Policy Configuration" resource.	VAL server
BDT_Configuration_Delete	Request to delete an existing "Individual BDT Policy Configuration" resource.	VAL server
Subscribe_Unified_Traffic_Pattern_and_Monitoring_Management	Request UE unified traffc pattern and monitoring management subscription.	VAL server
Update_Unified_Traffic_Pattern_and_Monitoring_Management_Subscription	Request the update of an existing UE unified traffc pattern and monitoring management subscription.	VAL server
Unsubscribe_Unified_Traffic_Pattern_and_Monitoring_Management	Request the removal of an existing UE unified traffc pattern and monitoring management subscription.	VAL server
Notify_Unified_Traffic_Pattern_Update	Notify about the update of UE unified traffic patterns.	NRM server
Reliable_Transmission_Request	Request reliable transmission service.	e.g., SEALDD Server, VAL 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

This service operation is used by a VAL server to request for updating the unicast resource used by the VAL user or UE.

5.5.1.2.4.2 VAL server requesting for updating the unicast resource using Update_Unicast_Resource service operation

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

1. verify the identity of the VAL server and check if the VAL server is authorized to request for updating the unicast resource;
2. if the VAL server is authorized, the NRM server decides the need to update the unicast resource. If NRM server decides that no update is required for the unicast resource, then the NRM server sends a failure indication in the response message;
3. if NRM server decides to update the unicast resource, then the NRM server initiates interaction via SIP core; and

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

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, the local MBMS information or the local MBMS activation indication 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 defined in clause 5.5.1.2.5, or the MBS Resource creation/update request defined in clauses 5.5.1.2.10 and 5.5.1.2.11. 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.

5.5.1.2.7 Create_TSC_Stream

5.5.1.2.7.1 General

This service operation is used by a VAL server to request the NRM server to create TSC stream resources.

5.5.1.2.7.2 VAL server requesting for create TSC stream using Create_TSC_Stream service operation

In order to create a TSC stream resource, the VAL server shall send an HTTP PUT message to the NRM server with {valStreamId} in the request URI path to identify the TSC stream to be created. The request body with the "TscStreamData" data structure shall include stream specification and Traffic Specification Information which includes MaxFrameInterval, MaxFrameSize, MaxIntervalFrames, MaxLatency.

Upon reception of the HTTP PUT message, the NRM server shall:

1. verify the requestor identity of the VAL server, check whether the VAL server is authorized to request the NRM server to create a TSC stream with the VAL Stream ID as the TSC stream resource identifier;

NOTE: It's up to the VAL server to secure the uniqueness of the VAL Stream ID.

2. if the VAL server is authorized, the NRM server shall calculate the schedule for the VAL Stream ID based on the information collected earlier from the 5GS. It provides per-stream filtering and policy parameters (e.g as defined in IEEE 802.1Qcc [29]) used to derive the TSC QoS information and related flow information. The NRM server also provides the forwarding rule (e.g.as defined in IEEE 802.1Qcc [29]) used to identify the DS-TT MAC address of the corresponding PDU session. Based on the 5GS bridge delay information it determines the TSC QoS information and TSC Assistance information for the stream;

3. determine whether time synchronization needs to be activated for the TSC stream on the DS-TTs. If the DS-TTs are time synchronized, then the NRM shall not activate the time synchronization for the corresponding DS-TTs;

4. for each VAL UE, the trusted NRM server within the PLMN operator domain acting as a TSCTSF shall initiate the PCC procedures by triggering the Npcf_policy_Authorization_Create service operation as described in 3GPP TS 29.514 [30] for the TSC stream for both uplink QoS flow (sender UE to UPF/bridge) and downlink QoS flow (UPF/bridge to receiver UE). The creation request includes the DS-TT port MAC address, TSC QoS information, TSC Assistance Information, flow bit rate, priority, Service Data Flow Filter containing flow description including Ethernet Packet Filters. The QoS flow will be assigned for the PDU session with the source MAC address for the uplink direction and with the destination MAC address for the downlink direction. This information is delivered to the DS-TT by the 5GS;

5. if the time synchronization for the TSC stream on the DS-TTs was determined as required in step 3, the NRM server shall use the procedures described in 3GPP TS 29.514 [30] to activate the time synchronization for the corresponding DS-TTs; and

6. after the NRM server receiving a successful response from the PCF, the NRM server shall create an "Individual TSC Stream" resource which represents the created TSC stream, addressed by a URI that contains the {valStreamId} as the VAL Stream ID identifier the TSC Stream, and shall respond to the VAL server with a 201 Created status code, including a Location header field containing the URI for the created resource. If the NRM server receives an error response from the PCF, the NRM server shall not create the resource and shall respond to the VAL server with a proper error status code.

5.5.1.2.8 Delete_TSC_Stream

5.5.1.2.8.1 General

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

5.5.1.2.8.2 VAL server requesting to delete a TSC stream using Delete_TSC_Stream service operation

In order to delete a TSC stream, the VAL server shall send an HTTP DELETE message to the NRM server, with "{apiRoot}/ss-nra/<apiVersion>/tsc-streams/{valStreamId}" as the Resource URI representing the TSC stream identified by the VAL sStream ID to be deleted.

Upon reception of the HTTP DELETE message, the NRM server shall:

1. identify the MAC addresses of the DS-TTs involved in the stream based on the stored information for the VAL Stream ID;

2. determine the actions related to the time synchronization deactivation for the DS-TTs:

   - if none of the streams require to keep the time synchronization activated, deactivate the time synchronization for the involved DS-TTs in step 3; and

   - otherwise, keep the time synchronization activated for the involved DS-TTs for which time synchronization was previously activated;

3. for each VAL UE, as the trusted NRM server within the PLMN operator domain acting as a TSCTSF shall:

   - deactivate the time synchronization for the DS-TTs as per step 2 above by invoking the Npcf_PolicyAuthorization_Update service operation as defined in 3GPP TS 29.514 [30]; and

- initiate the PCC procedures by triggering the Npcf_policy_Authorization_Delete service operation to delete the QoS flows as defined in 3GPP TS 29.514 [30] with all the MAC addresses referred by the VAL Stream ID; and

4. if the NRM server receive a successful response from the PCF, the NRM server shall delete the existing TSC stream in the "Individual TSC Stream" resource. Then the NRM server shall send an HTTP DELETE response message with "204 No Content" status code to the VAL server as a successful result of TSC stream deletion for the VAL Stream ID. If the NRM server receive an error code from the PCF, the NRM server shall take proper error handling action and shall respond to the VAL server with a proper error status code as unsuccessful result.

5.5.1.2.9 Discover_TSC_Stream_Availability

5.5.1.2.9.1 General

This service operation is used by a VAL server to request the NRM server to retrieve the connectivity information between the source and destination DS-TT ports and the related available QoS characteristics, prior to creating the stream.

5.5.1.2.9.2 VAL server discovering TSC stream availability using Discover_TSC_Stream_Availability service operation

In order to discover the connectivity between the source and destination DS-TT ports and the related available QoS characteristics, the VAL server shall send an HTTP GET request message to the NRM server, with the query parameters containing the targeted stream specifications.

Upon reception of the HTTP GET request message, the NRM server shall:

1. verify if the VAL server is authorized to discover the TSC stream availability;

2. if the VAL server is authorized, the NRM server shall check the connectivity between the DS-TTs ports indicated in the requested TSC stream definition based on the collected 5GS TSC bridge management and port management information, the traffic classes supported by the DS-TTs and the end-to-end latency (including the UE-DS-TT residence times, UPF residence time, and propagation delays) per traffic class;

   The necessary information to process the TSC stream availability discovery request, i.e. 5GS TSC bridge management and port management information, the traffic classes supported by the DS-TTs and the end-to-end latency (including the UE-DS-TT residence times, UPF residence time, and propagation delays) per traffic class, is collected by the NRM server and shall be available at the NRM server prior to the reception of the request from the VAL server.

3. if the discovery result is successful upon the connectivity between the DS-TT ports is discovered, the NRM server shall return an HTTP GET response message to the VAL server with an HTTP "200 OK" status code with the TscStreamAvailability data structure as the response body which shall include the stream specification matching the received query parameters and the corresponding list of traffic specifications;

4. if there is no stream specification matching the query parameters or no TSC stream availability information was discovered between the DS-TT ports, then the NRM server shall responsde with a 204 No Content status code without response body;

5. Otherwise if error case occur (e.g. the necessary information to process the request is not available at the NRM server), the NRM server shall respond to the VAL server with a proper error status code.

5.5.1.2.10 Create_MBS_Resource

5.5.1.2.10.1 General

This service operation is used by a VAL Server to request the creation of a new MBS Resource at the NRM Server (see also clause 14.3.4A of 3GPP°TS°23.434°[2]).

5.5.1.2.10.2 VAL Server requesting the creation of an MBS Resource using the Create_MBS_Resource service operation

In order to request the creation of a new MBS Resource, the VAL Server shall send an HTTP POST request message to the NRM Server targeting the "MBS Resources" collection resource, with the request body containing the MBSResourceReq data structure.

Upon reception of the HTTP POST request message, the NRM Server shall:

- verify the identity of the VAL Server and whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized and upon successful processing of the request, the NRM Server shall create a new "Individual MBS Resource" resource and respond to the VAL Server with an HTTP "201 Created" status code with the response body containing a representation of the created resource and potentially additional information (e.g. the user plane addressing information of the NRM Server for downlink data delivery) within the MBSResourceResp data structure; and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.11 Update_MBS_Resource

5.5.1.2.11.1 General

This service operation is used by a VAL Server to request the update of an existing MBS Resource at the NRM Server (see also clause 14.3.4A of 3GPP°TS°23.434°[2]).

5.5.1.2.11.2 VAL Server requesting the update of an existing MBS Resource using the Update_MBS_Resource service operation

In order to request the update of an existing MBS Resource, the VAL Server shall send an HTTP PUT/PATCH request message to the NRM Server targeting the corresponding "Individual MBS Resource" resource, with the request body containing either:

- the updated representation of the resource within the MBSResource data structure, in case the HTTP PUT method is used; or
- the requested modifications to the resource within the MBSResourcePatch data structure, in case the HTTP PATCH method is used.

Upon reception of the HTTP PUT/PATCH request message, the NRM Server shall:

- verify whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized and upon successful processing of the request, the NRM Server shall update the targeted "Individual MBS Resource" resource and respond to the VAL Server with either:
  - an HTTP "200 OK" status code with the response body containing a representation of the updated resource and potentially additional information (e.g., the updated user plane addressing information of the NRM Server for downlink data delivery) within the MBSResource data structure; or
  - an HTTP "204 No Content" status code;

  and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.12 Delete_MBS_Resource

5.5.1.2.12.1 General

This service operation is used by a VAL Server to request the deletion of an existing MBS Resource at the NRM Server (see also clause 14.3.4A of 3GPP°TS°23.434°[2]).

5.5.1.2.12.2 VAL Server requesting the deletion of an existing MBS Resource using the Delete_MBS_Resource service operation

In order to request the deletion of an existing MBS Resource, the VAL Server shall send an HTTP DELETE request message to the NRM Server targeting the corresponding "Individual MBS Resource" resource.

Upon reception of the HTTP DELETE request message, the NRM Server shall:

- verify whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized and upon successful processing of the request, the NRM Server shall delete the targeted "Individual MBS Resource" resource and respond to the VAL Server with an HTTP "204 No Content" status code; and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.13 Activate_MBS_Resource

5.5.1.2.13.1 General

This service operation is used by a VAL Server to request the activation of an existing MBS Resource at the NRM Server (see also clause 14.3.4A of 3GPP°TS°23.434°[2]).

5.5.1.2.13.2 VAL Server requesting the activation of an existing MBS Resource using the Activate_MBS_Resource service operation

In order to request the activation of an existing MBS Resource, the VAL Server shall invoke the "Activate" resource custom operation by sending an HTTP POST request message to the NRM Server targeting the URI of the corresponding "Individual MBS Resource" resource custom operation, i.e. "{apiRoot}/ss-nra/<apiVersion>/mbs-resources/{mbsResId}/activate", with the request body including the MbsResAct data structure.

Upon reception of the HTTP POST request message, the NRM Server shall:

- verify whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized and upon successful processing of the request, the NRM Server shall respond to the VAL Server with an HTTP "200 OK" status code with the response body including the the MbsResAct data structure; and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.14 Deactivate_MBS_Resource

5.5.1.2.14.1 General

This service operation is used by a VAL Server to request the deactivation of an existing MBS Resource at the NRM Server (see also clause 14.3.4A of 3GPP°TS°23.434°[2]).

5.5.1.2.14.2 VAL Server requesting the deactivation of an existing MBS Resource using the Deactivate_MBS_Resource service operation

In order to request the deactivation of an existing MBS Resource, the VAL Server shall invoke the "Deactivate" resource custom operation by sending an HTTP POST request message to the NRM Server targeting the URI of the corresponding "Individual MBS Resource" resource custom operation, i.e. "{apiRoot}/ss-nra/<apiVersion>/mbs-resources/{mbsResId}/deactivate", with the request body including the MbsResDeact data structure.

Upon reception of the HTTP POST request message, the NRM Server shall:

- verify whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized and upon successful processing of the request, the NRM Server shall respond to the VAL Server with an HTTP "200 OK" status code with the response body including the the MbsResDeact data structure; and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.15 BDT_Configuration_Request

5.5.1.2.15.1 General

This service operation is used by a VAL Server to request the creation of a background data transfer policy configuration at the NRM Server.

5.5.1.2.15.2 Creation of background data transfer policy configuration using the BDT_Configuration_Request service operation

In order to create a background data transfer policy configuration, the VAL Server shall send an HTTP POST request message to the NRM server targeting the URI of the "BDT Policy Configurations" collection resource, with the request body including the BdtPolConfig data structure.

Upon reception of the HTTP POST request message, the NRM Server shall:

- verify whether the VAL Server is authorized to initiate such request;
- if the VAL Server is authorized, when the NRM server decides to negotiate BDT policy with the 3GPP network, it triggers the background data transfer procedures defined in the clause 4.16.7.2 of 3GPP TS 23.502 [39];
- upon success, the NRM Server shall respond to the VAL Server with an HTTP "201 Created" status code with the response body including the representation of the created "Individual BDT Policy Configuration" resource within the BdtPolConfig data structure; and
- if errors occur when processing the request or the NRM Server receives an error response from 5GC, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.16 BDT_Negotiation_Notification

5.5.1.2.16.1 General

This service operation is used by the NRM Server to notify about update in the negotiated background data transfer policy.

5.5.1.2.16.2 NRM Server notifying the background data transfer policy using the BDT_Negotiation_Notification service operation

To notify on the updates in the negotiated BDT policies received from the 3GPP network, the NRM server shall send an HTTP POST request message with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the VAL Server during the creation/update of the corresponding BDT policy configuration as defined in clauses 5.5.1.2.15 and 5.5.1.2.18, and the request body including the BdtNotification data structure.

Upon successful processing of the request, the VAL Server shall:

- respond with an HTTP "204 No Content" status code.

On failure, the VAL Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the NRM server with an appropriate error status code.

5.5.1.2.17 BDT_Configuration_Get

5.5.1.2.17.1 General

This service operation is used by a VAL Server to request the retrieval of an existing "Individual BDT Policy Configuration" resource at the NRM Server.

5.5.1.2.17.2 Retreivel of an individual background data transfer policy configuration using the BDT_Configuration_Get service operation

In order to retrieve an individual background data transfer policy configuration resource, the VAL Server shall send an HTTP GET request message targeting the URI of the corresponding "Individual BDT Policy Configuration" resource.

Upon reception of the HTTP GET request message, the NRM server shall:

- verify whether the VAL Server is authorized to retrieve the BDT policy configuration information;
- if the VAL Server is authorized to fetch the BDT policy configuration information, the NRM server shall;
- responds to the VAL Server with an HTTP "200 OK" status code with the response body including the requested BDT policy configuration within the BdtPolConfig data structure.

5.5.1.2.18 BDT_Configuration_Update

5.5.1.2.18.1 General

This service operation is used by a VAL Server to request the update of an existing "Individual BDT Policy Configuration" resource at the NRM server.

5.5.1.2.18.2 Update of an individual background data transfer policy configuration using the BDT_Configuration_Update service operation

In order to update an existing background data transfer policy configuration, the VAL Server shall send an HTTP PUT/PATCH request message to the NRM server targeting the corresponding "Individual BDT Policy Configuration" resource with the request body including either:

- the updated representation of the resource within the BdtPolConfig data structure, in case the HTTP PUT method is used; or
- the requested modifications to the resource within the BdtPolConfigPatch data structure, in case the HTTP PATCH method is used.

Upon receiving the HTTP PUT/PATCH request message from the VAL Server, the NRM server shall:

- check whether the VAL Server is authorized to request the update of the targeted existing "Individual BDT Policy Configuration" resource;
- if the VAL Server is authorized, then the NRM server shall update/modify the targeted resource accordingly and respond to the VAL Server with either:
  - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual BDT Policy Configuration" resource within the BdtPolConfig data structure; or
  - an HTTP "204 No Content" status code;

  and
- if errors occur when processing the request or the NRM Server receives an error response from 5GC, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the VAL Server with an appropriate error status code.

5.5.1.2.19 BDT_Configuration_Delete

5.5.1.2.19.1 General

This service operation is used by a VAL Server to request the deletion of an existing "Individual BDT Policy Configuration" resource at the NRM server.

5.5.1.2.19.2 Deletion an individual background data transfer policy configuration using the BDT_Configuration_Delete service operation

In order to delete an existing BDT policy configuration, the VAL Server shall send an HTTP DELETE request message to the NRM server targeting the corresponding "Individual BDT Policy Configuration" resource.

Upon receiving the HTTP DELETE request message:

- check whether the VAL Server is authorized to request the deletion of the targeted existing "Individual BDT Policy Configuration" resource;
- if the VAL Server is authorized, the NRM server shall delete the resource and respond to the VAL Server with an HTTP "204 No Content" status code; and
- if errors occur when processing the request, the NRM Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.4.1.5.

5.5.1.2.20 Subscribe_Unified_Traffic_Pattern_and_Monitoring_Management

5.5.1.2.20.1 General

This service operation is used by a service consumer to subscribe to UE unified traffic pattern and monitoring management at the NRM Server.

5.5.1.2.20.2 Service consumer subscribing to unified traffic pattern using the Subscribe_Unified_Traffic_Pattern_and_Monitoring_Management service operation

In order to create subscribe to UE unified traffic pattern monitoring and management, the service consumer shall send an HTTP POST request message to the NRM server targeting the URI of the "Unified Traffic Pattern Subscriptions" resource, with the request body including the UnfTrafficSubc data structure.

Upon reception of the HTTP POST request message, the NRM Server shall:

- verify whether the service consumer is authorized to initiate such request;
- if the service consumer is authorized, then the NRM Server executes one or more management and 5GC exposure procedures (per UE) as specified in clause 14.3.12.2 of 3GPP TS 23.434 [2];
- upon success, the NRM shall create the requested "Individual Unified Traffic Pattern Subscription" resource and respond to the service consumer with an HTTP "201 Created" status code with the response body including the the representation of the created resource within the UnfTrafficSubc data structure; and
- if errors occur when processing the request, the NRM Server shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the service consumer with an appropriate error status code.

5.5.1.2.21 Update_Unified_Traffic_Pattern_and_Monitoring_Management_Subscription

5.5.1.2.21.1 General

This service operation is used by a service consumer to update an existing UE unified traffic pattern and monitoring management subscription at the NRM Server.

5.5.1.2.21.2 Service consumer updating the subscription to unified traffic pattern using the Update_Unified_Traffic_Pattern_and_Monitoring_Management_Subscription service operation

To update an existing UE unified traffic pattern monitoring and management subscription, the service consumer shall send to the NRM server targeting the URI of the "Individual Unified Traffic Pattern Subscription" resource either,

- an HTTP PUT request message with the request body including the UnfTrafficSubc data structure, or
- an HTTP PATCH request message with the request body including the UnfTrafficSubcPatch data structure

Upon receiving the HTTP PUT/PATCH request message, if the service consumer is authorized to modify/update the UE unified traffic pattern and monitoring management subscription, then the NRM server shall:

1. update/modify the targeted resource accordingly;
2. respond to the service consumer with either:
   - an HTTP "200 OK" with the response body containing the updated representation of the "Individual Unified Traffic Pattern Subscription" resource within UnfTrafficSubc data structure; or
   - an HTTP "204 No Content" status code;

   and
3. if errors occur when processing the request, the NRM Server shall respond to the service consumer with an appropriate error response as specified in clause 7.1.3.5.

5.5.1.2.22 Unsubscribe_Unified_Traffic_Pattern_and_Monitoring_Management

5.5.1.2.22.1 General

This service operation is used by a service consumer to delete an existing UE unified traffic pattern and monitoring management subscription at the NRM Server.

5.5.1.2.22.2 Service consumer deleting the subscription to unified traffic pattern using the Unsubscribe_Unified_Traffic_Pattern_and_Monitoring_Management service operation

To delete an existing UE unified traffic pattern subscription, the service consumer shall send a HTTP DELETE request message to the NRM server targeting the corresponding "Individual Unified Traffic Pattern Subscription" resource.

Upon reception of the HTTP DELETE request message, if the service consumer is authorized to delete the UE unified traffic pattern subscription, then the NRM server shall:

1. delete the targeted resource and respond to the service consumer with an HTTP "204 No Content" status code;and
2. if errors occur when processing the request, the NRM Server shall respond to the service consumer with an appropriate error response as specified in clause 7.1.3.5.

5.5.1.2.23 Notify_Unified_Traffic_Pattern_Update

5.5.1.2.23.1 General

This service operation is used by the NRM Server to notify the service consumer on UE unified traffic pattern monitoring and management related event(s).

5.5.1.2.23.2 NRM Server notifying on unified traffic pattern monitoring and management related event(s) using the Notify_Unified_Traffic_Pattern_Update service operation

To notify on UE unified traffic pattern monitoring and management related event(s) as specified in clause 14.3.12.3 of 3GPP TS 23.434 [2], the NRM server shall send an HTTP POST request message to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation/update of the corresponding unified traffic pattern subscription as defined in clauses 5.5.1.2.20 and 5.5.1.2.21 and the request body including the UpdTrafficUpdNotif data structure.

Upon successful processing of the request, the service consumer shall respond with an HTTP "204 No Content" status code.

On failure, the service consumer shall take proper error handling actions, as specified in clause 7.4.1.5, and respond to the NRM server with an appropriate error status code.

5.5.1.2.24 Reliable_Transmission_Request

5.5.1.2.24.1 General

This service operation is used by a service consumer (e.g., SEALDD Server, VAL Server) to request reliable transmission service to the NRM Server (see also clause 14.3.10.2 of 3GPP°TS°23.434°[2]).

The following procedures are supported by the "Reliable_Transmission_Request" service operation:

- Reliable Transmission Service Request.

5.5.1.2.24.2 Reliable Transmission Service Request

1. In order to request reliable transmission service, the service consumer shall send an HTTP POST request to the NRM Server targeting the URI of the corresponding custom operation (i.e., "RelTransRequest"), with the request body including the RelTransReq data structure.

2. Upon reception of the HTTP POST request message, the NRM Server shall:

   - check whether the service consumer is authorized to initiate such request;

   - if the service consumer is authorized and upon successful processing of the request, the NRM Server shall respond with an HTTP "204 No Content" status code; and

- on failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 7.4.1.5.

5.5.2 SS_EventsMonitoring API

The SS_EventsMonitoring API, as defined in 3GPP TS 23.434 [2], allows a VAL server via NRM-S reference point to subscribe for and receive notifications from the Network Resource Management server about events related to VAL UE(s). The SS_EventsMonitoring API supports this via the "NRM_MONITOR_UE_USER_EVENTS" event in SS_Events API as specified in clause 7.5. Based on the events of interest information related to the VAL UE(s), the NRM server shall subscribe to UE monitoring types and analytics events as specified in clause 4.4.2 and clause 4.4.14 of 3GPP TS 29.522 [28].

5.5.3 SS_NetworkResourceMonitoring API

5.5.3.1 Service Description

5.5.3.1.1 Overview

The SS_NetworkResourceMonitoring API, as defined in 3GPP TS 23.434 [2], allows VAL server via NRM-S reference point to communicate with the network resource management server for network resource monitoring including requesting unicast QoS monitoring data and managing unicast QoS monitoring subscription.

5.5.3.2 Service Operations

5.5.3.2.1 Introduction

The service operations defined for the SS_NetworkResourceMonitoring API are shown in the table 5.5.3.2.1-1.

Table 5.5.3.2.1-1: Operations of the SS_NetworkResourceMonitoring API

Service operation name	Description	Initiated by
Subscribe_Unicast_QoS_Monitoring	This service operation is used by VAL server to subscribe to unicast QoS monitoring events from SEAL servers.	VAL server
Unsubscribe_Unicast_QoS_Monitoring	This service operation is used by VAL server to unsubscribe from unicast QoS monitoring events from SEAL servers.	VAL server
Notify_Unicast_QoS_Monitoring	This service operation is used by SEAL server to send the notifications to the VAL server.	NRM server
Obtain_Unicast_QoS_Monitoring	This service operation is used by VAL server to obtain unicast QoS monitoring data.	VAL server
Update_Unicast_QoS_Monitoring_Subscription	This service operation is used by VAL server to update or modify the individual unicast QoS monitoring subscription.	VAL server

5.5.3.2.2 Subscribe_Unicast_QoS_Monitoring

5.5.3.2.2.1 General

This service operation is used by a VAL server to create a unicast QoS monitoring subscription to the NRM server.

5.5.3.2.2.2 VAL server subscribes for Unicast QoS Monitoring using Subscribe_Unicast_QoS_Monitoring

In order to subscribe to unicast QoS monitoring, the VAL server shall send an HTTP POST message to the NRM server targeting the URI of the "Unicast Monitoring Subscriptions" resource as specified in clause 7.4.2.2.2.3.1. The request body shall include the MonitoringSubscription data structure as defined in clause 7.4.2.4.2.8. The VAL server shall indicate within the ReportingRequirement data structure whether one-time reporting and/or immediate reporting is requested, i.e.:

- the "immRep" attribute set to "true", if immediate reporting of the unicast QoS Monitoring data is requested; and/or
- the "reportingMode" attribute set to "ONE_TIME" and the "immRep" attribute set to "true", if one-time reporting of the unicast QoS Monitoring data is requested via the Obtain_Unicast_QoS_Monitoring service operation.

Upon reception of the HTTP POST request message, the NRM server shall:

1. verify the identity of the VAL server and whether the VAL server is authorized to create a unicast QoS monitoring subscription at the NRM server;
2. if the VAL server is not authorized, the NRM server shall respond to the VAL server with an appropriate error status code;
3. if the VAL server is authorized:
   a. if immediate reporting and one-time reporting are requested, the NRM server determines if it the requested data is available internally or not and whether to interact with the NEF to retrieve the data using the Nnef_AnalyticsExposure API (UE Communication Analytics Events and DN Performance Analytics) as defined in 3GPP TS 29.522 [28];
   b. otherwise, the NRM server shall interact with the NEF to establish the associated QoS monitoring subscriptions by invoking the Nnef_AnalyticsExposure API (UE Communication Analytics Events and DN Performance Analytics) and AsSessionWithQoS API as defined in 3GPP TS 29.522 [28]. The NRM server determines the relevant NEF subscription procedures and the parameters for these subscriptions based on the inputs received from the VAL server;
4. upon reception of successful response(s) from the NEF or retrieval of the requested data internally:

a. if immediate reporting and one-time reporting are requested, an HTTP "200 OK" status code, with the response body including the MonitoringReport data structure containing the available requested Unicast QoS Monitoring data as defined in clause 7.4.2.4.2.2;

b. otherwise, the NRM server shall create a new "Individual Unicast Monitoring Subscription" resource and respond to the VAL server with:

- an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual Unicast Monitoring Subscription" resource and the response body including the MonitoringSubscription data structure containing a representation of the created resource as defined in clause 7.4.2.4.2.8; and

- if immediate reporting was requested by the VAL server, the returned MonitoringSubscription data structure shall also contain the requested Unicast QoS Monitoring data within the "monRep" attribute, if the requested data is available, as defined in clause 7.4.2.4.2.2;

c. in the case of partial failure, i.e. the request fails for only a subset of the targeted VAL UE(s) or VAL Stream ID(s), the NRM server shall include the "failureRep" attribute within the returned MonitoringReport data structure indicating the list of VAL UE(s) or VAL Stream ID(s) for which the NRM server failed to obtain the requested data and the related failure reasons;

and

5. if the NRM server is unable to satisfy the request, the NRM server shall respond to the VAL server with an appropriate error status code.

5.5.3.2.3 Unsubscribe_Unicast_QoS_Monitoring

5.5.3.2.3.1 General

This service operation is used by a VAL server to terminate a unicast QoS monitoring subscription at the NRM server.

5.5.3.2.3.2 VAL server unsubscribes for Unicast QoS Monitoring using Unsubscribe_Unicast_QoS_Monitoring

In order to terminate a unicast QoS monitoring subscription, the VAL server shall send an HTTP DELETE request message to the NRM server, on the corresponding "Individual Unicast Monitoring Subscription" resource URI as specified in clause 7.4.2.2.3.3.1.

Upon reception of the HTTP DELETE request message, the NRM server shall:

1. verify the identity of the VAL server and check if the VAL server is authorised to terminate the targeted "Individual Unicast Monitoring Subscription" associated with the resource URI;

2. if the VAL server is authorized to unsubscribe from Unicast QoS Monitoring, interact with the NEF to terminate the related QoS monitoring subscription and delete the related "Individual Unicast Monitoring Subscription" subscription resource at the NRM server; and

3. upon success, respond to the VAL server with a "204 No Content" status code.

5.5.3.2.4 Notify_Unicast_QoS_Monitoring

5.5.3.2.4.1 General

This service operation is used by the NRM server to notify the VAL server of unicast QoS monitoring data.

5.5.3.2.4.2 NRM server notifies for Unicast QoS Monitoring using Notify_Unicast_QoS_Monitoring

The NRM server receives unicast QoS monitoring data by means of notifications provided by the NEF. The NRM server coordinates and aggregates the received information from the NEF notifications and determines whether to send a notification to the VAL server based on the VAL server subscription's reporting requirements. For event-triggered reporting, the NRM server notifies the VAL server when any given event is triggered. For a VAL group or a list of

VAL UEs, the NRM server aggregates QoS monitoring data for each UE belonging to the group or the list; for a VAL stream, the NRM server aggregates the QoS monitoring data for the stream.

The NRM server stops reporting according to the VAL server subscription's termination of reporting requirements. In the case user-triggered termination of reporting is requested or no termination of reporting requirements are provided, the NRM server terminates the Unicast Monitoring Subscription after receiving an explicit request from the VAL Server as specified in clause 5.5.3.2.3. In the case of time-triggered or event-triggered termination of reporting, the NRM server shall stop the reporting and terminate the subscription when the provided conditions are met. The NRM server may also store internally the QoS monitoring data as needed for later retrieval.

In order to notify the VAL server about Unicast QoS Monitoring information updates, the NRM server shall send an HTTP POST request message to the VAL server targeting the notification URI provided during subscription creation as specified in clause 5.5.3.2.2.2.

Upon receiving the HTTP POST request message, the VAL server shall:

1. process the Unicast QoS Monitoring notification; and

2. upon success, respond to the NRM server with a "204 No Content" status code.

5.5.3.2.5 Obtain_Unicast_QoS_Monitoring_Data

5.5.3.2.5.1 General

This service operation is used by a VAL server to obtain the QoS monitoring data from the NRM server for a time period of interest either in the past or in the present (i.e. current time). This service operation is supported via the Subscribe_Unicast_QoS_Monitoring service operation using the immediate reporting and one-time reporting mechanisms as defined in clause 5.5.3.2.2.2.

5.5.3.2.6 Update_Unicast_QoS_Monitoring_Subscription

5.5.3.2.6.1 General

This service operation is used by a VAL server to update a unicast QoS monitoring subscription at the NRM server.

5.5.3.2.6.2 VAL server modifies for Unicast QoS Monitoring Subscription using Update_Unicast_QoS_Monitoring Subscription

If the "UpdateSupport" feature defined in clause 7.4.2.6 is supported, the VAL server may send an HTTP PUT or an HTTP PATCH request to update or modify an individual unicast QoS monitoring subscription, respectively.

In order to update an existing individual unicast QoS monitoring subscription, the VAL server shall send an HTTP PUT request message to the NRM server, targeting the corresponding "Individual Unicast Monitoring Subscription" resource URI as specified in clause 7.4.2.2.3.3.3.

In order to modify an existing individual unicast QoS monitoring subscription, the VAL server shall send an HTTP PATCH request message targeting the "Individual Unicast Monitoring Subscription" resource URI as specified in clause 7.4.2.2.3.3.4. The body of the HTTP PATCH request message shall include the requested modifications as specified in clause 7.4.2.2.3.3.4.

The updated resource representation information provided via an HTTP PUT method shall not change any target identifier, i.e., the "valUeIds", "valGroupId", and "valStreamIds" attributes within the "Individual Unicast Monitoring Subscription" resource.

Upon receiving the HTTP PUT or HTTP PATCH request message, the NRM server shall:

1. check if the required features for the received HTTP request are supported as defined in clause 7.4.2.6;

2. verify the identity of the VAL server and check if the VAL server is authorised to update or modify the "Individual Unicast Monitoring Subscription" resource;

3. if the required feature for the received HTTP request is supported and the VAL server is authorized, then the NRM server shall:

a. if the configuration information in the request is valid, interact with the NEF to update, modify, or establish the associated QoS monitoring subscriptions by invoking the Nnef_AnalyticsExposure API (UE Communication Analytics Events and DN Performance Analytics) and AsSessionWithQoS API as defined in 3GPP TS 29.522 [28]. The NRM server determines the relevant NEF subscription procedures and the parameters for these subscriptions based on the inputs received from the VAL server;

4. upon reception of successful response(s) from the NEF:

   a. update/modify the resource identified by the Resource URI of the configuration received in the request; and

   b. respond to the VAL server with an HTTP "200 OK" status;

and

5. if the NRM server is unable to satisfy the request, the NRM server shall respond to the VAL server with an appropriate error status code as defined in clause 7.4.2.5.

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).
Update_Subscription	This service operation is used by VAL server to update its events subscription at SEAL server.	VAL Server

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. verify the provided identifier(s) in the request;
   b. if the PartialFailureSupport feature is supported and partial failure has occurred (e.g. the SEAL server fails to verify the identifier(s) of only a subset of the provided target identifiers), the SEAL server shall process the request for the identifier(s) for which the verification is successful, create a new resource as specified in clause 7.5.1.2.1 and include in the response to the service consumer (i.e. VAL server) the "partialFailRep" attribute within the EventSubscription data structure indicating the list of the target identifier(s) for which the verification failed;
   c. otherwise, upon successful verification of the provided identifier(s) and successful processing of the request, create a new resource as specified in clause 7.5.1.2.1;
   d. return the created resource representation and the created SEAL Resource URI in the response message ; and
   e. if the SEAL server is unable to satisfy the request, the SEAL server shall respond to the VAL server with an appropriate error status code as defined in clause 7.5.1.5.

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

5.6.1.2.5 Update_Subscription

5.6.1.2.5.1 General

This service operation is used by a VAL server to update its SEAL events subscription.

5.6.1.2.5.2 Updating the SEAL events subscription using Update_Subscription service operation

If the "SubscUpdate" feature as defined in clause 7.5.1.6 is supported, then to request the update/modification of an existing Individual SEAL Events Subscription, the VAL server shall send a HTTP PATCH request (for partial modification) or PUT request (for fully replacement) message to the SEAL server on resource URI "Individual SEAL Events Subscription" resource as specified in clause 7.5.1.2.3.3.2 for HTTP PATCH message and in clause 7.5.1.2.3.3.3 for HTTP PUT message.

Upon receiving the HTTP PATCH or PUT message from the VAL server, the SEAL server shall:

1. check whether the VAL server is authorized to update the existing "Individual SEAL Events Subscription" resource or not;
2. if the VAL server is authorized to update the SEAL Events Subscription, then:
   a. if the "PartialFailureSupport" feature is supported and partial failure has occurred (e.g., the SEAL server fails to verify the identifier(s) of only a subset of the provided target identifiers), the SEAL server shall process the request for the identifier(s) for which the verification is successful, update the existing "Individual SEAL Events Subscription" resource and respond to the service consumer (i.e., VAL server) with an HTTP "200 OK" status code with the response body including the "partialFailRep" attribute, indicating the list of the target identifier(s) for which the verification failed, within the concerned instance(s) (encoded using the EventSubscription data structure) of the SEALEventSubscription data structure;
   b. otherwise, the SEAL server shall update the existing "Individual SEAL Events Subscription" resource and respond to the VAL server with either an HTTP "204 No Content" status code or an HTTP "200 OK" status code with the response body including the updated representation of the "Individual SEAL Events Subscription" resource within the SEALEventSubscription data structure.

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.

5.7.2 SS_KMParametersProvisioning API

5.7.2.1 Service Description

5.7.2.1.1 Overview

As specified in 3GPP TS 23.434 [2] and 3GPP TS 33.434 [26], the SS_KMParametersProvisioning API enables a VAL server to provision the key parameters information specific to VAL service, VAL User or VAL UE at the Key Management (KM) server over the SEAL KM-S reference point.

5.7.2.2 Service Operations

5.7.2.2.1 Introduction

The service operations defined for the SS_KMParametersProvisioning API are shown in the table 5.7.2.2.1-1.

Table 5.7.2.2.1-1: Operations of the SS_KMParametersProvisioning API

Service operation name	Description	Initiated by
Provide_Configuration	This service operation is used by a VAL server to provision the VAL service, VAL User or VAL UE specific key parameter information to the KM server.	VAL server

5.7.2.2.2 Provide_Configuration

5.7.2.2.2.1 General

This service operation is used by a VAL server to provision key parameter information to the KM server.

5.7.2.2.2.2 VAL server provisioning key parameter information using Provide_Configuration service operation

To provision the VAL service, VAL User or VAL UE specific key parameter information, the VAL server shall send an HTTP POST request message to the KM Server with the request body including the VALKeyConfiguration data structure specified in clause 7.6.2.5.2.2.

Upon receiving HTTP POST message, the key management server shall:

1. verify the identity of the VAL Server and check if the VAL Server is authorized to provision the key parameter information as specified in 3GPP TS 33.434 [26];
2. if the VAL Server is authorized to provision the key parameter information, shall create a new resource as defined in 7.6.2.2.2.3.1; and
3. if the KM Server is unable to satisfy the request, the KM Server shall respond to the VAL Server with an appropriate error status code as defined in clause 7.6.2.5.

5.8 Network Slice Capability Enablement APIs

NSCE APIs are defined in 3GPP TS 29.435 [42].

5.9 Identity Management APIs

5.9.1 SS_IdmParameterProvisioning API

5.9.1.1 Service Description

5.9.1.1.1 Overview

As specified in 3GPP TS 23.434 [2], the SS_IdmParameterProvisioning API enables a VAL server to communicate with the Identity Management (IM) server for the provisioning of the VAL service specific information for a VAL server (i.e. VAL server's VAL service(s) and the related VAL user(s) information) over the SEAL IM-S reference point.

5.9.1.2 Service Operations

5.9.1.2.1 Introduction

The service operations defined for the SS_IdmParameterProvisioning API are shown in the table 5.9.1.2.1-1.

Table 5.9.1.2.1-1: Operations of the SS_IdmParameterProvisioning API

Service operation name	Description	Initiated by
Provide_Configuration	This service operation is used to provision the VAL service specific information to the IM server.	e.g. VAL server
Get_Configuration	This service operation is used to retrieve the VAL service specific information provisioned to the IM server.	e.g. VAL server
Update_Configuration	This service operation is used to update the VAL service specific information provisioned to the IM server.	e.g. VAL server
Delete_Configuration	This service operation is used to delete the VAL service specific information provisioned to the IM server.	e.g. VAL server

5.9.1.2.2 Provide_Configuration

5.9.1.2.2.1 General

This service operation is used by a VAL server to provision the list of VAL service specific information of the VAL server to the IM server.

5.9.1.2.2.2 VAL server provisioning VAL service specific information using Provide_Configuration service operation

To provision the VAL services specific information, the VAL server shall send an HTTP POST request message to the IM Server with the request body including the VALServicesConfig data structure specified in clause 7.8.1.5.2.2.

Upon receiving HTTP POST message, the identity management server shall:

1. verify the identity of the VAL Server and check if the VAL Server is authorized to provision the VAL services specific configuration information;
2. if the VAL Server is authorized to provision the VAL services specific configuration information, shall create a new resource as defined in 7.8.1.2.2.3.1; and
3. if the IM Server is unable to satisfy the request, the IM Server shall respond to the VAL Server with an appropriate error status code as defined in clause 7.8.1.5.

5.9.1.2.3 Get_Configuration

5.9.1.2.3.1 General

This service operation is used by a service consumer to fetch the provisioned list of VAL services specific information of the VAL server from the IM server.

5.9.1.2.3.2 Service consumer obtaining the VAL service specific information provisioned using Get_Configuration service operation

To obtain the provisioned VAL services configuration information, the service consumer shall send a HTTP GET message to the IM server targeting either,

- "Individual VAL Services Configuration" resource representation URI as specified in clause 7.8.1.2.3.3.1; or

- "VAL Services Configurations" collection resource representation URI as specified in clause 7.8.1.2.2.3.2. In the GET message to "VAL Services Configurations" collection resource, the service consumer may include the VAL Server ID of the requesting VAL server, list of identifiers identifying the "Individual VAL Services Configuration" resources, as query parameters.

Upon receiving the HTTP GET message as described above, if the service consumer is authorized to obtain the VAL Services Configuration information, then the IM server shall:

1. in the request to "VAL Services Configurations" collection resource representation URI, return the VAL Service Configurations, list of "VALServicesConfig" data type, matching the query parameters in the response message;

2. in the request to "Individual VAL Services Configuration" resource representation URI, return the VAL Service Configuration resource "VALServicesConfig" data type in the response message.

3. if errors occur when processing the request, the IM Server shall respond to the service consumer with an appropriate error response as specified in clause 7.1.3.5.

5.9.1.2.4 Update_Configuration

5.9.1.2.4.1 General

This service operation is used by a service consumer to udpate the list of VAL service specific information of the VAL server provisioned to the IM server.

5.9.1.2.4.2 Service consumer updating VAL service specific information using Update_Configuration service operation

To modify the VAL Services Configuration, the service consumer shall send either,

- HTTP PUT message, including the "VALServicesConfig" data type, to the IM server to the Resource URI identifying the "Individual VAL Services Configuration" resource representation, as specified in the clause 7.8.1.2.3.3.2. This request shall not replace valServerId property in the existing resource, or

- HTTP PATCH request message, including the "VALServicesConfigPatch" data type, to the "Individual VAL Services Configuration" resource URI as specified in clause 7.8.1.2.3.3.3, to partially update the VAL Service Configuration. The body of the HTTP PATCH request message shall include the requested modifications as specified in clause 7.8.1.2.3.3.3.

Upon receiving the HTTP PUT / PATCH message, if the service consumer is authorized to modify/update the VAL services configuration information, then the IM server shall:

1. update/modify the resource identified by the Resource URI of the "Individual VAL Services Configuration" with the VAL Services information received in the request;

2. respond to the service consumer with HTTP "200 OK" with the response body containing the updated "Individual VAL Services Configuration" in "VALServicesConfig" data type, in the response or a 204 No Content status code;

3. if errors occur when processing the request, the IM Server shall respond to the service consumer with an appropriate error response as specified in clause 7.1.3.5.

5.9.1.2.5 Delete_Configuration

5.9.1.2.5.1 General

This service operation is used by a service consumer to delete the list of VAL service specific information of the VAL server provisioned to the IM server.

5.9.1.2.5.2 Service consumer deleting VAL service specific information using Delete_Configuration service operation

To delete a VAL Services Configuration information, the service consumer shall send a HTTP DELETE message to the IM server to its "Individual VAL Services Configuration" resource representation in the IM server as specified in

clause 7.8.1.2.3.3.4. Upon receiving the HTTP DELETE message, if the service consumer is authorized to delete the VAL Services Configuration, then the IM server shall:

1. delete the resource representation pointed by the Individual VAL Service Configuration resource identifier;
2. if errors occur when processing the request, the IM Server shall respond to the service consumer with an appropriate error response as specified in clause 7.1.3.5.

5.10 Data Delivery APIs

SEALDD APIs are defined in 3GPP TS 29.548 [35].

5.11 Application data analytics enablement service configuration APIs

5.11.1 SS_ADAE_VALPerformanceAnalytics API

5.11.1.1 Service Description

5.11.1.1.1 Overview

The SS_ADAE_VALPerformanceAnalytics API, as defined 3GPP TS 23.436 [38], allows the VAL server via ADAE-S reference point to subscribe to VAL performance analytics event to the ADAE Server.

5.11.1.2 Service Operations

5.11.1.2.1 Introduction

The service operation defined for SS_ADAE_VALPerformanceAnalytics API is shown in the table 5.11.1.2.1-1.

Table 5.11.1.2.1-1: Operations of the SS_ADAE_VALPerformanceAnalytics API

Service operation name	Description	Initiated by
Subscribe_VAL_Performance_Analytics	This service operation is used by VAL server to subsribe to the event of the VAL performance analytics.	VAL Server
Notify_VAL_Performance_Analytics	This service operation is used by ADAE Server to notify about the VAL performance analytics.	ADAE Server
Unsubscribe_VAL_Performance_Analytics	This service operation is used by VAL server to unsubsribe from the event of the VAL performance analytics.	VAL server

5.11.1.2.2 Subscribe_VAL_Performance_Analytics

5.11.1.2.2.1 General

This service operation is used by the VAL server for VAL performance analytics event subscription to the ADAE Server.

5.11.1.2.2.2 Subscribing to VAL performance analytics event using Subscribe_VAL_Performance_Analytics service operation

To subscribe to VAL performance analytics event, the VAL server shall send an HTTP POST request with a Request-URI according to the pattern "{apiRoot}/ss-adae-pa/<apiVersion>/application-performance" and with a body containing data type AppPerfSub as defined in clause 7.10.1.4.2.2.

Upon receipt of the HTTP POST request, the ADAE Server shall:

1. verify the identity of the VAL server and determine if the VAL server is authorized to subscribe to the VAL performance analytics event; and
2. if the VAL server:
   a. is not authorized, the ADAE Server shall respond to the VAL server with an appropriate error status code; or
   b. is authorized, the ADAE Server shall create a new "Individual application performance event subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual application performance event subscription" and the response body including the AppPerfSub data structure containing a representation of the created resource as defined in clause 7.10.1.2.

5.11.1.2.3 Notify_VAL_Performance_Analytics

5.11.1.2.3.1 General

This service operation is used by the ADAE Server to send notification to the VAL server with the VAL performance analytics event subscription to the ADAE Server.

5.11.1.2.3.2 Notifying VAL performance analytics event using Notify_VAL_Performance_Analytics service operation

To notify VAL performance analytics event, the ADAE Server shall send an HTTP POST request with a Request-URI according to the pattern "{notiUri}" and with a body containing data type AppPerfNotif as defined in clause 7.10.1.4.2.3.

Upon receipt of the HTTP POST request, the VAL server shall respond to the ADAE Server with:

1. if the request is successfully processed, a "204 No Content" status code and process the event notification; or
2. if errors occur when processing the request, an appropriate error response as specified in clause 7.10.1.5.

5.11.1.2.4 Unsubscribe_VAL_Performance_Analytics

5.11.1.2.4.1 General

This service operation is used by the VAL server to unsubscribe from the VAL performance analytics event.

5.11.1.2.4.2 Unsubscribing from VAL performance analytics event using Unsubscribe_VAL_Performance_Analytics service operation

To unsubscribe from VAL performance analytics event, the VAL server shall send an HTTP DELETE request to the resource representing the event in the ADAE Server as specified in clause 7.10.1.2.3.2.

Upon receiving the HTTP DELETE request:

1. the ADAE Server shall verify the identity of the VAL server and check if the VAL server is authorized to unsubscribe from the VAL performance analytics event associated with the resource URI "{apiRoot}/ss-adae-pa/<apiVersion>/application-performance/{appPerfId}";
2. if the VAL server is authorized to unsubscribe from the VAL performance analytics event, the ADAE Server shall delete the resource pointed by the resource URI "{apiRoot}/ss-adae-pa/<apiVersion>/application-performance/{appPerfId}";

3. if the request is successfully processed, the ADAE Server shall respond to the VAL server with a "204 No Content" status code; and

4. if errors occur when processing the request, the ADAE Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.1.5.

5.11.2 SS_ADAE_SlicePerformanceAnalytics API

5.11.2.1 Service Description

5.11.2.1.1 Overview

The SS_ADAE_SlicePerformanceAnalytics API, as defined 3GPP TS 23.436 [38], allows the VAL server via ADAE-S reference point to subscribe to slice specific application performance analytics event to the ADAE Server.

5.11.2.2 Service Operations

5.11.2.2.1 Introduction

The service operation defined for SS_ADAE_SlicePerformanceAnalytics API is shown in the table 5.11.2.2.1-1.

Table 5.11.2.2.1-1: Operations of the SS_ADAE_SlicePerformanceAnalytics API

Service operation name	Description	Initiated by
Subscribe_Slice_Performance_Analytics	This service operation is used by VAL server to subsribe to the event of the slice-specific application performance analytics.	VAL Server
Notify_Slice_Performance_Analytics	This service operation is used by ADAE Server to notify about the slice-specific application performance analytics.	ADAE Server
Unsubscribe_Slice_Performance_Analytics	This service operation is used by VAL server to unsubsribe from the event of the slice-specific application performance analytics.	VAL server

5.11.2.2.2 Subscribe_Slice_Performance_Analytics

5.11.2.2.2.1 General

This service operation is used by the VAL server for slice-specific application performance analytics event subscription to the ADAE Server.

5.11.2.2.2.2 Subscribing to slice-specific application performance analytics event using Subscribe_Slice_Performance_Analytics service operation

To subscribe to slice specific application performance analytics event, the VAL server shall send an HTTP POST request with a Request-URI according to the pattern "{apiRoot}/ss-adae-sspa/<apiVersion>/slice-specific-application-performance" and with a body containing data type SliceAppPerfSub as defined in clause 7.10.2.4.2.2.

Upon receipt of the HTTP POST request, the ADAE Server shall:

1. verify the identity of the VAL server and determine if the VAL server is authorized to subscribe to the slice-specific application performance analytics event; and

2. if the VAL server:

   a. is not authorized, the ADAE Server shall respond to the VAL server with an appropriate error status code; or

   b. is authorized, the ADAE Server shall create a new "Individual slice specific application performance event subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual slice specific application performance event subscription" and the response body including the SliceAppPerfSub data structure containing a representation of the created resource as defined in clause 7.10.2.2.

5.11.2.2.3 Notify_Slice_Performance_Analytics

5.11.2.2.3.1 General

This service operation is used by the ADAE Server to send notification to the VAL server with the slice-specific application performance analytics event subscription to the ADAE Server.

5.11.2.2.3.2 Notifying slice-specific application performance analytics event using Notify_Slice_Performance_Analytics service operation

To notify slice-specific application performance analytics event, the ADAE Server shall send an HTTP POST request with a Request-URI according to the pattern "{notiUri}" and with a body containing data type SliceAppPerfNotif as defined in clause 7.10.2.4.2.3.

Upon receipt of the HTTP POST request, the VAL server shall respond to the ADAE Server with:

1. if the request is successfully processed, a "204 No Content" status code and process the event notification; or

2. if errors occur when processing the request, an appropriate error response as specified in clause 7.10.2.5.

5.11.2.2.4 Unsubscribe_Slice_Performance_Analytics

5.11.2.2.4.1 General

This service operation is used by the VAL server to unsubscribe from the slice-specific application performance analytics event.

5.11.2.2.4.2 Unsubscribing from slice-specific application performance analytics event using Unsubscribe_Slice_Performance_Analytics service operation

To unsubscribe from slice-specific application performance analytics event, the VAL server shall send an HTTP DELETE request to the resource representing the event in the ADAE Server as specified in clause 7.10.2.2.3.2.

Upon receiving the HTTP DELETE request:

1. the ADAE Server shall verify the identity of the VAL server and check if the VAL server is authorized to unsubscribe from the slice-specific application performance analytics event associated with the resource URI "{apiRoot}/ss-adae-sspa/<apiVersion>/slice-specific-application-performance/{ssAppPerfId}";

2. if the VAL server is authorized to unsubscribe from the slice-specific application performance analytics event, the ADAE Server shall delete the resource pointed by the resource URI "{apiRoot}/ss-adae-sspa/<apiVersion>/slice-specific-application-performance/{ssAppPerfId}";

3. if the request is successfully processed, the ADAE Server shall respond to the VAL server with a "204 No Content" status code; and

4. if errors occur when processing the request, the ADAE Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.2.5.

5.11.3 SS_ADAE_Ue2UePerformanceAnalytics API

5.11.3.1 Service Description

5.11.3.1.1 Overview

The SS_ADAE_Ue2UePerformanceAnalytics API, as defined in 3GPP TS 23.436 [38], allows VAL server via ADAE-S reference point to communicate with the ADAE Server for UE-to-UE session performance analytics retrieval including managing UE-to-UE session performance subscriptions.

5.11.3.2 Service Operations

5.11.3.2.1 Introduction

The service operations defined for the SS_ADAE_Ue2UePerformanceAnalytics API are shown in the table 5.11.3.2.1-1.

Table 5.11.3.2.1-1: Operations of the SS_ADAE_Ue2UePerformanceAnalytics API

Service operation name	Description	Initiated by
UE-to-UE_Performance_Analytics_Subscribe	This service operation is used by VAL server to subscribe to UE-to-UE performance analytics from SEAL servers.	VAL server
UE-to-UE_Performance_Analytics_Notify	This service operation is used by the SEAL Server to notify the VAL Server on UE-to-UE performance analytics events.	ADAE server
UE-to-UE_Performance_Analytics_Unsubscribe	This service operation is used by VAL server to unsubscribe to UE-to-UE performance analytics from SEAL servers.	VAL server

5.11.3.2.2 UE-to-UE_Performance_Analytics_Subscribe

5.11.3.2.2.1 General

This service operation is used by VAL server to subscribe to UE-to-UE performance analytics from ADAE Server.

5.11.3.2.2.2 VAL server subscribes for UE-to-UE performance analytics using UE-to-UE_Performance_Analytics_Subscribe

In order to subscribe to UE-to-UE performance analytics, the VAL server shall send an HTTP POST message to the ADAE server targeting the URI of the "UE-to-UE Session Performance Event Subscription" resource as specified in clause 7.10.3.2.2.3.1. The request body shall include the U2UPerfSub data structure as defined in clause 7.10.3.4.2.2.

Upon reception of the HTTP POST request message, the ADAE Server shall:

1. verify the identity of the VAL server and whether the VAL server is authorized to create an individual UE-to-UE session performance analytics event subscription at the ADAE Server;
2. if the VAL server is authorized, the ADAE Server shall create a new "Individual UE-to-UE Session Performance Event Subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual UE-to-UE Session Performance Event Subscription" resource and the response body including the U2UPerfSub data structure containing a representation of the created resource as defined in clause 7.10.3.4.2.2; and
3. if errors occur when processing the request, the ADAES Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.3.5.

5.11.3.2.3 UE-to-UE_Performance_Analytics_Notify

5.11.3.2.3.1 General

This service operation is used by the ADAE Server to notify the VAL server of UE-to-UE performance analytics events.

5.11.3.2.3.2 ADAE server notifies for UE-to-UE performance analytics events using UE-to-UE_Performance_Analytics_Notify

In order to notify the VAL server about UE-to-UE performance analytics events, the ADAE Server shall send an HTTP POST request message to the VAL Server targeting the notification URI provided during subscription creation as specified in clause 5.11.3.2.2.2.

Upon receiving the HTTP POST request message, the VAL Server shall:

1. process the UE-to-UE performance analytics events notification; and
2. upon success, respond to the ADAE Server with a "204 No Content" status code; and
3. if errors occur when processing the request, the VAL Server shall respond to the ADAE Server with an appropriate error response as specified in clause 7.10.3.5.

5.11.3.2.3.2 UE-to-UE_Performance_Analytics_Unsubscribe

5.11.3.2.3.2.1 General

This service operation is used by VAL server to unsubscribe to UE-to-UE performance analytics from the SEAL Server.

5.11.3.2.3.2.2 VAL server unsubscribes from the UE-to-UE performance analytics events using UE-to-UE_Performance_Analytics_Unsubscribe

In order to terminate an individual UE-to-UE session performance event subscription, the VAL server shall send an HTTP DELETE request message to the ADAE Server, on the corresponding "Individual UE-to-UE Session Performance Event Subscription" resource URI as specified in clause 7.10.3.2.3.3.2.

Upon reception of the HTTP DELETE request message, the LM server shall:

1. verify the identity of the VAL Server and check if the VAL Server is authorised to terminate the targeted "Individual UE-to-UE Session Performance Event Subscription" associated with the resource URI;
2. if the VAL Server is authorized to unsubscribe from UE-to-UE performance analytics events, the ADAE Server shall delete the related "Individual UE-to-UE Session Performance Event Subscription" subscription resource at the ADAE Server;
3. upon success, respond to the ADAE Server with a "204 No Content" status code; and
4. if errors occur when processing the request, the ADAE Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.3.5.

5.11.4 SS_ADAE_LocationAccuracyAnalytics API

5.11.4.1 Service Description

5.11.4.1.1 Overview

The SS_ADAE_LocationAccuracyAnalytics API, as defined 3GPP TS 23.436 [38], allows the VAL server via ADAE-S reference point to subscribe to location accuracy performance analytics event.

5.11.4.2 Service Operations

5.11.4.2.1 Introduction

The service operation defined for SS_ADAE_LocationAccuracyAnalytics API is shown in the table 5.11.4.2.1-1.

Table 5.11.4.2.1-1: Operations of the SS_ADAE_LocationAccuracyAnalytics API

Service operation name	Description	Initiated by
Subscribe_Location_Accuracy_Analytics	This service operation is used by VAL server to subsribe to the event of the location accuracy performance analytics.	VAL Server
Notify_Location_Accuracy_Analytics	This service operation is used by ADAE Server to notify about the location accuracy performance analytics.	ADAE Server
Unsubscribe_Location_Accuracy_Analytics	This service operation is used by VAL server to unsubsribe from the event of the location accuracy performance analytics.	VAL server

5.11.4.2.2 Subscribe_Location_Accuracy_Analytics

5.11.4.2.2.1 General

This service operation is used by the VAL server for location accuracy performance analytics event subscription to the ADAE Server.

5.11.4.2.2.2 Subscribing to location accuracy performance analytics event using Subscribe_Location_Accuracy_Analytics service operation

To subscribe to location accuracy performance analytics event, the VAL server shall send an HTTP POST request with a Request-URI according to the pattern "{apiRoot}/ss-adae-laa/<apiVersion>/location-accuracy" and with a body containing data type LocAccurSub as defined in clause 7.10.4.4.2.2.

Upon receipt of the HTTP POST request, the ADAE Server shall:

1. verify the identity of the VAL server and determine if the VAL server is authorized to subscribe to the location accuracy performance analytics event; and
2. if the VAL server:
   a. is not authorized, the ADAE Server shall respond to the VAL server with an appropriate error status code; or
   b. is authorized, the ADAE Server shall create a new "Individual location accuracy event subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual location accuracy event subscription" and the response body including the LocAccurSub data structure containing a representation of the created resource as defined in clause 7.10.4.2.

5.11.4.2.3 Notify_Location_Accuracy_Analytics

5.11.4.2.3.1 General

This service operation is used by the ADAE Server to send notification to the VAL server with the location accuracy performance analytics event subscription to the ADAE Server.

5.11.4.2.3.2 Notifying location accuracy performance analytics event using Notify_Location_Accuracy_Analytics service operation

To notify location accuracy performance analytics event, the ADAE Server shall send an HTTP POST request with a Request-URI according to the pattern "{notiUri}" and with a body containing data type LocAccurNotif as defined in clause 7.10.4.4.2.3.

Upon receipt of the HTTP POST request, the VAL server shall respond to the ADAE Server:

1. if the request is successfully processed, a "204 No Content" status code and process the event notification; or
2. if errors occur when processing the request, an appropriate error response as specified in clause 7.10.4.5.

5.11.4.2.4 Unsubscribe_Location_Accuracy_Analytics

5.11.4.2.4.1 General

This service operation is used by the VAL server to unsubscribe from the location accuracy performance analytics event.

5.11.4.2.4.2 Unsubscribing from location accuracy performance analytics event using Unsubscribe_Location_Accuracy_Analytics service operation

To unsubscribe from location accuracy performance analytics event, the VAL server shall send an HTTP DELETE request to the resource representing the event in the ADAE Server as specified in clause 7.10.4.2.3.2.

Upon receiving the HTTP DELETE request:

1. the ADAE Server shall verify the identity of the VAL server and check if the VAL server is authorized to unsubscribe from the location accuracy performance analytics event associated with the resource URI "{apiRoot}/ss-adae-laa/<apiVersion>/location-accuracy/{locAccId}";
2. if the VAL server is authorized to unsubscribe from the location accuracy performance analytics event, the ADAE Server shall delete the resource pointed by the resource URI "{apiRoot}/ss-adae-laa/<apiVersion>/location-accuracy/{locAccId}";
3. if the request is successfully processed, the ADAE Server shall respond to the VAL server with a "204 No Content" status code; and
4. if errors occur when processing the request, the ADAE Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.4.5.

5.11.5 SS_ADAE_ServiceApiAnalytics API

5.11.5.1 Service Description

5.11.5.1.1 Overview

The SS_ADAE_ServiceApiAnalytics API, as defined 3GPP TS 23.436 [38], allows the VAL server via ADAE-S reference point to subscribe to service API analytics event to the ADAE Server.

5.11.5.2 Service Operations

5.11.5.2.1 Introduction

The service operation defined for SS_ADAE_ServiceApiAnalytics API is shown in the table 5.11.5.2.1-1.

Table 5.11.5.2.1-1: Operations of the SS_ADAE_ServiceApiAnalytics API

Service operation name	Description	Initiated by
Subscribe_Service_API_Analytics	This service operation is used by VAL server to subsribe to the event of the service API analytics.	VAL Server
Notify_Service_API_Analytics	This service operation is used by ADAE Server to notify about the service API analytics.	ADAE Server
Unsubscribe_Service_API_Analytics	This service operation is used by VAL server to unsubsribe from the event of the service API analytics.	VAL Server

5.11.5.2.2 Subscribe_Service_API_Analytics

5.11.5.2.2.1 General

This service operation is used by the VAL server for service API analytics event subscription to the ADAE Server.

5.11.5.2.2.2 Subscribing to service API analytics event using Subscribe_Service_API_Analytics service operation

To subscribe to service API analytics event, the VAL server shall send an HTTP POST request with a Request-URI according to the pattern "{apiRoot}/ss-adae-sa/<apiVersion>/service-api" and with a body containing data type SrvApiSub as defined in clause 7.10.5.4.2.2.

Upon receipt of the HTTP POST request, the ADAE Server shall:

1. verify the identity of the VAL server and determine if the VAL server is authorized to subscribe to the service API analytics event; and
2. if the VAL server:
   a. is not authorized, the ADAE Server shall respond to the VAL server with an appropriate error status code; or
   b. is authorized, the ADAE Server shall create a new "Individual service API event subscription" resource and respond to the VAL server with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual service API event subscription" and the response body including the SrvApiSub data structure containing a representation of the created resource as defined in clause 7.10.5.2.

5.11.5.2.3 Notify_Service_API_Analytics

5.11.5.2.3.1 General

This service operation is used by the ADAE Server to send notification to the VAL server with the service API analytics event subscription to the ADAE Server.

5.11.5.2.3.2 Notifying service API analytics event using Notify_Service_API_Analytics service operation

To notify service API analytics event, the ADAE Server shall send an HTTP POST request with a Request-URI according to the pattern "{notiUri}" and with a body containing data type SrvApiNotif as defined in clause 7.10.5.4.2.3.

Upon receipt of the HTTP POST request, the VAL server shall respond to the ADAE Server with:

1. if the request is successfully processed, a "204 No Content" status code and process the event notification; or
2. if errors occur when processing the request, an appropriate error response as specified in clause 7.10.5.5.

5.11.5.2.4 Unsubscribe_Service_API_Analytics

5.11.5.2.4.1 General

This service operation is used by the VAL server to unsubscribe from the service API analytics event.

5.11.5.2.4.2 Unsubscribing from service API analytics event using Unsubscribe_Service_API_Analytics service operation

To unsubscribe from service API analytics event, the VAL server shall send an HTTP DELETE request to the resource representing the event in the ADAE Server as specified in clause 7.10.5.2.3.2.

Upon receiving the HTTP DELETE request:

1. the ADAE Server shall verify the identity of the VAL server and check if the VAL server is authorized to unsubscribe from the service API analytics event associated with the resource URI "{apiRoot}/ss-adae-sa/<apiVersion>/service-api/{srvApiId}";
2. if the VAL server is authorized to unsubscribe from the service-api analytics event, the ADAE Server shall delete the resource pointed by the resource URI "{apiRoot}/ss-adae-sa/<apiVersion>/service-api/{srvApiId}";
3. if the request is successfully processed, the ADAE Server shall respond to the VAL server with a "204 No Content" status code; and
4. if errors occur when processing the request, the ADAE Server shall respond to the VAL Server with an appropriate error response as specified in clause 7.10.5.5.

5.11.6 SS_ADAE_SliceUsagePatternAnalytics API

5.11.6.1 Service Description

5.11.6.1.1 Overview

The SS_ ADAE_SliceUsagePatternAnalytics API allows the VAL server and the NSCE server to subscribe to slice usage pattern analytics events and to request slice usage statistics.

5.11.6.2 Service Operations

5.11.6.2.1 Introduction

The service operations defined for the SS_ ADAE_SliceUsagePatternAnalytics API is shown in table 5.11.6.2.1-1.

Table 5.11.6.2.1-1: Operations of the SS_ADAE_SliceUsagePatternAnalytics API

Service operation name	Description	Initiated by
Subscribe_Slice_Usage_Pattern_Analytics	This service operation is used by the VAL server or the NSCE server to subsribe to the slice usage pattern analytics.	VAL Server, NSCE server
Notify_Slice_Usage_Pattern_Analytics	This service operation is used by the ADAE server to notify about slice usage pattern analytics.	ADAE server
Unsubscribe_Slice_Usage_Pattern_Analytics	This service operation is used by the VAL server or the NSCE server to unsubscribe from slice usage pattern analytics.	VAL server, NSCE server
Get_Slice_Usage_Stats	This service operation is used by the VAL server or the NSCE server to request slice usage statistics.	VAL server, NSCE server

5.11.6.2.2 Subscribe_Slice_Usage_Pattern_Analytics

5.11.6.2.2.1 General

This service operation is used by the service consumer to subscribe to slice usage pattern analytics to the ADAE server.

5.11.6.2.2.2 Subscribing to slice usage pattern analytics using the Subscribe_Slice_Usage_Pattern_Analytics service operation

To subscribe to slice usage pattern analytics, the service consumer shall send an HTTP POST request to the ADAE server with a Request-URI according as "{apiRoot}/ss-adae-sup/<apiVersion>/slice-usage-pattern", with the body containing the data type SUPSub as defined in clause 7.10.6.4.2.2.

Upon receipt of the HTTP POST request, the ADAES shall:

1. verify the identity of the service consumer and determine if the service consumer is authorized to subscribe to the slice usage pattern analytics event; and
2. if the service consumer:
   a. is not authorized, the ADAE server shall respond with an appropriate error status code; or
   b. is authorized, the ADAE server shall create a new "Individual slice usage pattern event subscription" resource and respond to the service consumer with an HTTP "201 Created" status code, including a Location header field containing the URI for the created resource and the response body including the SUPSub data structure containing a representation of the created resource.

If errors occur when processing the HTTP POST request, the ADAE server shall send an HTTP error response as specified in clause 7.10.6.5.

5.11.6.2.3 Notify_Slice_Usage_Pattern_Analytics

5.11.6.2.3.1 General

This service operation is used by the ADAE server to send a notification about slice usage pattern analytics to a previously subscribed service consumer.

NOTE: The steps performed by the ADAE server for data collection, interaction with other entities, and generation of the analytics, which take place between the subscription to slice usage pattern analytics and the sending of the respective notification, are described in 3GPP TS 23.436 [38].

5.11.6.2.3.2 Notifying slice usage pattern analytics using the Notify_Slice_Usage_Pattern_Analytics service operation

To notify about slice usage pattern analytics, the ADAE server shall send an HTTP POST request to the service consumer at the notification URI that was provided during the subscription, with a body containing the data type SUPNotif as defined in clause 7.10.6.4.2.3.

Upon receipt of the HTTP POST request, the service consumer shall process the event notification and in case of success it shall respond with the HTTP "204 No Content" status code.

If errors occur when processing the HTTP POST request, the service consumer shall send an HTTP error response as specified in clause 7.10.6.5.

5.11.6.2.4 Unsubscribe_Slice_Usage_Pattern_Analytics

5.11.6.2.4.1 General

This service operation is used by the service consumer to unsubscribe from slice usage pattern analytics events.

5.11.6.2.4.2 Unsubscribing from slice usage pattern analytics events using the Unsubscribe_Slice_Usage_Pattern_Analytics service operation

To unsubscribe from slice usage pattern analytics events, the service consumer shall send to the ADAE server an HTTP DELETE request with "{apiRoot}/ss-adae-sup/<apiVersion>/slice-usage-pattern/{subscriptionId}" as Resource URI, where "{subscriptionId}" is the identifier of the existing subscription that is to be deleted.

Upon receiving the HTTP DELETE request, if the ADAE sever authorizes the service consumer and successfully performs the deletion of the indicated subscription, the ADAE server shall remove the corresponding subscription and respond with the HTTP "204 No Content" status code.

If errors occur when processing the HTTP DELETE request, the ADAE server shall send an HTTP error response as specified in clause 7.10.6.5.

5.11.6.2.5 Get_Slice_Usage_Stats

5.11.6.2.5.1 General

This service operation is used by the service consumer to retrieve slice usage statistics.

5.11.6.2.5.2 Retrieving slice usage statistics using the Get_Slice_Usage_Stats service operation

To retrieve slice usage statistics, the service consumer shall invoke the Subscribe_Slice_Usage_Pattern_Analytics service operation as described in 5.11.6.2.2.2, requesting immediate and one-time reporting of historical statistics as described in clause 7.10.6.4.2.2.

5.11.7 SS_ADAE_EdgeLoadAnalytics API

5.11.7.1 Service Description

5.11.7.1.1 Overview

The SS_ADAE_EdgeLoadAnalytics API corresponding to SS_ ADAE_edge_analytics API defined in 3GPP TS 23.436 [38], allows a VAL server via ADAE-S reference point or EAS to subscribe and unsubscribe from edge load events to receive notifications from the ADAE server for edge load analytics and for getting notified when analytics are derived, or to request and get response from the ADAE server for edge load analytics data.

5.11.7.2 Service Operations

5.11.7.2.1 Introduction

The service operations defined for the SS_ADAE_EdgeLoadAnalytics API are shown in the table 5.11.7.2.1-1.

Table 5.11.7.2.1-1: Operations of the SS_ADAE_EdgeLoadAnalytics API

Service operation name	Description	Initiated by
Subscribe_Edge_Load	This service operation is used by analytics consumer (VAL Server, EAS, EES) to subscribe for edge load events from ADAE servers.	VAL Server, EAS, EES
Unsubscribe_Edge_Load	This service operation is used by analytics consumer to unsubscribe for edge load events from ADAE servers.	VAL Server, EAS, EES
Notify_Edge_Load	This service operation is used by ADAE servers to send the notifications to the analytics consumer.	ADAES
Get_Edge_Load_Data	This service operation is used by analytics consumer to retrieve edge load analytics data from ADAE server.	VAL Server, EAS, EES

5.11.7.2.2 Subscribe_Edge_Load

5.11.7.2.2.1 General

This service operation is used by an analytics consumer (VAL server, EAS, EES) to subscribe to the events for edge load analytics and for getting notified when analytics are derived.

5.11.7.2.2.2 Subscribing to edge load events using Subscribe_Edge_Load service operation

To subscribe to edge load events, the analytics consumer (VAL server, EAS, EES) shall send an HTTP POST message to the ADAE server. The body of the HTTP POST message shall include EdgeSub data type as specified in clause 7.10.7.4.2.2.

Upon receiving the above described HTTP POST message, the ADAE Server shall:

1. verify the identity of the analytics consumer and check if the Consumer is authorized to subscribe to the events mentioned in the HTTP POST message;
2. if the analytics consumer is authorized to subscribe to the events, the ADAE server shall:
   a. verify the provided identifier(s) in the request;
   b. upon successful verification of the provided identifier(s) and successful processing of the request, create a new resource as specified in clause 7.10.7.2.1;
   c. return the created resource representation and the created Resource URI in the response message; and
   d. if the ADAE server is unable to satisfy the request, the ADAE server shall respond to the analytics consumer with an appropriate error status code as defined in clause 7.10.7.5.

5.11.7.2.3 Notify_Edge_Load

5.11.7.2.3.1 General

This service operation is used by the ADAE server to send notifications to the analytics consumer.

5.11.7.2.3.2 Notifying edge load events using Notify_Edge_Load service operation

To notify the edge load events, the ADAE 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 Resource URI.

Upon receiving the HTTP POST request message, the VAL Server shall:

1. process the edge load analytics events notification;
2. upon success, respond to the ADAE Server with a "204 No Content" status code; and
3. if errors occur when processing the request, the VAL Server shall respond to the ADAE Server with an appropriate error response as specified in clause 7.10.3.5.

5.11.7.2.4 Unsubscribe_Edge_Load

5.11.7.2.4.1 General

This service operation is used by an analytics consumer to unsubscribe from the edge load events for edge load analytics.

5.11.7.2.4.2 Unsubscribing from edge load events using Unsubscribe_Edge_Load service operation

To unsubscribe for edge load events, the analytics consumer shall send an HTTP DELETE message to the resource representing the event in the ADAE server as specified in clause 7.10.7.2.3.3.2.

Upon receiving the HTTP DELETE message, the ADAE server shall:

1. verify the identity of the analytics consumer and check if the analytics consumer is authorized to Unsubscribe from the event associated with the Resource URI; and
2. if the analytics consumer is authorized to unsubscribe from the events, the ADAE server shall delete the resource pointed by the Resource URI.

5.11.7.2.5 Get_Edge_Load_Data

5.11.7.2.5.1 General

This service operation is used by the service consumer to retrieve edge load analytics data.

5.11.7.2.5.2 Retrieving edge load analytics data using the Get_Edge_Load_Data service operation

To retrieve edge load analytics data, the service consumer shall invoke the Subscribe_Edge_Load service operation as described in 5.11.7.2.2.2, requesting immediate and one-time reporting of edge load analytics data as described in clause 7.10.7.4.2.2.

5.11.8 SS_AADRF_DataManagement API

5.11.8.1 Service Description

5.11.8.1.1 Overview

The SS_AADRF_DataManagement API corresponding to SS_AADRF_Data_Collection, SS_ AADRF_Historical_serviceAPI_logs, SS_ AADRF_NetworkSlice_data, SS_AADRF_EdgeData_Collection and SS_AADRF_Location_Accuracy service as defined in 3GPP TS 23.436 [38], is provided by the Application layer - Analytical Data Repository Function (A-ADRF) and allows ADAE server to retrieve the offline analytics/data from the A-ADRF.

5.11.8.2 Service Operations

5.11.8.2.1 Introduction

The following services are specified for the A-ADRF.

Table 5.11.8.2.1-1: Services provided by A-ADRF

Service Name	Description	Service Operations	Operation Semantics	Example Consumer(s)
SS_AADRF_DataManagement (NOTE)	This service enables the NF service consumers to subscribe to/unsubscribe from notifications for offline analytics/data from the A-ADRF.	Subscribe Unsubscribe Notify	Subscribe / Notify	ADAE server
NOTE: This service implements the AADRF_Historical_serviceAPI_logs, SS_ AADRF_NetworkSlice_data and SS_AADRF_Location_Accuracy services as specified in 3GPP TS 23.436 [38] by using immediate and one-time reporting requirement.				

5.11.8.2.2 SS_AADRF_DataManagement_Subscribe service operation

5.11.8.2.2.1 General

This service operation is used by an ADAE server to subscribe the offline analytics/data from the A-ADRF.

5.11.8.2.2.2 Subscribing to the offline analytics/data using the SS_AADRF_DataManagement_Subscribe service operation

In order to subscribe to the offline analytics/data from the A-ADRF, the consumer shall send an HTTP POST message to the A-ADRF, with "{apiRoot}/ss-aadrf-datamanagement/<apiVersion>/subscriptions" as Resource URI, to create a subscription for an "Individual A-ADRF Data Management Subscription" according to the DataManageSub data type contained in the message body as defined in clause 7.10.8.5.2.2.

Upon receiving the HTTP POST message as described above, the A-ADRF shall:

1. verify the identity of the consumer and check if the consumer is authorized to retrieve the requested analytics/data;

2. if the consumer is authorized, the A-ADRF shall create a new "Individual A-ADRF Data Management Subscription" resource and respond to the consumer with an HTTP "201 Created" status code, including a Location header field containing the URI for the created "Individual A-ADRF Data Management Subscription" resource and the response body including the NaadrfDataManageSub data structure containing a representation of the created resource as defined in clause 7.10.8.5.2.2;

and

3. if the A-ADRF is unable to satisfy the request, the A-ADRF shall respond to the consumer with an appropriate error status code as specified in clause 7.10.8.5.

5.11.8.2.3 SS_AADRF_DataManagement_Notify service operation

5.11.8.2.3.1 General

This service operation is used by an A-ADRF to send a notification about the offline analytics/data to a previously subscribed service consumer.

5.11.8.2.3.2 Notifying the offline analytics/data using the SS_AADRF_DataManagement_Notify service operation

To notify about offline analytics/data, the A-ADRF shall send an HTTP POST request to the service consumer at the notification URI that was provided during the subscription, with a body containing the data type DataManageNotification as defined in clause 7.10.8.5.2.6.

Upon receipt of the HTTP POST request, the service consumer shall process the event notification and in case of success it shall respond with the HTTP "204 No Content" status code.

If errors occur when processing the HTTP POST request, the service consumer shall send an HTTP error response as specified in clause 7.10.8.6.

If the service consumer determines the received HTTP POST request needs to be redirected, the service consumer shall send an HTTP redirect response as defined in clause 7.10.8.4.2.

5.11.8.2.4 SS_AADRF_DataManagement_Unsubscribe

5.11.8.2.4.1 General

This service operation is used by the service consumer to unsubscribe from the offline analytics/data events.

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], 3GPP TS 23.433 [34] (for SEALDD) and 3GPP TS 23.435 [41] (for NSCE).

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 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 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 9112 [5], IETF RFC 9110 [6] and IETF RFC 9111 [9]) over TLS is mandatory and support of HTTP/2 (IETF RFC 9113 [12]) over TLS is recommended.

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

The JSON objects defined in clause 5.2.3 of 3GPP TS 29.122 [3] for the HTTP PATCH request shall be supported.

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 (see clause 5.2.5.2 of 3GPP TS 29.122 [3]);
- may support testing delivery of notifications (see clause 5.2.5.3 of 3GPP TS 29.122 [3]); and
- may support the delivery of notification using WebSocket protocol (see IETF RFC 6455 [4] and clause 5.2.5.4 of 3GPP TS 29.122 [3]),

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 and error handling described in clause 5.2.6 of 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 and the HTTP custom 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

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

Figure 7.1.1.2.1-1 depicts the resource URIs structure for the SS_LocationReporting API.

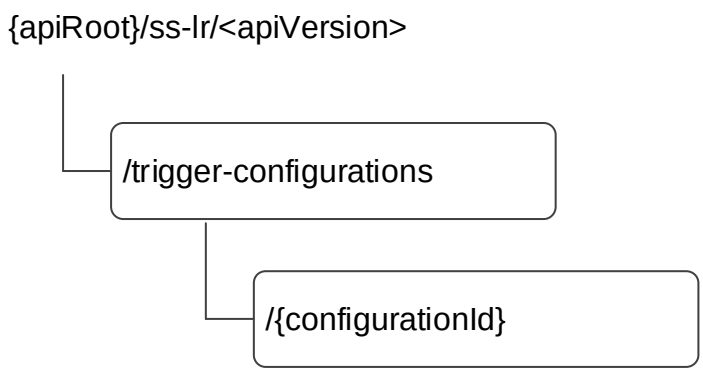

Figure 7.1.1.2.1-1: Resource URI structure of the SS_LocationReporting API

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}.
		PATCH	Partially modifies 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

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
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.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

Table 7.1.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

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.
n/a			204 No Content	The location reporting configuration updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

Table 7.1.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

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.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.1.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

Table 7.1.1.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

7.1.1.2.3.3.4 PATCH

This method shall support the URI query parameters specified in table 7.1.1.2.3.3.4-1.

Table 7.1.1.2.3.3.4-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.1.1.2.3.3.4-2 and the response data structures and response codes specified in table 7.1.1.2.3.3.4-3.

Table 7.1.1.2.3.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
LocationReportConfigurationPatch	M	1	Contains the modifications to be applied to the Individual SEAL Location Reporting Configuration resource.

Table 7.1.1.2.3.3.4-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocationReportConfiguration	M	1	200 OK	Individual SEAL Location Reporting Configuration resource is modified successfully and representation of the modified Individual SEAL Location Reporting Configuration resource is returned.
n/a			204 No Content	The Individual SEAL Location Reporting Configuration resource is updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.1.1.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.1.1.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

7.1.1.2.3.4 Resource Custom Operations

None.

7.1.1.3 Notifications

7.1.1.3.1 General

Table 7.1.1.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Location Reporting Notification	{notifUri}	POST	Notify on location event.

7.1.1.3.2 Location Trigger Event Notification

7.1.1.3.2.1 Description

7.1.1.3.2.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.1.1.3.2.2-1.

Table 7.1.1.3.2.2-1: 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 7.1.1.3.2.2-2 and the response data structures and response codes specified in table 7.1.1.3.2.2-3.

Table 7.1.1.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationReport	M	1	Represents the reported location event.

Table 7.1.1.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The notification is successfully received.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.1.1.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contans an alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

Table 7.1.1.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

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
InsideOutsideInd	7.1.1.4.3.3	Represents a desired condition of the location reporting, e.g., inside or outside the given area.	TriggeringCriteria
LocChangeCond	7.1.1.4.3.4	Represents a desired condition of the requested location change	TriggeringCriteria
LocationReport	7.1.1.4.2.5	Represents the location trigger report.	NotifSupport
LocationReportConfiguration	7.1.1.4.2.2	Represents the location reporting configuration information.	
LocationReportConfigurationPatch	7.1.1.4.2.3	Represents the requested modifications to the location reporting configuration information. Used to partially update Individual SEAL Location Reporting Configuration resource.	PatchUpdate
TriggeringCriteria	7.1.1.4.2.4	Represents the location reporting triggering criteria.	TriggeringCriteria

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]	Used to represent the desired level of accuracy of the requested location information.	
DateTime	3GPP TS 29.571 [21]	Used to represent the subscription duration.	
DurationSec	3GPP TS 29.571 [21]	Used to represent the time interval between successive location reports.	
ScheduledCommunicationTime	3GPP TS 29.571 [21]	Used to represent the scheduled location reporting time interval.	TriggeringCriteria
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.	
ValSvcAreaId	Clause 7.1.3.4.3.2	Used to represent the VAL service area identifier.	ValSrvArea
Uri	3GPP TS 29.122 [3]	Represents a URI.	NotifSupport

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	ValTarget Ue	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 minimum time interval between successive location reports.	
notifUri	Uri	C	0..1	Represents the notification URI. This attribute shall be provided when the "NotifSupport" feature is supported.	NotifSupport
accuracy	Accuracy	O	0..1	Represents the desired level of accuracy of the requested location information.	
triggCriteria	Triggering Criteria	O	0..1	Represents the location report triggering criteria based on the VAL service area information.	TriggeringCriteria
valSvcAreaIds	array(ValSvcAreaId)	O	1..N	Represents the VAL service area ID(s).	ValSrvArea
suppFeat	Supported Features	C	0..1	Used to negotiate the applicability of optional features as defined in clause 7.1.1.6. This attribute shall be provided only if feature negotiation needs to take place.	
report	LocationReport	O	0..1	Represents location report. This attribute may be present only in the response to a Location Trigger creation/update request.	NotifSupport

7.1.1.4.2.3 Type: LocationReportConfigurationPatch

Table 7.1.1.4.2.3-1: Definition of type LocationReportConfigurationPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
valTgtUe	ValTarget Ue	O	1	Represents the VAL User ID or VAL UE ID to which the location reporting applies.	
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 minimum time interval between successive location reports.	
notifUri	Uri	O	0..1	Represents the notification URI.	NotifSupport
accuracy	Accuracy	O	0..1	Represents the desired level of accuracy of the requested location information.	
valSvcAreaIds	array(ValSvcAreaId)	O	1..N	Represents the VAL service area ID(s).	ValSrvArea
triggCriteria	Triggering Criteria	O	0..1	Represents the location report triggering criteria.	TriggeringCriteria

7.1.1.4.2.4 Type: TriggeringCriteria

Table 7.1.1.4.2.4-1: Definition of type TriggeringCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
reportingMode	NotificationMethod	M	1	The indication of the requested reporting mode: periodic or event-triggered. The "ONE_TIME" value is not applicable for this attribute.	
repPer	DurationSec	C	0..1	Indicates the reporting periodicy. This attribute shall be present if the "reportingMode" attribute is set to the "PERIODIC".	
locChgCond	LocChangeCond	C	0..1	Identifies the location change condition for the event-triggered reporting. This attribute shall be present if the "reportingMode" attribute is set to the "ON_EVENT_DETECTION".	
ioInd	InsideOutsideInd	O	0..1	Indicates the condition when the reporting shall occur.	
repSchedules	array(ScheduledCommunicationTime)	O	1..N	Indicates the requested reporting schedule, e.g., day(s) of the week and/or time period(s) for the location reporting.	

7.1.1.4.2.5 LocationReport

Table 7.1.1.4.2.5-1: Definition of type LocationReport

Attribute name	Data type	P	Cardinality	Description	Applicability
subscriptionId	string	M	1	Represents the identifier of the subscription to which the location reporting notification is related.	
valTgtUe	ValTarget Ue	M	1	VAL User ID or UE ID whose location information is notified.	
locInfo	LocationInfo	M	1	The location information associated with the valTgtUe.	
timeStamp	DateTime	O	0..1	Timestamp of the location report.	

7.1.1.4.3 Simple data types and enumerations

7.1.1.4.3.1 Introduction

This clause defines simple data types and enumerations that are referenced from data structures defined in the previous clauses. In addition, data types and enumerations defined in clause 6.2.1 can be referenced.

7.1.1.4.3.2 Simple data types

The simple data types defined in table 7.1.1.4.3.2-1 shall be supported.

Table 7.1.1.4.3.2-1: Simple data types

Type name	Description

7.1.1.4.3.3 Enumeration: InsideOutsideInd

The enumeration InsideOutsideInd represents a desired condition of the location reporting, e.g., inside or outside the given area. It shall comply with the provisions defined in table 7.1.1.4.3.3-1.

Table 7.1.1.4.3.3-1: Enumeration InsideOutsideInd

Enumeration value	Description	Applicability
INSIDE	Indicates that the reporting shall occur when the UE is inside the given location.	
OUTSIDE	Indicates that the reporting shall occur when the UE is outside the given location.	

7.1.1.4.3.4 Enumeration: LocChangeCond

The enumeration LocChangeCond represents a desired condition of the requested location change. It shall comply with the provisions defined in table 7.1.1.4.3.4-1.

Table 7.1.1.4.3.4-1: Enumeration LocChangeCond

Enumeration value	Description	Applicability
CELL	The condition is cell change.	
NODEB	The condition is eNodeB or gNodeB change.	
TA_RA	The condition is TA or RA change.	
WLAN_AN	The condition is WLAN access network change (e.g., SSID or BSSID change).	
CIVIC_ADDR	The condition is civic address change.	
GPS	The condition is GPS coordinate change. (NOTE)	
SAI	The condition is SAI change.	
ECGI	The condition is ECGI change.	
RAT	The condition is RAT change.	
VAL_SERVICE_AREA	The condition is VAL service area change.	ValSrvArea
NOTE: Care needs to be taken with regards to load and signalling cost when using the "GPS" condition.		

7.1.1.5 Error Handling

7.1.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.1.1.5.2 Protocol Errors

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

7.1.1.5.3 Application Errors

The application errors defined for SS_LocationReporting API are listed in table 7.1.1.5.3-1.

Table 7.1.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

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
1	PatchUpdate	Indicates the support of the PATCH method for updating an Individual SEAL Location Reporting Configuration resource.
2	ValSrvArea	This feature indicates the support of VAL service area ID functionality as part of phase-3 of the enhancements to the SEAL framework. The following functionalities are supported: - Support the usage of the VAL service area identifier to identify a VAL service area.
3	TriggeringCriteria	Indicates the support of the triggering criteria for the location reporting trigger as a part of the enhancements to the SEAL framework. The following functionalities are supported: - Support location reporting based on triggering criteria information.
4	NotifSupport	Indicates the support of the notification service operation.

7.1.2 SS_LocationAreaInfoRetrieval API

7.1.2.1 API URI

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

- The <apiName> shall be "ss-lair".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.1.2.2.

7.1.2.2 Resources

7.1.2.2.1 Overview

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

Figure 7.1.2.2.1-1 depicts the resource URIs structure for the SS_LocationAreaInfoRetrieval API.

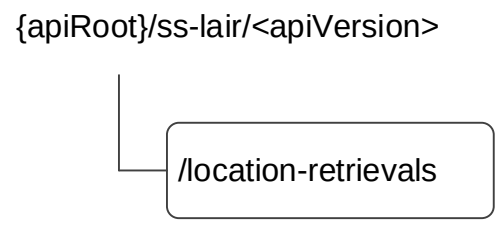

Figure 7.1.2.2.1-1: Resource URI structure of the SS_LocationAreaInfoRetrieval API

Table 7.1.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.1.2.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
Location Information	/location-retrievals	GET	Obtains the UE(s) information in an application defined proximity range of a location.

7.1.2.2.2 Resource: Location Information

7.1.2.2.2.1 Description

The Location Information resource represents the collection of UE(s) location information at the location management server.

7.1.2.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-lair/<apiVersion>/location-retrievals**

This resource shall support the resource URI variables defined in the table 7.1.2.2.2.2-1.

Table 7.1.2.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.1.2.2.2.3 Resource Standard Methods

7.1.2.2.2.3.1 GET

This operation obtains the UE(s) information in an application defined proximity range of a location. This method shall support the URI query parameters specified in table 7.1.2.2.2.3.1-1.

Table 7.1.2.2.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
location-info	LocationInfo	M	1	Location information around which the UE(s) information is requested. (NOTE)	
val-svc-area-id	ValSvcAreaId	O	0..1	Contains the identifier of the VAL service area around which the UE(s) information is requested. (NOTE)	ValSrvArea

range	Float	M	1	The range information over which the UE(s) information is required, expressed in meters. Minimum = 0	
NOTE: If the "ValSrvArea" feature is supported and the "val-svc-area-id" query parameter is provided, then the LM server shall ignore the "location-info" query parameter.					

This method shall support the request data structures specified in table 7.1.2.2.2.3.1-2 and the response data structures and response codes specified in table 7.1.2.2.2.3.1-3.

Table 7.1.2.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.2.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(LMInformation)	O	1..N	200 OK	The UE(s) information in an application defined proximity range of a location
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative location management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.2.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

Table 7.1.2.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

7.1.2.2.2.4 Resource Custom Operations

None.

7.1.2.3 Notifications

None.

7.1.2.4 Data Model

7.1.2.4.1 General

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

Table 7.1.2.4.1-1 specifies the data types defined specifically for the SS_LocationAreaInfoRetrieval API service.

Table 7.1.2.4.1-1: SS_LocationAreaInfoRetrieval API specific Data Types

Data type	Section defined	Description	Applicability

Table 7.1.2.4.1-2 specifies data types re-used by the SS_LocationAreaInfoRetrieval API service.

Table 7.1.2.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
Float	3GPP TS 29.571 [21]	Used to represent the value of the range.	
LMInformation	7.5.1.4.2.8	Used to represent the location information for a VAL User ID or a VAL UE ID.	
LocationInfo	3GPP TS 29.122 [3]	Used to represent the location information.	
ValSvcAreaId	Clause 7.1.3.4.3.2	Used to represent the VAL service area identifier.	ValSrvArea

7.1.2.4.2 Structured Data Types

None.

7.1.2.4.3 Simple data types and enumerations

None.

7.1.2.5 Error Handling

7.1.2.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.1.2.5.2 Protocol Errors

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

7.1.2.5.3 Application Errors

The application errors defined for SS_LocationAreaInfoRetrieval API are listed in table 7.1.2.5.3-1.

Table 7.1.2.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.1.2.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.1.2.6-1: Supported Features

Feature number	Feature Name	Description
1	ValSrvArea	This feature indicates the support of VAL service area ID functionality as part of the enhancements to SEAL. The following functionalities are supported: - Support the usage of the VAL service area identifier to identify a VAL service area.

7.1.3 SS_VALServiceAreaConfiguration API

7.1.3.1 API URI

The SS_VALServiceAreaConfiguration service shall use the SS_VALServiceAreaConfiguration API.

The API URI of the SS_VALServiceAreaConfiguration API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure as defined in clause 6.5, i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5.
- The <apiName> shall be "ss-vsac".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.1.3.2.

7.1.3.1A Usage of HTTP

The provisions of clause 6.3 shall apply for the SS_VALServiceAreaConfiguration API.

7.1.3.2 Resources

7.1.3.2.1 Overview

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

Figure 7.1.3.2.1-1 depicts the resource URIs structure for the SS_VALServiceAreaConfiguration API.

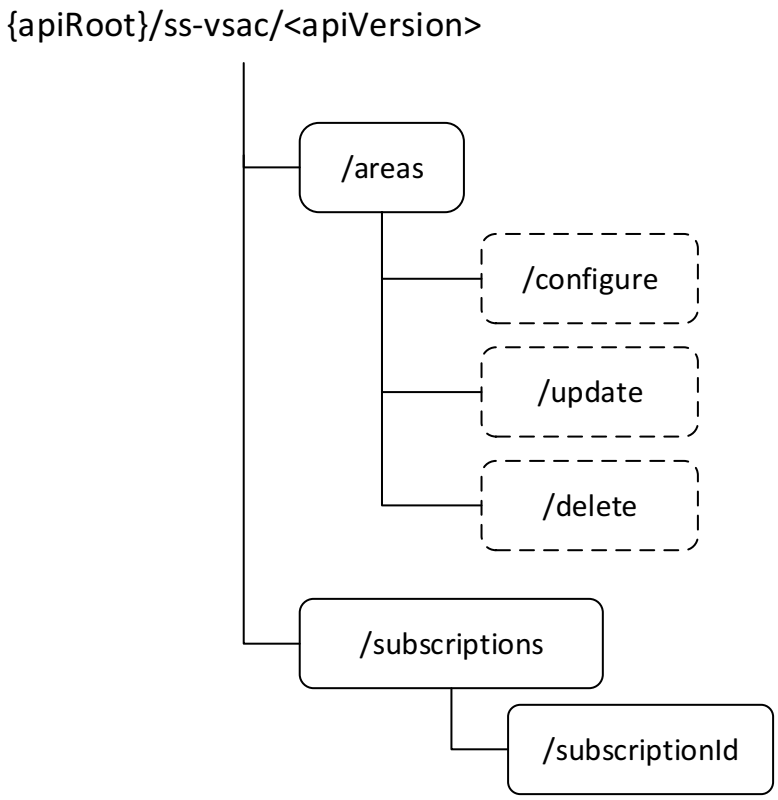

Figure 7.1.3.2.1-1: Resource URI structure of the SS_VALServiceAreaConfiguration API

Table 7.1.3.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.1.3.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
VAL Service Areas	/areas	GET	Obtain the VAL service area(s) according to the provided filtering criteria.
	/areas/configure	Configure	Configure VAL service area(s).
	/areas/update	Update	Update existing VAL service area(s).
	/areas/delete	Delete	Delete existing VAL service area(s).
VAL Service Area Change Subscriptions	/subscriptions	POST	Create a new VAL service area change event(s) subscription.
Individual VAL Service Area Change Subscription	/subscriptions/{subscriptionId}	GET	Retrieve the individual VAL service area change event(s) subscription resource according to the subscriptionId.
		DELETE	Delete an existing VAL service area change event(s) subscription resource according to the subscriptionId.

7.1.3.2.2 Resource: VAL Service Areas

7.1.3.2.2.1 Description

7.1.3.2.2.2 Resource Definition

Resource URI: {**apiRoot**}/**ss-vsac**/<**apiVersion**>/**areas**

This resource shall support the resource URI variables defined in table 7.1.3.2.2.2-1.

Table 7.1.3.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.1.3.1.

7.1.3.2.2.3 Resource Standard Methods

7.1.3.2.2.3.1 GET

This operation enables to retrieve one or several "Individual VAL Service Area" resources managed by the LM Server. This method shall support the URI query parameters specified in table 7.1.3.2.2.3.1-1.

Table 7.1.3.2.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
val-svc-area-ids	array(ValSvcAreaId)	O	1..N	Represents the requested VAL service area(s).
supp-feats	SupportedFeatures	O	0..1	To filter irrelevant responses related to unsupported features.
NOTE: At least one of these query parameters shall be present, unless the request targets to retrieve all the VAL service area(s) available for the VAL server at the LM Server.				

This method shall support the request data structures specified in table 7.1.3.2.2.3.1-2 and the response data structures and response codes specified in table 7.1.3.2.2.3.1-3.

Table 7.1.3.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.3.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaData	M	1	200 OK	The requested VAL service area(s) information is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

7.1.3.2.2.4 Resource Custom Operations

7.1.3.2.2.4.1 Overview

Table 7.1.3.2.2.4.1-1: Custom operations

Operation name	Custom operation URI	Mapped HTTP method	Description
Configure	/areas/configure	POST	Enables to configure VAL Service Area(s).
Update	/areas/update	POST	Enables to update existing VAL Service Area(s).
Delete	/areas/delete	POST	Enables to delete existing VAL Service Area(s).

7.1.3.2.2.4.2 Operation: Configure

This custom operation enables to configure VAL Service Area(s).

This operation shall support the request data structures specified in table 7.1.3.2.2.4.2-2 and the response data structures and response codes specified in table 7.1.3.2.2.4.2-3.

Table 7.1.3.2.2.4.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaReq	M	1	Represents the VAL service area(s) configuration information.

Table 7.1.3.2.2.4.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaResp	M	1	200 OK	Indicates the successfully configured VAL service area ID(s).
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.2.4.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.2.4.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

7.1.3.2.2.4.3 Operation: Update

This custom operation enables to update existing VAL Service Area(s).

This operation shall support the request data structures specified in table 7.1.3.2.2.4.3-2 and the response data structures and response codes specified in table 7.1.3.2.2.4.3-3.

Table 7.1.3.2.2.4.3-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaReq	M	1	Represents the VAL service area(s) information that shall be updated.

Table 7.1.3.2.2.4.3-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaResp	M	1	200 OK	Indicates the successfully updated VAL service area ID(s).
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.2.4.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.2.4.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

7.1.3.2.2.4.4 Operation: Delete

This custom operation enables to delete existing VAL Service Area(s).

This operation shall support the request data structures specified in table 7.1.3.2.2.4.4-2 and the response data structures and response codes specified in table 7.1.3.2.2.4.4-3.

Table 7.1.3.2.2.4.4-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaReq	M	1	Represents the VAL service area(s) information that shall be deleted.

Table 7.1.3.2.2.4.4-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaResp	M	1	200 OK	Indicates the successfully deleted VAL service area ID(s).
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.2.4.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.2.4.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

7.1.3.2.3 Resource: VAL Service Area Change Subscriptions

7.1.3.2.3.1 Description

7.1.3.2.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 7.1.3.2.3.2-1.

Table 7.1.3.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.1.3.1.

7.1.3.2.3.3 Resource Standard Methods

7.1.3.2.3.3.1 POST

This method enables a SEAL Server to request the creation of the individual VAL service area change subscription at the LM Server. This method shall support the URI query parameters specified in table 7.1.3.2.3.3.1-1.

Table 7.1.3.2.3.3.1-1: 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 7.1.3.2.3.3.1-2 and the response data structures and response codes specified in table 7.1.3.2.3.3.1-3.

Table 7.1.3.2.3.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaSubsc	M	1	Represents the requested VAL service area change subscription parameters.

Table 7.1.3.2.3.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaSubsc	M	1	201 Created	Successful case. The requested individual VAL service area change event(s) subscription resource is successfully created and a representation of the created resource is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.3.3.1-4: 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-vsac/<apiVersion>/subscriptions{subscriptionId}

Table 7.1.3.2.3.3.1-5: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.3.3.1-6: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM Server.

7.1.3.2.3.4 Resource Custom Operations

None.

7.1.3.2.4 Resource: Individual VAL Service Area Change Subscription

7.1.3.2.4.1 Description

7.1.3.2.4.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 7.1.3.2.4.2-1.

Table 7.1.3.2.4.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.1.3.1.
subscriptionId	string	Represents the identifier of an individual VAL service area change event(s) subscription resource.

7.1.3.2.4.3 Resource Standard Methods

7.1.3.2.4.3.1 GET

This operation reads the Individual VAL Service Area Change Subscription resource. This method shall support the URI query parameters specified in table 7.1.3.2.4.3.1-1.

Table 7.1.3.2.4.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.1.3.2.4.3.1-2 and the response data structures and response codes specified in table 7.1.3.2.4.3.1-3.

Table 7.1.3.2.4.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.3.2.4.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaSubsc	M	1	200 OK	The requested individual VAL service area change event(s) subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.1.3.2.4.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM server.

Table 7.1.3.2.4.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM server.

7.1.3.2.4.3.2 PUT

This operation updates the Individual VAL Service Area Change Subscription resource. This method shall support the URI query parameters specified in table 7.1.3.2.4.3.2-1.

Table 7.1.3.2.4.3.2-1: 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 7.1.3.2.4.3.2-2 and the response data structures and response codes specified in table 7.1.3.2.4.3.2-3.

Table 7.1.3.2.4.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaSubsc	M	1	Represents the updated representation of the VAL service area change event(s) subscription.

Table 7.1.3.2.4.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaSubsc	M	1	200 OK	The individual VAL service area change event(s) subscription is updated successfully, and the representation of the updated resource is returned.
n/a			204 No Content	The individual VAL service area change event(s) subscription is updated successfully and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.3.2.4.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.4.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative LM Server.

7.1.3.2.4.3.3 PATCH

This operation modifies the Individual VAL Service Area Change Subscription resource. This method shall support the URI query parameters specified in table 7.1.3.2.4.3.3-1.

Table 7.1.3.2.4.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.1.3.2.4.3.3-2 and the response data structures and response codes specified in table 7.1.3.2.4.3.3-3.

Table 7.1.3.2.4.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaSubscPatch	M	1	Represents the requested modifications to the VAL service area change event(s) subscription.

Table 7.1.3.2.4.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServiceAreaSubsc	M	1	200 OK	The individual VAL service area change event(s) subscription is modified successfully, and the representation of the modified resource is returned.
n/a			204 No Content	The individual VAL service area change event(s) subscription is modified successfully and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.1.3.2.4.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative LM Server.

Table 7.1.3.2.4.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative LM Server.

7.1.3.2.4.3.4 DELETE

This operation deletes the Individual VAL Service Area Change Subscription resource. This method shall support the URI query parameters specified in table 7.1.3.2.4.3.4-1.

Table 7.1.3.2.4.3.4-1: 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 7.1.3.2.4.3.4-2 and the response data structures and response codes specified in table 7.1.3.2.4.3.4-3.

Table 7.1.3.2.4.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.3.2.4.3.4-3: 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 service area change event(s) subscription resource matching the subscriptionId is deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.1.3.2.4.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM server.

Table 7.1.3.2.4.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative LM server.

7.1.3.3 Notifications

7.1.3.3.1 General

Table 7.1.3.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
VAL Service Area Change Notification	{notifUri}	POST	Notify on changes of the VAL service area(s).

7.1.3.3.2 Individual Unicast Monitoring Notification

7.1.3.3.2.1 Description

7.1.3.3.2.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.1.3.3.2.2-1.

Table 7.1.3.3.2.2-1: 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 7.1.3.3.2.2-2 and the response data structures and response codes specified in table 7.1.3.3.2.2-3.

Table 7.1.3.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ValServiceAreaNotif	M	1	Represents the reported VAL service area data.

Table 7.1.3.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The notification is successfully received.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.1.3.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

Table 7.1.3.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

7.1.3.4 Data Model

7.1.3.4.1 General

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

Table 7.1.3.4.1-1 specifies the data types defined specifically for the SS_VALServiceAreaConfiguration API service.

Table 7.1.3.4.1-1: SS_VALServiceAreaConfiguration API specific Data Types

Data type	Section defined	Description	Applicability
ValServiceArea	7.1.3.4.2.2	Represents the VAL service area.	
ValServiceAreaReq	7.1.3.4.2.3	Represents the VAL service area configuration/update/delete request.	
ValServiceAreaData	7.1.3.4.2.4	Represents the VAL service area retrieval information.	
ValServiceAreaResp	7.1.3.4.2.5	Represents the VAL service area configuration/update/delete response.	
ValServiceAreaSubsc	7.1.3.4.2.6	Represents the VAL service area change event(s) subscription.	
ValServiceAreaEventType	7.1.3.4.2.7	Represents the VAL service area change event type.	
ValServiceAreaNotif	7.1.3.4.2.8	Represents the VAL service area change event(s) notifcation.	
ValServiceAreaEventInfo	7.1.3.4.2.9	Represents the VAL service area change event(s) content.	
ValServiceAreaEvent	7.1.3.4.3.3	Represents the VAL service area change event.	
ValServiceAreaSubscPatch	7.1.3.4.2.10	Represents the VAL service area change event(s) modification request.	
ValSvcAreaId	Clause 7.1.3.4.3.2	Used to represent the VAL service area identifier.	

Table 7.1.3.4.1-2 specifies data types re-used by the SS_VALServiceAreaConfiguration API service.

Table 7.1.3.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
DurationSec	3GPP TS 29.571 [21]	Used to indicate the subscription duration.	
LocationArea5G	3GPP TS 29.122 [3]	Used to indicate the location information.	
SupportedFeatures	3GPP TS 29.571 [21]	Used to negotiate the applicability of optional features defined in table 7.1.3.6-1.	
Uri	3GPP TS 29.571 [21]	Used to indicate the notification URI.	

7.1.3.4.2 Structured data types

7.1.3.4.2.1 Introduction

7.1.3.4.2.2 Type: ValServiceArea

Table 7.1.3.4.2.2-1: Definition of type ValServiceArea

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcAreaId	ValSvcAreaId	M	1	Represents the VAL service area ID.	
locations	array(LocationArea5G)	M	1..N	Represents the locations associated with the VAL service area. (NOTE)	
NOTE: The "nwAreaInfo" attribute within the LocationArea5G data type provided within this attriute is not applicable and shall not be present.					

7.1.3.4.2.3 Type: ValServiceAreaReq

Table 7.1.3.4.2.3-1: Definition of type ValServiceAreaReq

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcAreas	array(ValServiceArea)	M	1..N	Represents the VAL service area(s).	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

7.1.3.4.2.4 Type: ValServiceAreaData

Table 7.1.3.4.2.4-1: Definition of type ValServiceAreaData

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcAreas	array(ValServiceArea)	O	1..N	Represents the requested VAL service area(s). If this attribute is not present, this means that no VAL service data instance satisfies the provided query parameter(s) in the request.	
suppFeats	SupportedFeatures	C	0..1	Used to negotiate the applicability of optional features defined in table 7.1.3.6-1. This attribute shall be present only if feature negotiation needs to take place.	

7.1.3.4.2.5 Type: ValServiceAreaResp

Table 7.1.3.4.2.5-1: Definition of type ValServiceAreaResp

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcAreaIds	array(ValSvcAreaId)	M	1..N	Represents the successfully handled VAL service area ID(s).	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

7.1.3.4.2.6 Type: ValServiceAreaSubsc

Table 7.1.3.4.2.6-1: Definition of type ValServiceAreaSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(ValServiceAreaEventType)	M	1..N	Represents the subscribed VAL service area change event(s).	
notifUri	Uri	M	1	Indicates the URI towards which the notification should be delivered.	
subscDur	DurationSec	O	0..1	Indicates the subscription duration. If omitted, there is no time limit.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

7.1.3.4.2.7 Type: ValServiceAreaEventType

Table 7.1.3.4.2.7-1: Definition of type ValServiceAreaEventType

Attribute name	Data type	P	Cardinality	Description	Applicability
event	ValServiceAreaEvent	M	1	Represents the requested VAL service area change event.	
valSvcAreaIds	array(ValSvcAreaId)	M	1..N	Represents the VAL service area ID(s) associated with the event.	

7.1.3.4.2.8 Type: ValServiceAreaNotif

Table 7.1.3.4.2.8-1: Definition of type ValServiceAreaNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcAreaConts	array(ValServiceAreaEventInfo)	M	1..N	Represents the VAL service area change event(s) content.	

7.1.3.4.2.9 Type: ValServiceAreaEventInfo

Table 7.1.3.4.2.9-1: Definition of type ValServiceAreaEventInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
event	ValServiceAreaEvent	M	1	Represents the VAL service area change event.	
valSvcAreas	array(ValServiceArea)	C	1..N	Represents the VAL service area(s) associated with the event. This attribute shall be provided if the "event" is "UPDATE".	
valSvcAreaIds	array(ValSvcAreaId)	C	1..N	Represents the VAL service area ID(s) associated with the event. This attribute shall be provided if the "event" is "DELETE".	

7.1.3.4.2.10 Type: ValServiceAreaSubscPatch

Table 7.1.3.4.2.10-1: Definition of type ValServiceAreaSubscPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
events	array(ValServiceAreaEventType)	O	1..N	Represents the subscribed VAL service area change event(s).	
notifUri	Uri	O	0..1	Indicates the URI towards which the notification should be delivered.	
subscDur	DurationSec	O	0..1	Indicates the subscription duration.	

7.1.3.4.3 Simple data types and enumerations

7.1.3.4.3.1 Introduction

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

7.1.3.4.3.2 Simple data types

The simple data types defined in table 7.1.3.4.3.2-1 shall be supported.

Table 7.1.3.4.3.2-1: Simple data types

Type name	Description
ValSvcAreaId	Represents the VAL Service Area identifier encoded as a string and generated either based on VAL Server ID or using the Universally Unique Identifier (UUID) version 4 as described in IETF RFC 4122 [40].

7.1.3.4.3.3 Enumeration: ValServiceAreaEvent

Table 7.1.3.4.3.3-1: Enumeration ValServiceAreaEvent

Enumeration value	Description	Applicability
UPDATE	Indicates that the VAL service area change event is VAL service area update.	
DELETE	Indicates that the VAL service area change event is VAL service area delete.	

7.1.3.5 Error Handling

7.1.3.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.1.3.5.2 Protocol Errors

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

7.1.3.5.3 Application Errors

The application errors defined for SS_VALServiceAreaConfiguration API are listed in table 7.1.3.5.3-1.

Table 7.1.3.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability
n/a			

7.1.3.6 Feature negotiation

The optional features in table 7.1.3.6-1 are defined for the SS_VALServiceAreaConfiguration API. They shall be negotiated using the extensibility mechanism defined in clause 6.8.

Table 7.1.3.6-1: 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

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

Figure 7.2.1.2.1-1 depicts the resource URIs structure for the SS_GroupManagement API.

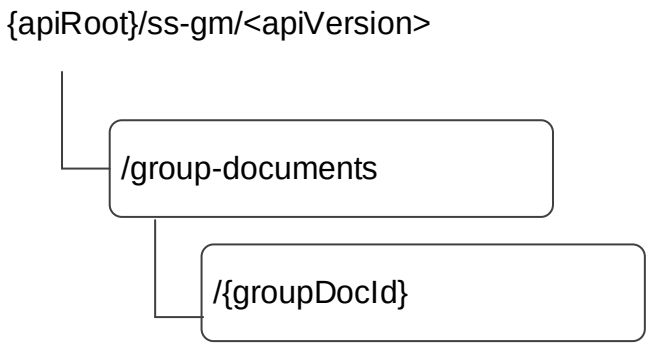

Figure 7.2.1.2.1-1: Resource URI structure of the SS_GroupManagement API

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}.
		PATCH	Partially update an individual VAL group's membership and configuration information identified by {groupDocId}
		DELETE	Deletes 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

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.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.2.1.2.2.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

Table 7.2.1.2.2.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

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
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.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.2.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

Table 7.2.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

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.
n/a			204 No Content	The VAL group document updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.2.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

Table 7.2.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

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.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative group management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.2.1.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

Table 7.2.1.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative group management server.

7.2.1.2.3.3.4 PATCH

This method shall support the URI query parameters specified in table 7.2.1.2.3.3.4-1.

Table 7.2.1.2.3.3.4-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.2.1.2.3.3.4-2 and the response data structures and response codes specified in table 7.2.1.2.3.3.4-3.

Table 7.2.1.2.3.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
VALGroupDocumentPatch	M	1	Contains the modifications to be applied to the Individual VAL Group Document resource.

Table 7.2.1.2.3.3.4-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALGroupDocument	M	1	200 OK	Individual VAL Group Document resource is modified successfully and representation of the modified VAL Group Document resource is returned.
n/a			204 No Content	The Individual VAL Group Document resource is updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.2.1.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.2.1.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

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
VALGroupDocument	7.2.1.4.2.2	Represents details of the VAL group document information.	
VALGroupDocumentPatch	7.2.1.4.2.3	Represent details of the partial update of VAL group document information.	PatchUpdate

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
ExternalGroupId	3GPP TS 29.122 [3]	Used to represent the the external group identifier related to the member UEs of the group.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
LocationInfo	3GPP TS 29.122 [3]	The location information related to VAL group.	
PduSessionType	3GPP TS 29.571 [21]	Identifies PDU Session Type.	
SupportedFeatures	3GPP TS 29.571 [21]	Used to negotiate the applicability of optional features defined in table 7.2.1.6-1.	
ValSvcAreaId	Clause 7.1.3.4.3.2	Used to represent the VAL service area identifier.	ValSrvArea
ValTargetUe	Clause 7.3.1.4.2.3	Used to indicate either VAL User ID or VAL UE ID, to which location reporting applies.	

7.2.1.4.2 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	C	0..1	Used to negotiate the supported optional features of the API as described in clause 6.8. This attribute shall be provided only if feature negotiation needs to take place..	
resUri	Uri	O	0..1	The URI for individual VAL group document resource. (NOTE 1)	
locInfo	LocationInfo	O	0..1	The location information related to the VAL group. This information is used to determine the members of the group. (NOTE 3)	
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 3)	
valSvcAreaId	ValSvcAreaId	O	0..1	Identifier of the VAL service area. (NOTE 3)	ValSrvArea
extGrpId	ExternalGroupId	O	0..1	The external group identifier, identifying the member UEs of the VAL group at the 3GPP core network.	
com5GLanType	PduSessionType	O	0..1	Identifies the 5G LAN-Type communication. (NOTE 2)	
valSvcInf	string	O	0..1	VAL service specific information that may be present during group membership update and in the notification of the events "GM_GROUP_INFO_CHANGE" and "GM_GROUP_CREATE".	
NOTE 1: The "resUri" attribute is not modifiable by the VAL server. NOTE 2: The enumeration value "UNSTRUCTURED" in data type "PduSessionType" is not applicable. NOTE 3: When the "ValSrvArea" feature is supported, the "locInfo" and "valSvcAreaId" attributes are mutually exclusive; and the “addLocInfo” and "valSvcAreaId" attributes are mutually exclusive.					

7.2.1.4.2.3 Type: VALGroupDocumentPatch

Table 7.2.1.4.2.3-1: Definition of type VALGroupDocumentPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
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.	
valServiceIds	array(string)	O	1..N	List of VAL services whose communications enabled on the group.	
locInfo	LocationInfo	O	0..1	The location information related to the VAL group. This information is used to determine the members of the group. (NOTE 2)	
addLocInfo	LocationArea5G	O	0..1	The additional location information related to the VAL group. This information is used to determining the members of the group. (NOTE 2)	
valSvcAreaId	ValSvcAreaId	O	0..1	Identifier of the VAL service area. (NOTE 2)	ValSrvArea
extGrpId	ExternalGroupId	O	0..1	The external group identifier, identifying the member UEs of the VAL group at the 3GPP core network.	
com5GLanType	PduSessionType	O	0..1	Identifies the 5G LAN-Type communication. (NOTE 1)	

NOTE 1: The enumeration value "UNSTRUCTURED" in data type "PduSessionType" is not applicable.
NOTE 2: When the “ValSrvArea" feature is supported, the "locInfo" attribute and "valSvcAreaId" attribute are mutually exclusive within the resource representation, and the "valSvcAreaId" attribute and the “addLocInfo” attribute are also mutually exclusive in the resource representation. If one of them is provided in this data type for the first time as part of an update request, the other shall be removed from the resource representation, if present.

7.2.1.4.3 Simple data types and enumerations

None.

7.2.1.5 Error Handling

7.2.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.2.1.5.2 Protocol Errors

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

7.2.1.5.3 Application Errors

The application errors defined for SS_GroupManagement API are listed in table 7.2.1.5.3-1.

Table 7.2.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

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
1	PatchUpdate	Indicates the support of the PATCH method for updating an Individual VAL Group Document resource.
2	enNB1	This feature indicates the support of enhancements to this application layer API in Rel-18.
3	ValSrvArea	This feature indicates the support of VAL service area ID functionality as part of the phase-3 of the enhancements to the SEAL framework. The following functionalities are supported: - Support the usage of the VAL service area identifier to identify a VAL service area.

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

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

Figure 7.3.1.2.1-1 depicts the resource URIs structure for the SS_UserProfileRetrieval API.

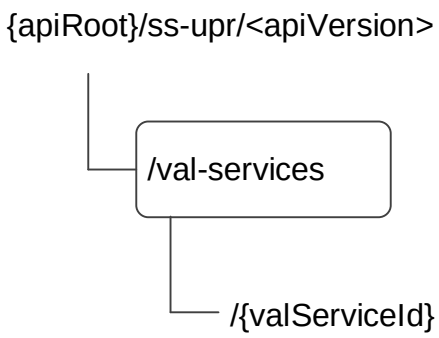

Figure 7.3.1.2.1-1: Resource URI structure of the SS_UserProfileRetrieval API

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

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 7.3.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.3.1.2.2.3.1 -3.

Table 7.3.1.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.3.1.2.2.3.1-3: 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.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative configuration management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative configuration management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.3.1.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative configuration management server.

Table 7.3.1.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative configuration management server.

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	Represents the profile information associated with VAL user ID or VAL UE ID.	
ValTargetUe	7.3.1.4.2.3	Represents the 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

7.3.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.3.1.5.2 Protocol Errors

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

7.3.1.5.3 Application Errors

The application errors defined for SS_UserProfileRetrieval API are listed in table 7.3.1.5.3-1.

Table 7.3.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

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

7.3.2 SS_VALServiceData API

7.3.2.1 API URI

The SS_VALServiceData service shall use the SS_VALServiceData API.

The API URI of the SS_VALServiceData API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure as defined in clause 6.5, i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5.
- The <apiName> shall be "ss-vsd".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.3.1.2.

7.3.2.1A Usage of HTTP

The provisions of clause 6.3 shall apply for the SS_VALServiceData API.

7.3.2.2 Resources

7.3.2.2.1 Overview

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

Figure 7.3.2.2.1-1 depicts the resource URIs structure for the SS_VALServiceData API.

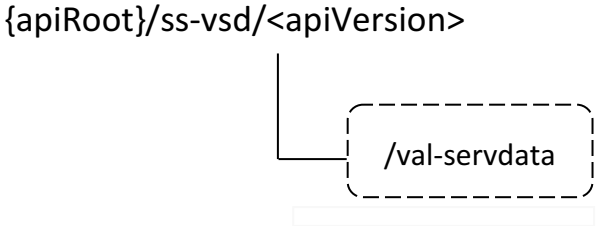

Figure 7.3.2.2.1-1: Resource URI structure of the SS_VALServiceData API

Table 7.3.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.3.2.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
VAL Service Data Sets	/val-servdata	GET	Retrieve the VAL service data according to the provided query parameter(s).

7.3.2.2.2 Resource: VAL Service Data Sets

7.3.2.2.2.1 Description

This resource represents the collection of VAL Service Data resources managed by the CM Server.

7.3.2.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-vsd/<apiVersion>/val-servdata**

This resource shall support the resource URI variables defined in the table 7.3.2.2.2.2-1.

Table 7.3.2.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.3.2.2.2.3 Resource Standard Methods

7.3.2.2.2.3.1 GET

This operation retrieves the VAL service data satisfying the filter criteria. This method shall support the URI query parameters specified in table 7.3.2.2.2.3.1-1.

Table 7.3.2.2.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
val-tgt-ues	array(string)	O	1..N	Identifying the list of the target VAL UE(s). (NOTE)
val-tgt-users	array(string)	O	1..N	Identifying the list of the target VAL user(s). (NOTE)
val-service-ids	array(string)	O	1..N	Identifying the list of the target VAL service(s). (NOTE)
supp-feats	SupportedFeatures	O	0..1	To filter irrelevant responses related to unsupported features.
NOTE: At least one of these query parameters shall be present, unless the request targets to retrieve all the VAL Service Data Sets managed by the CM Server.				

This method shall support the request data structures specified in table 7.3.2.2.2.3.1-2 and the response data structures and response codes specified in table 7.3.2.2.2.3.1-3.

Table 7.3.2.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.3.2.2.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ValServDataResp	M	1	200 OK	Represents the requested VAL service data.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative CM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.3.2.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CM Server.

Table 7.3.2.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative CM server.

7.3.2.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

7.3.2.3 Custom Operations without associated resources

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

7.3.2.4 Notifications

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

7.3.2.5 Data Model

7.3.2.5.1 General

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

Table 7.3.2.5.1-1 specifies the data types defined specifically for the SS_VALServiceData API service.

Table 7.3.2.5.1-1: SS_VALServiceData API specific Data Types

Data type	Section defined	Description	Applicability
ValServDataResp	7.3.2.5.2.2	Represents the response to a VAL service data retrieval request.	
ValServiceData	7.3.2.5.2.3	Represents the VAL service data.	

Table 7.3.2.5.1-2 specifies data types re-used by the SS_VALServiceData API service.

Table 7.3.2.5.1-2: SS_VALServiceData re-used Data Types

Data type	Reference	Comments	Applicability
SupportedFeatures	3GPP TS 29.571 [21]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
ValTargetUe	7.3.1.4.2.3	Used to indicate the VAL user ID or VAL UE ID.	

7.3.2.5.2 Structured data types

7.3.2.5.2.1 Introduction

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

7.3.2.5.2.2 Type: ValServDataResp

Table 7.3.2.5.2.2-1: Definition of type ValServDataResp

Attribute name	Data type	P	Cardinality	Description	Applicability
valServData	array(ValServiceData)	M	0..N	Contains the requested VAL service data. If an empty array is provided within this attribute, this means that no VAL service data set satisfies the provided query parameter(s) in the corresponding request.	
suppFeats	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.3.2.7. This attribute shall be present only when feature negotiation needs to take place.	

7.3.2.5.2.3 Type: ValServiceData

Table 7.3.2.5.2.3-1: Definition of type ValServiceData

Attribute name	Data type	P	Cardinality	Description	Applicability
valTgtUe	ValTargetUe	M	1	Contains the unique identifier of a VAL user or a VAL UE.	
valServIds	array(string)	M	1..N	Contains the list of the VAL service(s) associated with the VAL user or VAL UE provided within the "valTgtUe" attribute.	
valServSpecInfo	string	O	0..1	Contains the VAL service specific information.	

7.3.2.5.3 Simple data types and enumerations

7.3.2.5.3.1 Introduction

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

7.3.2.5.3.2 Simple data types

The simple data types defined in table 7.3.2.5.3.2-1 shall be supported.

Table 7.3.2.5.3.2-1: Simple data types

Type name	Description

7.3.2.5.4 Data types describing alternative data types or combinations of data types

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

7.3.2.5.5 Binary data

7.3.2.5.5.1 Binary Data Types

Table 7.3.2.5.5.1-1: Binary Data Types

Name	Clause defined	Content type

7.3.2.6 Error Handling

7.3.2.6.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.3.2.6.2 Protocol Errors

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

7.3.2.6.3 Application Errors

The application errors defined for SS_VALServiceData API are listed in table 7.3.2.6.3-1.

Table 7.3.2.6.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.3.2.7 Feature negotiation

The optional features in table 7.3.2.7-1 are defined for the SS_VALServiceData API. They shall be negotiated using the extensibility mechanism defined in clause 6.8.

Table 7.3.2.7-1: Supported Features

Feature number	Feature Name	Description

7.4 Network resource management APIs

7.4.1 SS_NetworkResourceAdaptation API

7.4.1.1 API URI

The SS_NetworkResourceAdaptation service shall use the SS_NetworkResourceAdaptation API.

The API URI of the SS_NetworkResourceAdaptation API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5, i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5.
- The <apiName> shall be "ss-nra".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.4.1.2

7.4.1.1A Usage of HTTP

The provisions of clause 6.3 shall apply for the SS_NetworkResourceAdaptation API.

7.4.1.2 Resources

7.4.1.2.1 Overview

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

Figure 7.4.1.2.1-1 depicts the resource URIs structure for the SS_NetworkResourceAdaptation API.

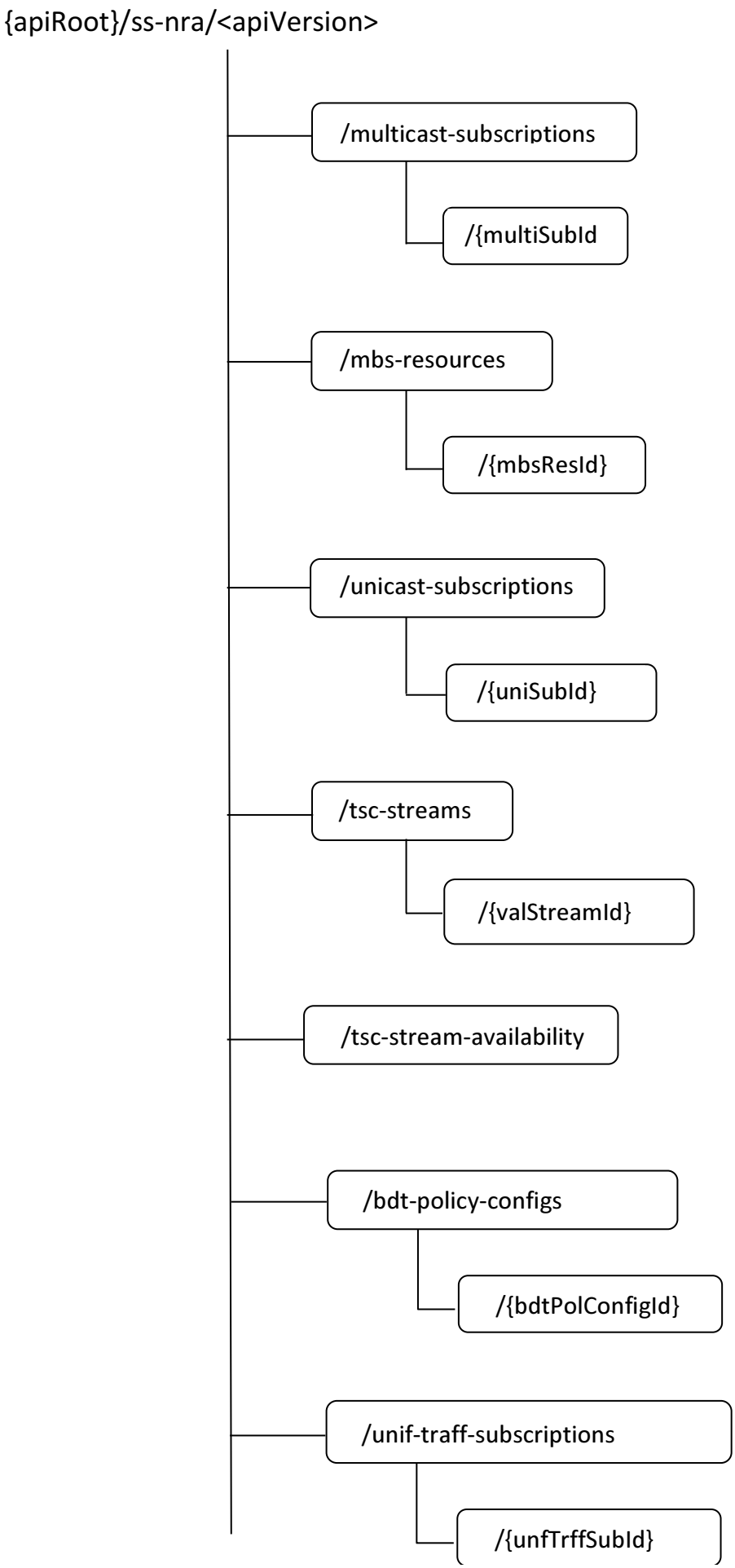
{apiRoot}/ss-nra/<apiVersion>
/multicast-subscriptions
/{multiSubId
/mbs-resources
/{mbsResId}
/unicast-subscriptions
/{uniSubId}
/tsc-streams
/{valStreamId}
/tsc-stream-availability
/bdt-policy-configs
/{bdtPolConfigId}
/unif-traff-subscriptions
/{unfTrffSubId}

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.
MBS Resources	/mbs-resources	POST	Request the creation of an MBS resource.
Individual MBS Resource	/mbs-resources/{mbsResId}	GET	Request the retrieval of an existing "Individual MBS Resource" resource.
		PUT	Request the update of an existing "Individual MBS Resource" resource.
		PATCH	Request the modification of an existing "Individual MBS Resource" resource.
		DELETE	Request the deletion of an existing "Individual MBS Resource" resource.
		Activate	Request the activation of an existing MBS Resource.
		Deactivate	Request the deactivation of an existing MBS 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.
TSC Stream Availability	/tsc-stream-availability	GET	Retrieve TSC stream availability information.
TSC Streams	/tsc-streams	GET	Retrieve TSC stream information.
Individual TSC Stream	/tsc-streams/{valStreamId}	GET	Read an Individual TSC stream resource.
		PUT	Create a new Individual TSC stream resource.
		DELETE	Remove an Individual TSC stream resource.
		GET	Read an Individual TSC stream resource.
BDT Policy Configurations	/bdt-policy-configs	POST	Create a new background data transfer policy configuration.
Individual BDT Policy Configuration	/bdt-policy-configs/{bdtPolConfigId}	GET	Request the retrieval of an existing "Individual BDT Policy Configuration" resource.
		PUT	Request the update of an existing "Individual BDT Policy Configuration" resource.
		PATCH	Request the modification of an existing "Individual BDT Policy Configuration" resource.
		DELETE	Request the deletion of an existing "Individual BDT Policy Configuration" resource.
Unified Traffic Pattern Subscriptions	/unif-traff-subscriptions	POST	Create a new Unified Traffic Pattern Subscription.
Individual Unified Traffic Pattern Subscription	/unif-traff-subscriptions/{unfTrffSubId}	GET	Retrieve an existing "Individual Unified Traffic Pattern Subscription" resource.

		PUT	Request to update of an existing "Individual Unified Traffic Pattern Subscription" resource.
		PATCH	Request the modification of an existing "Individual Unified Traffic Pattern Subscription" resource.
		DELETE	Request the deletion of an existing "Individual Unified Traffic Pattern 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 6.5

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 5.2.6-1 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	6.5
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	
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

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.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

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 6.5

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 5.2.6-1 of 3GPP TS 29.122 [3] 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 6.5.
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	
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.5.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.5.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

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.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.5.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.5.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.5.4 Resource Custom Operations

None.

7.4.1.2.6 Resource: TSC Stream Availability

7.4.1.2.6.1 Description

The TSC stream availability represent for TSC stream availability discovery with the given stream specification.

7.4.1.2.6.2 Resource Definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/tsc-stream-availability**

This resource shall support the resource URI variables defined in table 7.4.1.2.6.2-1.

Table 7.4.1.2.6.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.4.1.2.6.3 Resource Standard Methods

7.4.1.2.6.3.1 GET

This operation retrieves the TSC stream availability information. This method shall support the URI query parameters specified in table 7.4.1.2.6.3.1-1.

Table 7.4.1.2.6.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
stream-specs	array(StreamSpecification)	M	1..N	The MAC address(es) of the source DS-TT port(s) and the destination DS-TT port(s).

This method shall support the request data structures specified in table 7.4.1.2.6.3.1-2 and the response data structure and response codes specified in table 7.4.1.2.6.3.1-3, table 7.4.1.2.6.3.1-4 and table 7.4.1.2.6.3.1-5.

Table 7.4.1.2.6.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.6.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(TscStream Availability)	M	1..N	200 OK	List of TSC stream availability information, each including the stream specification and list of traffic specifications. This response shall include stream specification matching the query parameters provided in the request.
N/A	O	0..1	204 No Content	Indicates no stream specification matching with the query parameters, no TSC stream avaiability information.
N/A			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
N/A			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.4.1.2.6.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.6.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.6.4 Resource Custom Operations

None.

7.4.1.2.7 Resource: TSC streams

7.4.1.2.7.1 Description

The TSC streams represent the resources for TSC communication with the given stream specification.

7.4.1.2.7.2 Resource Definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/tsc-streams**

This resource shall support the resource URI variables defined in table 7.4.1.2.7.2-1.

Table 7.4.1.2.7.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.4.1.2.7.3 Resource Standard Methods

7.4.1.2.7.3.1 GET

This method shall support the URI query parameters specified in the table 7.4.1.2.7.3.1-1.

Table 7.4.1.2.7.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
val-stream-ids	array(string)	O	1..N	Retrieval of all the TSC stream resources managed by the NRM server or the TSC Stream resource(s) identified by the VAL Stream ID(s).

This method shall support the request data structures specified in table 7.4.1.2.7.3.1-2 and the response data structure and response codes specified in table 7.4.1.2.7.3.1-3, table 7.4.1.2.7.3.1-4 and table 7.4.1.2.7.3.1-5.

Table 7.4.1.2.7.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.7.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(TscStream Data)	M	1..N	200 OK	Retrieval of TSC stream data information.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.7.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.7.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.7.4 Resource Custom Operations

None.

7.4.1.2.8 Resource: Individual TSC Stream

7.4.1.2.8.1 Description

7.4.1.2.8.2 Resource Definition

Resource URI: {apiRoot}/ss-nra/<apiVersion>/tsc-streams/{valStreamId}

This resource shall support the resource URI variables defined in table 7.4.1.2.8.2-1.

Table 7.4.1.2.8.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.
valStreamId	string	The VAL Stream ID identifies the TSC stream.

7.4.1.2.8.3 Resource Standard Methods

7.4.1.2.8.3.1 GET

This operation retrieves an individual TSC stream information. This method shall support the URI query parameters specified in the table 7.4.1.2.8.3.1-1.

Table 7.4.1.2.8.3.1-1: 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 7.4.1.2.8.3.1-2 and the response data structure and response codes specified in table 7.4.1.2.8.3.1-3, table 7.4.1.2.8.3.1-4 and table 7.4.1.2.8.3.1-5.

Table 7.4.1.2.8.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.8.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TscStreamData	M	1	200 OK	
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.8.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.8.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.8.3.2 PUT

This operation create an individual TSC stream identified by VAL Stream ID. This method shall support the URI query parameters specified in the table 7.4.1.2.8.3.2-1.

Table 7.4.1.2.8.3.2-1: 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 7.4.1.2.8.3.2-2 and the response data structure and response codes specified in table 7.4.1.2.8.3.2-3 and table 7.4.1.2.8.3.2-4.

Table 7.4.1.2.8.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
TscStreamData	M	1	TSC stream creation request data from the VAL server to the NRM server.

Table 7.4.1.2.8.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TscStreamData	M	1	201 Created	TSC stream created data response from the NRM server to the VAL server.
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.8.3.2-4: 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>/tsc-streams/{valStreamId}

7.4.1.2.8.3.3 DELETE

This operation deletes the individual TSC stream resource. This method shall support the URI query parameters specified in the table 7.4.1.2.8.3.3-1.

Table 7.4.1.2.8.3.3-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.4.1.2.8.3.3-2 and the response data structure and response codes specified in table 7.4.1.2.8.3.3-3, table 7.4.1.2.8.3.3-4 and table 7.4.1.2.8.3.3-5.

Table 7.4.1.2.8.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description

Table 7.4.1.2.8.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Individual TSC Stream resource was deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.8.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.8.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.9 Resource: MBS Resources

7.4.1.2.9.1 Description

This resource represents the collection of MBS Resources managed by the NEF.

7.4.1.2.9.2 Resource Definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/mbs-resources**

This resource shall support the resource URI variables defined in table 7.4.1.2.9.2-1.

Table 7.4.1.2.9.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.4.1.2.9.3 Resource Standard Methods

7.4.1.2.9.3.1 POST

This method enables a VAL Server to request the creation of a new MBS Resource at the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.9.3.1-1.

Table 7.4.1.2.9.3.1-1: 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 7.4.1.2.9.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.9.3.1-3.

Table 7.4.1.2.9.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsResourceReq	M	1	Represents the parameters to request the creation of a new MBS resource.

Table 7.4.1.2.9.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsResourceResp	M	1	201 Created	Successful case. The requested MBS resource is successfully created and a representation of the created "Individual MBS Resource" resource is returned in the response body. The URI of the created resource shall also be returned in an HTTP "Location" header.
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply. NOTE 2: Failure cases are described in clause 7.4.1.5.				

Table 7.4.1.2.9.3.1-4: 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>/mbs-resources/{mbsResId}

7.4.1.2.9.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

7.4.1.2.10 Resource: Individual MBS Resource

7.4.1.2.10.1 Description

This resource represents an "Individual MBS Resource" resource managed by the NEF.

7.4.1.2.10.2 Resource Definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/mbs-resources/{mbsResId}**

This resource shall support the resource URI variables defined in table 7.4.1.2.10.2-1.

Table 7.4.1.2.10.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.
mbsResId	string	Represents the identifier of the "Individual MBS Resource" resource.

7.4.1.2.10.3 Resource Standard Methods

7.4.1.2.10.3.1 GET

This method enables a VAL Server to retrieve an existing "Individual MBS Resource" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.10.3.1-1.

Table 7.4.1.2.10.3.1-1: 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 7.4.1.2.10.3.1-2 and the response data structures and response codes specified in table 7.4.1.2.10.3.1-3.

Table 7.4.1.2.10.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.10.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSResource	M	1	200 OK	Successful case. A representation of the requested "Individual MBS Resource" resource is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.10.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.10.3.2 PUT

This method enables a VAL Server to request the update of an existing "Individual MBS Resource" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.10.3.2-1.

Table 7.4.1.2.10.3.2-1: 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 7.4.1.2.10.3.2-2 and the response data structures and response codes specified in table 7.4.1.2.10.3.2-3.

Table 7.4.1.2.10.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MBSResource	M	1	Represents the updated representation of the "Individual MBS Resource" resource.

Table 7.4.1.2.10.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSResource	M	1	200 OK	Successful case. The "Individual MBS Resource" resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual MBS Resource" resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply. NOTE 2: Failure cases are described in clause 7.4.1.5.				

Table 7.4.1.2.10.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.10.3.3 PATCH

This method enables a VAL Server to request the modification of an existing "Individual MBS Resource" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.10.3.3-1.

Table 7.4.1.2.10.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.4.1.2.10.3.3-2 and the response data structures and response codes specified in table 7.4.1.2.10.3.3-3.

Table 7.4.1.2.10.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MBSResourcePatch	M	1	Represents the requested modifications to the "Individual MBS Resource" resource.

Table 7.4.1.2.10.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MBSResource	M	1	200 OK	Successful case. The "Individual MBS Resource" resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual MBS Resource" resource is successfully modified and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply. NOTE 2: Failure cases are described in clause 7.4.1.5.				

Table 7.4.1.2.10.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.10.3.4 DELETE

This method enables a VAL Server to request the deletion of an existing "Individual MBS Resource" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.10.3.4-1.

Table 7.4.1.2.10.3.4-1: 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 7.4.1.2.10.3.4-2 and the response data structures and response codes specified in table 7.4.1.2.10.3.4-3.

Table 7.4.1.2.10.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.10.3.4-3: 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 MBS Resource" resource is successfully deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.10.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.10.4 Resource Custom Operations

7.4.1.2.10.4.1 Overview

Table 7.4.1.2.10.4.1-1: Custom operations

Operation name	Custom operaration URI	Mapped HTTP method	Description
Activate	/mbs-resources/{mbsResId}/activate	POST	Request the activation of an existing MBS Resource.
Deactivate	/mbs-resources/{mbsResId}/deactivate	POST	Request the deactivation of an existing MBS Resource.

7.4.1.2.10.4.2 Operation: Activate

7.4.1.2.10.4.2.1 Description

This resource custom operation enables a VAL Server to request the activation of an existing MBS Resource at the NRM Server.

7.4.1.2.10.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 7.4.1.2.10.4.2.2-1 and the response data structure and response codes specified in table 7.4.1.2.10.4.2.2-2.

Table 7.4.1.2.10.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsResAct	M	1	Contains the parameters to request the activation of the MBS Resource.

Table 7.4.1.2.10.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsResAct	M	1	200 OK	Successful case. The activation request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The manadatory HTTP error status code for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.4.1.2.10.4.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.4.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.10.4.3 Operation: Deactivate

7.4.1.2.10.4.3.1 Description

This resource custom operation enables a VAL Server to request the deactivation of an existing MBS Resource at the NRM Server.

7.4.1.2.10.4.3.2 Operation Definition

This operation shall support the request data structures specified in table 7.4.1.2.10.4.3.2-1 and the response data structure and response codes specified in table 7.4.1.2.10.4.3.2-2.

Table 7.4.1.2.10.4.3.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MbsResDeact	M	1	Contains the parameters related to the deactivation of the MBS Resource.

Table 7.4.1.2.10.4.3.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MbsResDeact	M	1	200 OK	Successful case. The deactivation request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The manadatory HTTP error status code for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.4.1.2.10.4.3.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.10.4.3.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.11 Resource: BDT Policy Configurations

7.4.1.2.11.1 Description

This resource represents the collection of BDT Policy Configurations managed by the NRM Server.

7.4.1.2.11.2 Resource definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/bdt-policy-configs**

This resource shall support the resource URI variables defined in table 7.4.1.2.11.2-1.

Table 7.4.1.2.11.2-1: Resource URI variables for resource "BDT Policy Configurations"

Name	Data type	Definition
apiRoot	string	See clause 6.5.

7.4.1.2.11.3 Resource methods

7.4.1.2.11.3.1 POST

This method enables to request the creation of a new "Individual BDT Policy Configuration" resource at the NRM Server

This method shall support the URI query parameters, request and response data structures, and response codes, as specified in the table 7.4.1.2.11.3.1-1, table 7.4.1.2.11.3.1-2 and table 7.4.1.2.11.3.1-3.

Table 7.4.1.2.11.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	Cardinality	Remarks

Table 7.4.1.2.11.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
BdtPolConfig	M	1	Represents the parameters to request the creation of a new "BDT Policy Configurations" resource.

Table 7.4.1.2.11.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BdtPolConfig	M	1	201 Created	Successful case. The requested BDT Policy configuration resource is successfully created and a representation of the created "Individual BDT Policy Configuration" resource is returned in the response body. The URI of the created resource shall also be returned in an HTTP "Location" header.
n/a			204 No Content	The request is successfully received.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.11.3.1-4: 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>/bdt-policy-configs/{bdtPolConfigId}

7.4.1.2.12 Resource: Individual BDT Policy Configuration

7.4.1.2.12.1 Description

This resource represents an "Individual BDT Policy Configuration" resource managed by the NRM Server.

7.4.1.2.12.2 Resource definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/bdt-policy-configs/{bdtPolConfigId}**

This resource shall support the resource URI variables defined in table 7.4.1.2.12.2-1.

Table 7.4.1.2.12.2-1: Resource URI variables for resource "Individual BDT Policy Config"

Name	Data type	Definition
apiRoot	string	See clause 6.5.
bdtPolConfigId	string	Represents the identifier of the "Individual BDT Policy Configuration" resource.

7.4.1.2.12.3 Resource methods

7.4.1.2.12.3.1 GET

The GET method allows to read an "Individual BDT Policy Configuration" resource to obtain details of an active resource BDT policy configuration.

This method shall support the URI query parameters, request and response data structures, and response codes, as specified in the table 7.4.1.2.12.3.1-1 and table 7.4.1.2.12.3.1-2.

Table 7.4.1.2.12.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.12.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BdtPolConfig	M	1	200 OK	Successful case. A representation of the requested "Individual BDT Policy Configuration" resource is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.12.3.2 PUT

This method enables a service consumer to request the update of an existing "Individual BDT Policy Configuration" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.12.3.2-1.

Table 7.4.1.2.12.3.2-1: 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 7.4.1.2.12.3.2-2 and the response data structures and response codes specified in table 7.4.1.2.12.3.2-3.

Table 7.4.1.2.12.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
BdtPolConfig	M	1	Represents the updated representation of the "Individual BDT Policy Configuration" resource.

Table 7.4.1.2.12.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BdtPolConfig	M	1	200 OK	Successful case. The targeted "Individual BDT Policy Configuration" resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The targeted "Individual BDT Policy Configuration" resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.12.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.13.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.12.3.3 PATCH

This method enables a service consumer to request the modification of an existing "Individual BDT Policy Configuration" resource managed by the NRM Server.

This method shall support the URI query parameters specified in table 7.4.1.2.12.3.3-1.

Table 7.4.1.2.12.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.4.1.2.12.3.3-2 and the response data structures and response codes specified in table 7.4.1.2.12.3.3-3.

Table 7.4.1.2.12.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
BdtPolConfigPatch	M	1	Represents the requested modifications to the "Individual BDT Policy Configuration" resource.

Table 7.4.1.2.12.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
BdtPolConfig	M	1	200 OK	Successful case. The targeted "Individual BDT Policy Configuration" resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The targeted "Individual BDT Policy Configuration" resource is successfully modified and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM Server. Redirection handling is defined in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.12.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

Table 7.4.1.2.12.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains an alternative URI of the resource located in an alternative NRM Server.

7.4.1.2.12.3.4 DELETE

The DELETE method deletes the resource related to the BDT policy configuration.

This method shall support the URI query parameters, request and response data structures, and response codes, as specified in the table 7.4.1.12.3.4-1 and table 7.4.1.2.12.3.4-2.

Table 7.4.1.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.3.3.4-3: 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 BDT policy Configuration" resource was deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative network resource management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative network resource management server.

Table 7.4.1.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative network resource management server.

7.4.1.2.12.4 Resource Custom Operations

None.

7.4.1.2.13 Resource: Unified Traffic Pattern Subscriptions

7.4.1.2.13.1 Description

This resource represents the collection of Unified Traffic Patterns Subscriptions managed by the NRM Server.

7.4.1.2.13.2 Resource definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/unif-traff-subscriptions**

This resource shall support the resource URI variables defined in table 7.4.1.2.13.2-1.

Table 7.4.1.2.13.2-1: Resource URI variables for resource " Unified Traffic Pattern Subscriptions"

Name	Data type	Definition
apiRoot	string	See clause 6.5.

7.4.1.2.13.3 Resource methods

7.4.1.2.13.3.1 POST

This method enables to request the creation of a new "Individual Unified Traffic Pattern Subscription" resource at the NRM Server

This method shall support the URI query parameters specified in the table 7.4.1.2.13.3.1-1.

Table 7.4.1.2.13.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	Cardinality	Remarks

This method shall support the request and response data structures and response codes specified in the table 7.4.1.2.13.3.1-2 and table 7.4.1.2.13.3.1-3.

Table 7.4.1.2.13.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
UnfTrafficSubc	M	1	Represents the parameters to request the creation of a new "Individual Unified Traffic Pattern Subscription" resource.

Table 7.4.1.2.13.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UnfTrafficSubc	M	1	201 Created	Successful case. The requested Unified Traffic Pattern Subscription is successfully created and a representation of the created "Individual Unified Traffic Pattern Subscription" resource is returned in the response body. The URI of the created resource shall also be returned in an HTTP "Location" header.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.13.3.1-4: 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>/ unif-traff-subscriptions/{unfTrffSubId}

7.4.1.2.14 Resource: Individual Unified Traffic Pattern Subscription

7.4.1.2.14.1 Description

This resource represents an "Individual Unified Traffic Pattern Subscription" resource managed by the NRM Server.

7.4.1.2.14.2 Resource definition

Resource URI: **{apiRoot}/ss-nra/<apiVersion>/unif-traff-subscriptions/{unfTrffSubId}**

This resource shall support the resource URI variables defined in table 7.4.1.2.14.2-1.

Table 7.4.1.2.14.2-1: Resource URI variables for resource "Individual BDT Policy Config"

Name	Data type	Definition
apiRoot	string	See clause 6.5.
unfTrffSubId	string	Represents the identifier of the "Individual Unified Traffic Pattern Subscription" resource.

7.4.1.2.14.3 Resource methods

7.4.1.2.14.3.1 GET

The GET method allows to retrieve an existing "Individual Unified Traffic Pattern Subscription" resource at the NRM Server.

This method shall support the URI query parameters specified in the table 7.4.1.2.14.3.1-1.

Table 7.4.1.2.14.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	Cardinality	Remarks

This method shall support the request and response data structures and response codes specified in the table 7.4.1.2.14.3.1-2 and table 7.4.1.2.14.3.1-3.

Table 7.4.1.2.14.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.14.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UnfTrafficSubc	M	1	200 OK	Successful case. The requested "Individual Unified Traffic Pattern Subscription" resource is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.14.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

Table 7.4.1.2.14.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

7.4.1.2.14.3.2 PUT

The PUT method allows to update an existing "Individual Unified Traffic Pattern Subscription" resource at the NRM Server.

This method shall support the URI query parameters specified in the table 7.4.1.2.14.3.2-1.

Table 7.4.1.2.14.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	Cardinality	Remarks

This method shall support the request and response data structures and response codes specified in the table 7.4.1.2.14.3.2-2 and table 7.4.1.2.14.3.2-3.

Table 7.4.1.2.14.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
UnfTrafficSubc	M	1	Contains the updated representation of the "Individual Unified Traffic Pattern Subscription" resource.

Table 7.4.1.2.14.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UnfTrafficSubc	M	1	200 OK	Successful case. The "Individual Unified Traffic Pattern Subscription" resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual Unified Traffic Pattern Subscription" resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.14.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

Table 7.4.1.2.14.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

7.4.1.2.14.3.3 PATCH

The PATCH method allows to modify an existing "Individual Unified Traffic Pattern Subscription" resource at the NRM Server.

This method shall support the URI query parameters specified in the table 7.4.1.2.14.3.3-1.

Table 7.4.1.2.14.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	Cardinality	Remarks

This method shall support the request and response data structures and response codes specified in the table 7.4.1.2.14.3.3-2 and table 7.4.1.2.14.3.3-3.

Table 7.4.1.2.14.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
UnfTrafficSubcPatch	M	1	Contains the requested modifications to the "Individual Unified Traffic Pattern Subscription" resource.

Table 7.4.1.2.14.3.3-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
UnfTrafficSubc	M	1	200 OK	Successful case. The "Individual Unified Traffic Pattern Subscription" resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual Unified Traffic Pattern Subscription" resource is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.14.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

Table 7.4.1.2.14.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

7.4.1.2.14.3.4 DELETE

The DELETE method allows to delete an existing "Individual Unified Traffic Pattern Subscription" resource at the NRM Server.

This method shall support the URI query parameters specified in the table 7.4.1.2.14.3.4-1.

Table 7.4.1.2.14.3.4-1: URI query parameters supported by the POST method on this resource

Name	Data type	Cardinality	Remarks

This method shall support the request and response data structures and response codes specified in the table 7.4.1.2.14.3.4-2 and table 7.4.1.2.14.3.4-3.

Table 7.4.1.2.14.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.1.2.14.3.4-3: 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 Unified Traffic Pattern Subscription" resource is successfully deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2.14.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

Table 7.4.1.2.14.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative NRM server.

7.4.1.2.14.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

7.4.1.2A Custom Operations without associated resources

7.4.1.2A.1 Overview

The structure of the custom operation URIs of the SS_NetworkResourceAdaptation API is shown in Figure 7.4.1.2A.1-1.

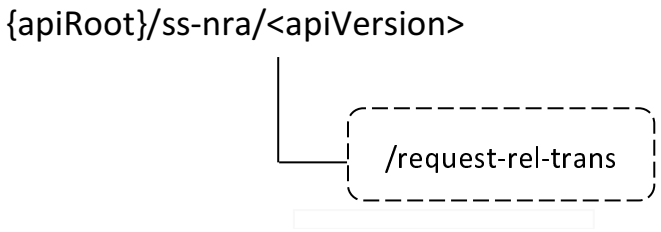

Figure 7.4.1.2A.1-1: Custom operation URI structure of the SDD_Transmission API

Table 7.4.1.2A.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the SS_NetworkResourceAdaptation API.

Table 7.4.1.2A.1-1: Custom operations without associated resources

Custom operation name	Custom operation URI	Mapped HTTP method	Description
RelTransRequest	/request-rel-trans	POST	Enables a service consumer to request reliable transmission service.

The custom operations shall support the URI variables defined in table 7.4.1.2A.1-2.

Table 7.4.1.2A.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 7.4.1.1.

7.4.1.2A.2 Operation: RelTransRequest

7.4.1.2A.2.1 Description

The custom operation enables a service consumer to request reliable transmission service to the NRM Server.

7.4.1.2A.2.2 Operation Definition

This operation shall support the request data structures specified in table 7.4.1.2A.2.2-1 and the response data structures and response codes specified in table 7.4.1.2A.2.2-2.

Table 7.4.1.2A.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
RelTransReq	M	1	Contains the parameters to request reliable transmission service.

Table 7.4.1.2A.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The reliable transmission service request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NRM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative NRM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2]
NOTE: The manadatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.1.2A.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative NRM Server.

Table 7.4.1.2A.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative NRM Server.

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} (NOTE)	POST	Report User Plane delivery mode.
Unified_Traffic_Pattern_Notification	{notifUri}	POST	Report UE unified traffic pattern monitoring and management event(s).
NOTE: This notification is used for both multicast resource management for EPS and multicast/broadcast resource management for 5GS. The "notifUri" is hence either provided via the Request_Multicast_Resource service operation for the former case, or the CreateMBSResource/UpdateMBSResource service operation for the latter case.			

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	Represents the content of the user plane delivery mode notification.

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.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.4.1.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.4.1.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.4.1.3.3 BDT_Negotiation_Notification

7.4.1.3.3.1 Description

7.4.1.3.3.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.4.1.3.3.2-1.

Table 7.4.1.3.3.2-1: 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 7.4.1.3.3.2-2 and the response data structures and response codes specified in table 7.4.1.3.3.2-3.

Table 7.4.1.3.3.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
BdtNotification	M	1	Represents the negotiated BDT policy notification.

Table 7.4.1.3.3.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.4.1.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.4.1.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.4.1.3.4 Unified_Traffic_Pattern_Notification

7.4.1.3.4.1 Description

7.4.1.3.4.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.4.1.3.4.2-1.

Table 7.4.1.3.4.2-1: 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 7.4.1.3.4.2-2 and the response data structures and response codes specified in table 7.4.1.3.4.2-3.

Table 7.4.1.3.4.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
UnfTrafficUpdNotif	M	1	Represents the Unified Traffic Pattern Notification

Table 7.4.1.3.4.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Notification is successfully received and acknowledged.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.4.1.3.4.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.4.1.3.4.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

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
AppTraffDesc	7.4.1.4.2.29	Represents the application traffic descriptor.	
BdtPolConfig	7.4.1.4.2.18	Represents the parameters related to the BDT Policy Configuration Resource.	
BdtNotification	7.4.1.4.2.20	Represents the negotiated BDT Policy notification.	
DeliveryMode	7.4.1.4.3.2	Indicates the delivery mode.	
GeoArea	7.4.1.4.2.19	Represents the Geographic Area.	
EpsMbmsInfo	7.4.1.4.3.0A	Represents the EPS MBMS bearer information.	
ManagementSubc	7.4.1.4.2.25	Represents the unified traffic pattern management subscription details.	
MbsResAct	7.4.1.4.2.16	Represents the parameters related to the activation of the MBS Resource.	
MbsResDeact	7.4.1.4.2.17	Represents the parameters related to the deactivation of the MBS Resource.	
MbsResource	7.4.1.4.2.12	Represents an MBS Resource.	
MbsResourcePatch	7.4.1.4.2.15	Represents the parameters to request the modification of an MBS Resource.	
MbsResourceReq	7.4.1.4.2.11	Represents the parameters to request the creation of an MBS Resource.	
MbsResourceRespInfo	7.4.1.4.2.13	Represents NRM Server side information related to the MBS Resource.	
MbsResourceResp	7.4.1.4.2.14	Represents a response to an MBS Resource creation/modification request.	
MulticastSubscription	7.4.1.4.2.2	Represents a multicast subscription.	
NetSysIndicator	7.4.1.4.3.4	Represents the network system indicator, i.e. 5GS, EPS or both.	
NrmEvent	7.4.1.4.3.3	Indicates the NRM event.	
NrmEventNotification	7.4.1.4.2.5	Represents a notification on an individual User Plane event.	
RelTransReq	7.4.1.4.2.28	Represents the parameters to request reliable transmission service.	
ServiceAnnoucementMode	7.4.1.4.3.1	Indicates the service announcement mode.	
StreamSpecification	7.4.1.4.2.9	Represents a stream specification that includes MAC addresses of the source and destination DS-TT ports.	
TrafficPatternIndication	7.4.1.4.3.7	Represents the traffic pattern indication requests.	
TrafficPatternConfig	7.4.1.4.2.26	Represents the traffic pattern configuration of the VAL service.	
TrafficSpecification	7.4.1.4.2.10	Represents the traffic class supported by the DS-TTs and available end-to-end maximum latency value.	
TrafficSpecInformation	7.4.1.4.2.7	Represents the traffic class supported by the DS-TTs and available end-to-end latency value and Priority Code Point (PCP) value.	
TscStreamAvailability	7.4.1.4.2.8	Represents the TSC stream availability information including the stream specification and list of traffic specifications.	
TscStreamData	7.4.1.4.2.6	Represents the TSC stream data information.	
UnfTrafficSubc	7.4.1.4.2.23	Represents the Unified Traffic Pattern Subscription.	
UnfTrafficSubcPatch	7.4.1.4.2.24	Represents the Unified Traffic Pattern Subscription Patch.	
UnfTrafficUpdNotif	7.4.1.4.2.27	Represents the Unified Traffic Pattern Notification.	
UnicastSubscription	7.4.1.4.2.3	Represents a unicast subscription.	
UserPlaneNotification	7.4.1.4.2.4	Represents a notification on User Plane events.	
ValUeAddrInfo	7.4.1.4.2.30	Represents VAL UE address information.	

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
ConnInfo	3GPP TS 29.548 [35]	Represents the data transmission connection information.	
DateTime	3GPP TS 29.571 [21]	Used to represent the subscription duration.	
DurationSec	3GPP TS 29.122 [3]	Used to represent the duration in seconds.	
ExternalGroupId	3GPP TS 29.122 [3]	Represents an External Group Identifier.	
ExternalMbsServiceArea	3GPP TS 29.571 [21]	Represents an MBS Service Area.	
GeographicArea	3GPP TS 29.572 [31]	Represents Geographical area.	
CivicAddress	3GPP TS 29.572 [31]	Represents civic address of an area.	
Ipv4Addr	3GPP TS 29.571 [21]	Used to identify the IPv4 address.	
Ipv6Addr	3GPP TS 29.571 [21]	Used to identify the IPv6 address.	
LocalMbmsInfo	3GPP TS 29.486 [27]	Used to represent the local MBMS information.	
MacAddr48	3GPP TS 29.571 [21]	Used to identify a MAC address.	
MbmsLocArea	3GPP TS 29.122 [3]	Used to indicate the requested area of the MBMS bearer.	
MbsServiceInfo	3GPP TS 29.571 [21]	Represents MBS Service Information.	
MbsSession	3GPP TS 29.571 [21]	Represents an MBS Session.	
MbsSessionId	3GPP TS 29.571 [21]	Represents the identifier of an MBS Session.	
Port	3GPP TS 29.122 [3]	Used to identify the port.	
ProblemDetails	3GPP TS 29.571 [21]	Represents error related information.	
ScheduledCommunicationTime	3GPP TS 29.122 [3]	Used to define the schedules for traffic pattern configurations.	
SupportedFeatures	3GPP TS 29.571 [21]	Used to negotiate the supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [3]	Represents a time interval.	
TransportProtocol	3GPP TS 29.558 [43]	Represents the transport layer protocol.	
UsageThreshold	3GPP TS 29.122 [3]	Represents the data usage threshold.	
Uint32	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uinteger	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uri	3GPP TS 29.571 [21]	Used to indicate the notification URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Used to identify either a VAL User ID or a VAL UE ID.	
WebsockNotifConfig	3GPP TS 29.122 [3]	Used to indicate the configuration parameters to set up notification delivery over Websocket protocol.	

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.	
localMbmsInfo	LocalMbmsInfo	O	0..1	Contains the local MBMS information. This attribute may be present only within the trust domain.	LocalMBMS
localMbmsActInd	boolean	O	0..1	Set to true to indicate that the local MBMS is activated. Set to false or omitted otherwise.	LocalMBMS
notifUri	Uri	M	1	Identifies the notification URI where the NRM notification shall be sent to.	
reqTestNotif	boolean	O	0..1	Set to true to request the VAE server to send a test notification as defined in clause 6.6. 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 6.6.	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	ValTarget Ue	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 to request the VAE server to send a test notification as defined in clause 6.6. Set to false or omitted otherwise.	Notification_test_event
wsNotifCfg	Websock NotifConfi g	O	0..1	Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.6.	Notification_websocket
suppFeat	Supported Features	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(NrmEventNotifi cation)	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, EPS MBMS multicast mode, 5GS MBS multicast mode or 5GS MBS broadcast mode. This attribute shall be present if the "event" attribute is set to "UP_DELIVERY_MODE".	
streamIds	array(string)	O	1..N	Indicates the media streams (unicast or multicast) to be used. This attribute may be present if the "event" attribute is set to "UP_DELIVERY_MODE" and the NRM Server already has the streams available.	
mbsResServiceArea	ExternalMbsServiceArea	O	0..1	Contains the Service Area of the MBS Resource where the reported delivery mode is applied. This attribute may be present only if the "deliveryMode" attribute is present and set to either "MBS_MULTICAST" or "MBS_BROADCAST".	SEAL_3

7.4.1.4.2.6 Type: TscStreamData

Table 7.4.1.4.2.6-1: Definition of type TscStreamData

Attribute name	Data type	P	Cardinality	Description	Applicability
streamSpec	StreamSpecification	M	1	Stream specification includes MAC addresses of the source and destination DS-TT ports.	
trafficSpecInfo	TrafficSpecInformation	M	1	Traffic Specification Information includes Priority Code Point (PCP), MaxFrameInterval, MaxFrameSize, MaxIntervalFrames, MaxLatency, etc. (e.g. as described in IEEE 802.1Qcc [29] in clause 46.2).	

7.4.1.4.2.7 Type: TrafficSpecInformation

Table 7.4.1.4.2.7-1: Definition of type TrafficSpecInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
pcpValue	Uint32	M	1	The Priority Code Point (PCP) value identify the traffic class, with value between 0 to 7.	
maxFramInt	DurationSec	M	1	Maximum Frame Interval.	
maxFramSize	Uint32	M	1	Maximum frame size will transmit, excluding the overhead.	
maxIntFrames	Uint32	M	1	Maximum interval frames.	
maxLatency	Uint32	M	1	Indicates the end-to-end latency (including the UE-DS-TT residence times, UPF residence time, and propagation delays) in milliseconds.	

7.4.1.4.2.8 Type: TscStreamAvailability

Table 7.4.1.4.2.8-1: Definition of type TscStreamAvailability

Attribute name	Data type	P	Cardinality	Description	Applicability
streamSpec	StreamSpecification	M	1	Stream specification includes MAC addresses of the source and destination DS-TT ports.	
trafficSpecs	array(TrafficSpecification)	M	1..N	The traffic classes supported by the DS-TTs and available end-to-end maximum latency values.	

7.4.1.4.2.9 Type: StreamSpecification

Table 7.4.1.4.2.9-1: Definition of type StreamSpecification

Attribute name	Data type	P	Cardinality	Description	Applicability
srcMacAddr	MacAddr48	M	1	The MAC address of the source DS-TT port.	
dstMacAddr	MacAddr48	M	1	The MAC address of the destination DS-TT port.	

7.4.1.4.2.10 Type: TrafficSpecification

Table 7.4.1.4.2.10-1: Definition of type TrafficSpecification

Attribute name	Data type	P	Cardinality	Description	Applicability
trafficClass	Uint32	M	1	The traffic class supported by the DS-TTs with value between 0 to 7.	
e2eMaxLatency	Uinteger	M	1	Indicates the end to end maximum latency (including the UE-DS-TT residence times, UPF residence time, and propagation delays), in the units of milliseconds.	

7.4.1.4.2.11 Type: MBSResourceReq

Table 7.4.1.4.2.11-1: Definition of type MBSResourceReq

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsResource	MBSResource	M	1	Contains the parameters to request the creation of the MBS Resource.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.4.1.6. This attribute shall be present only when feature negotiation needs to take place.	

7.4.1.4.2.12 Type: MBSResource

Table 7.4.1.4.2.12-1: Definition of type MBSResource

Attribute name	Data type	P	Cardinality	Description	Applicability
valGroupId	string	C	0..1	Contains the identity of the VAL group to which the MBS Resource is related. (NOTE 1)	
valUeIdsList	array(ValTargetUe)	C	1..N	Contains the list of the identitier(s) of the VAL UE(s) to which the MBS Resource is related. (NOTE 1)	
servAnmtMode	ServiceAnnoucementMode	M	1	Contain the MBS Service Announcement mode to be used, i.e. whether the MBS Service Announcement is delivered by the NRM Server or the VAL Server.	
mbsResServInfo	MbsServiceInfo	M	1	Contains the MBS Service Information for the MBS Resource.	
mbsResServiceArea	ExternalMbsServiceArea	O	0..1	Contains the Service Area of the MBS Resource.	
notifUri	Uri	M	1	Contains the URI towards which the user plane delivery mode notifications shall be sent.	
netSysInd	NetSysIndicator	O	0..1	Indicates whether the MBS Resource requires multicast/broadcast services from 5GS, EPS or both.	
localMbmsInfo	LocalMbmsInfo	O	0..1	Contains the local MBMS information. This attribute may only be provided if the "netSysInd" attribute is set to "EPS" or "5GS_AND_EPS". (NOTE 2)	
localMbmsActInd	boolean	O	0..1	Set to true by the service consumer to indicate that the local MBMS is activated. Set to false or omitted otherwise. (NOTE 2)	
mbsResRespInfo	MBSResourceRespInfo	O	0..1	Represents the NRM Server side information related to the created MBS Resource. This attribute may only be present in the response to the request to create/update/modify/retrieve the MBS Resource.	
NOTE 1: These attributes are mutually exclusive. Either one of them shall be present. NOTE 2: These attributes are mutually exclusive. Either one of them may be present.					

7.4.1.4.2.13 Type: MBSResourceRespInfo

Table 7.4.1.4.2.13-1: Definition of type MBSResourceRespInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mbs5gSessionId	MbsSessionId	O	0..1	Contains the identifier of the MBS session (i.e. TMGI and/or SSM, in addition to the NID in the case an SNPN). This attribute may not be present if the MBS Service Announcement is delivered by the NRM Server (i.e. the "servAnmtMode" attribute in the corresponding request is set to "NRM").	
mbmsBearerId	MbsSessionId	O	0..1	Contains the identifier of the MBMS bearer (i.e. TMGI). This attribute may not be present if the MBS Service Announcement is delivered by the NRM Server (i.e. the "servAnmtMode" attribute in the corresponding request is set to "NRM").	
upIpv4Addr	Ipv4Addr	C	0..1	Contains the user plane IPv4 address of the NRM Server to be used by the VAL Server for downlink packets delivery. (NOTE 1)	
upIpv6Addr	Ipv6Addr	C	0..1	Contains the user plane IPv6 address of the NRM Server to be used by the VAL Server for downlink packets delivery. (NOTE 1)	
upPortNum	Port	O	0..1	Contains the user plane UDP port number to be used by VAL Server for downlink packets delivery.	
mbs5GInfo	MbsSession	O	0..1	Contains MBS related configuration information. This attribute may only be present if the network system used for multicast/broadcast services is 5GS or both 5GS and EPS.	
epsMbmsInfo	EpsMbmsInfo	O	0..1	Contains MBMS related configuration information. This attribute may only be present if the network system used for multicast/broadcast services is EPS or both 5GS and EPS.	
NOTE 1: At least one of these attributes shall be present.					

7.4.1.4.2.14 Type: MBSResourceResp

Table 7.4.1.4.2.14-1: Definition of type MBSResourceResp

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsResource	MBSResource	M	1	Contains the the created MBS Resource.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.4.1.6. This attribute shall be present only when feature negotiation is taking place.	

7.4.1.4.2.15 Type: MBSResourcePatch

Table 7.4.1.4.2.15-1: Definition of type MBSResourcePatch

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsResServInfo	MbsServiceInfo	O	0..1	Contains the updated MBS Service Information for the MBS Resource.	
mbsResServiceArea	ExternalMbsServiceArea	O	0..1	Contains the updated Service Area of the MBS Resource.	
notifUri	Uri	O	0..1	Contains the URI towards which the user plane delivery mode notifications shall be sent.	
localMbmsInfo	LocalMbmsInfo	O	0..1	Contains the local MBMS information. This attribute may only be provided if the "netSysInd" attribute is set to "EPS" or "5GS_AND_EPS". (NOTE)	
localMbmsActInd	boolean	O	0..1	Set to true by the service consumer to indicate that the local MBMS is activated. Set to false or omitted otherwise. (NOTE)	
NOTE: These attributes are mutually exclusive. Either one of them may be present.					

7.4.1.4.2.16 Type: MbsResAct

Table 7.4.1.4.2.16-1: Definition of type MbsResAct

Attribute name	Data type	P	Cardinality	Description	Applicability
mbs5gSessionId	MbsSessionId	M	1	Contains the identifier of the MBS session to be activated.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.4.1.6. This attribute shall be present only when feature negotiation needs to take place.	

7.4.1.4.2.17 Type: MbsResDeact

Table 7.4.1.4.2.17-1: Definition of type MbsResDeact

Attribute name	Data type	P	Cardinality	Description	Applicability
mbs5gSessionId	MbsSessionId	M	1	Contains the identifier of the MBS session to be deactivated.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.4.1.6. This attribute shall be present only when feature negotiation needs to take place.	

7.4.1.4.2.18 Type: BdtPolConfig

Table 7.4.1.4.2.18-1: Definition of type BdtPolConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	M	1	Identifies a VAL Service.	
valGroupId	string	C	0..1	Identifies a group of UEs. (NOTE)	
valUeIds	array(string)	C	1..N	Represents a List of VAL UEs whose BDT policy is provided. (NOTE)	
dataVolUe	UsageThreshold	M	1	Represents the Data volume per UE for BDT.	
desiredTimeWindow	TimeWindow	M	1	Represents the desired time window for BDT.	
grantTimeWindow	TimeWindow	C	0..1	Represents the granted time window by the 3GPP network for BDT. This attribute may be present only in the responses.	
desiredGeoArea	GeoArea	M	1	Represents the desired geographical area for BDT.	
expTime	DurationSec	O	0..1	Represents the expiration time for the background data transfer request.	
policyGuidance	array(PolicyGuidance)	O	0..N	Represents a list of policy guidance. If no value is included, NRM server may use local policies.	
bdtPolRefId	string	C	0..1	Identifies a BDT policy reference identifier. This attribute may be present only in the responses.	
notifUri	Uri	M	1	Identifies the destination notification URI where the NRM notification shall be sent to.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	
NOTE: Either one of the "valGroupId" or "valUeIds" attribute shall be present.					

7.4.1.4.2.19 Type: GeoArea

Table 7.4.1.4.2.19-1: Definition of type GeoArea

Attribute name	Data type	P	Cardinality	Description	Applicability
geographicalAreas	array(GeographicArea)	O	1..N	Represents a list of Geographical area.	
civicAddress	array(CivicAddress)	O	1..N	Represents a list of Civic address of an area.	

7.4.1.4.2.20 Type: BdtNotification

Table 7.4.1.4.2.20-1: Definition of type BdtNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
notifId	Uri	M	1	The BDT policy configuration resource Uri to which this notification is related.	
bdtConfigId	string	M	0..1	Identifies the BDT policy configuration to which the notification is related.	
grantTimeWindow	TimeWindow	C	0..1	Represents the updated time window granted by the 3GPP network for BDT. This attribute shall be present only if the "bdtPolicyRemoveInd" attribute value is not present, or preset and set to "false".	
bdtPolicyRemoveInd	boolean	O	0..1	Indicates whether the BDT policy at the 3GPP network correponding to the BDT policy reference identifier has been removed. When present, it shall be set as follows: - "true": The BDT policy was removed by the 3GPP network. - "false": the BDT policy was not removed at the 3GPP network. - Default value when omitted is "false".	

7.4.1.4.2.21 Type: BdtPolConfigPatch

Table 7.4.1.4.2.21-1: Definition of type BdtPolConfigPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
dataVolUe	UsageThreshold	O	0..1	Represents the Data volume per UE for BDT.	
desiredTimeWindow	TimeWindow	O	0..1	Represents the desrired time window for BDT.	
desiredGeoArea	GeoArea	O	0..1	Represents the desired geographical area for BDT.	
expTime	DurationSec	O	0..1	Represents the expiration time for the background data transfer request.	
policyGuidance	array(PolicyGuidance)	O	0..N	Represents a list of policy guidance.	

7.4.1.4.2.22 Type: PolicyGuidance

Table 7.4.1.4.2.22-1: Definition of type PolicyGuidance

Attribute name	Data type	P	Cardinality	Description	Applicability
policyType	PolicyType	O	0..1	Indicates the policy type.	
cost	UInteger	C	0..1	Represents the cost associated with the policy type and shall be included when the value of the "policyType" attribute is set to "HIGH_THROUGHPUT_WITH_COST"	

7.4.1.4.2.23 Type: UnfTrafficSubc

Table 7.4.1.4.2.21-1: Definition of type UnfTrafficSubc

Attribute name	Data type	P	Cardinality	Description	Applicability
mgmtSubs	map(ManagementSubc)	M	1..N	Represent the list of UE unified traffic pattern management subscriptions. The key of the map shall be any unique string encoded value.	
notifUri	Uri	M	1	Identifies the destination notification URI where the notifications shall be sent to.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

7.4.1.4.2.24 Type: UnfTrafficSubcPatch

Table 7.4.1.4.2.22-1: Definition of type UnfTrafficSubcPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
mgmtSubs	map(ManagementSubc)	0	1..N	Represent the list of UE unified traffic pattern management subscriptions. The key of the map shall be any unique string encoded value and shall be set to the same value as the one received during creation of the corresponding resource.	
notifUri	Uri	0	1	Identifies the updated destination notification URI where the notifications shall be sent to.	

7.4.1.4.2.25 Type: ManagementSubc

Table 7.4.1.4.2.23-1: Definition of type ManagementSubc

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	M	1	Identifies a VAL Service.	
valUeIds	array(string)	M	1..N	Represents a List of VAL UE(s) for which unified traffic pattern subscription is requested.	
traffPatInd	array(TrafficPatternIndication)	M	1..N	Represents the traffic pattern indications.	
traffPatConfig	TrafficPatternConfig	O	0..1	Contains the traffic pattern configuration of the VAL service for the UE(s) provided within the "valUeIds" attribute.	

7.4.1.4.2.26 Type: TrafficPatternConfig

Table 7.4.1.4.2.24-1: Definition of type TrafficPatternConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
scheds	array(ScheduledCommunicationTime)	O	1..N	Contains the list of schedule(s) applicable to the traffic patterns of the VAL service for the concerned UE(s).	
expTime	DateTime	O	0..1	Identifies the absolute time at which the VAL traffic pattern parameter configuration expires. When omitted, it indicates that the VAL traffic pattern parameter configuration never expires.	
stationaryInd	boolean	O	0..1	Contains the stationary indication. - Set to "true" to indicate that the UE(s) are expected to be stationary while communicating using this traffic pattern configuration. - Set to "false" or omitted, to indicate that the UE(s) are expected to be mobile while communicating using this traffic pattern configuration. - The Default value is "false" when this attribute is omitted.	

7.4.1.4.2.27 Type: UnfTrafficUpdNotif

Table 7.4.1.4.2.25-1: Definition of type UnfTrafficUpdNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
valUeIds	array(string)	M	1..N	Represents the list of VAL UEs to which the unified traffic pattern update notification is related.	
sched	ScheduledCommunicationTime	O	0..1	Contains the schedule applicable to the unified traffic patterns of the UE(s) provided within the "valUeIds" attribute, and indicates the times or durations of UE availability.	
stationInd	boolean	O	0..1	Contains the stationary indication. - Set to "true" to indicate that the UE(s) are expected to be stationary while communicating using this traffic pattern configuration. - Set to "false" or omitted, to indicate that the UE(s) are expected to be mobile while communicating using this traffic pattern configuration. - The Default value is "false" when this attribute is omitted.	
cause	string	C	0..1	This attribute shall be present when the notification is provided to inform of a parameter configuration applied by the network which is incompatible with the existing Traffic Patterns. The attribute may be present when the notification informs of UE unified traffic pattern updates, providing additional information on the reason for the UE unified traffic pattern update (e.g. monitoring events received).	

7.4.1.4.2.28 Type: RelTransReq

Table 7.4.1.4.2.28-1: Definition of type RelTransReq

Attribute name	Data type	P	Cardinality	Description	Applicability
appDescs	array(AppTraffDesc)	O	1..N	Contains the application traffic descriptors of the service consumer, which are used to establish redundant transmission paths. (NOTE)	
valUeId	string	O	0..1	Contains the unique identifier of the concerned VAL UE.	
valAddrInfo	ValUeAddrInfo	O	0..1	Contains the address information of the concerned VAL UE.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.4.1.6. This attribute shall be present only when feature negotiation needs to take place.	
NOTE: In this release of this specification, this attribute shall not contain more than two array elements.					

7.4.1.4.2.29 Type: AppTraffDesc

Table 7.4.1.4.2.29-1: Definition of type AppTraffDesc

Attribute name	Data type	P	Cardinality	Description	Applicability
connInfo	ConnInfo	M	1	Contains the data transmission connection information, i.e., address/port and/or URI via which application traffic is exchanged.	
transProtoc	TransportProtocol	O	0..1	Represents the transport layer protocol via which application traffic is exchanged.	

7.4.1.4.2.30 Type: ValUeAddrInfo

Table 7.4.1.4.2.30-1: Definition of type ValUeAddrInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
valUeIpv4Addr	Ipv4Addr	C	0..1	Contains the IPv4 address of the targeted VAL UE. (NOTE)	
valUeIpv6Addr	Ipv6Addr	C	0..1	Contains the IPv6 address of the targeted VAL UE. (NOTE)	
port	Port	O	0..1	Contains the port information of the targeted VAL UE.	
NOTE: These attributes are mutually exclusive. Either one of them shall be present.					

7.4.1.4.3 Simple data types and enumerations

7.4.1.4.3.0 Introduction

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

7.4.1.4.3.0A Simple data types

The simple data types defined in table 7.4.1.4.3.0A-1 shall be supported.

Table 7.4.1.4.3.0A-1: Simple data types

Type Name	Type Definition	Description	Applicability
EpsMbmsInfo	Bytes	Represents the EPS MBMS bearer information encoded as specified in clause 6.4.7 of 3GPP TS 29.468 [23].	

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	Indicates Unicast delivery.	
MULTICAST	Indicates EPS MBMS Multicast delivery.	
MBS_MULTICAST	Indicates 5GS MBS Multicast delivery.	SEAL_3
MBS_BROADCAST	Indicates 5GS MBS Broadcast delivery.	SEAL_3

7.4.1.4.3.4 Enumeration: NetSysIndicator

Table 7.4.1.4.3.4-1: Enumeration NetSysIndicator

Enumeration value	Description	Applicability
5GS	Indicates that the network system is 5GS.	
EPS	Indicates that the network system is EPS.	
5GS_AND_EPS	Indicates that the network system is both 5GS and EPS.	

7.4.1.4.3.5 Enumeration: NrmEvent

Table 7.4.1.4.3.5-1: Enumeration NrmEvent

Enumeration value	Description	Applicability
UP_DELIVERY_MODE	User Plane delivery mode.	

7.4.1.4.3.6 Enumeration: PolicyType

Table 7.4.1.4.3.6-1: Enumeration PolicyType

Enumeration value	Description	Applicability
LOWEST_COST	Indicates that the policy guidance is to consider lowest cost.	
HIGH_THROUGHPUT_WITH_COST	Indicates that the policy guidance is to consider highest throughput.	

7.4.1.4.3.7 Enumeration: TrafficPatternIndication

Table 7.4.1.4.3.6-1: Enumeration TrafficPatternIndication

Enumeration value	Description	Applicability
TRAFFIC_PATTERN_MANAGE	Indicate that the management of the UE unified traffic pattern is requested.	
TRAFFIC_PATTERN_MONITOR	Indicate that UE unified traffic pattern monitoring related notifications is requested.	
NETWORK_PARAM_COORDINATION	Indicate that network parameter coordination by the NRM with 5GC is requested.	

7.4.1.5 Error Handling

7.4.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.4.1.5.2 Protocol Errors

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

7.4.1.5.3 Application Errors

The application errors defined for SS_NetworkResourceAdaptation API are listed in table 7.4.1.5.3-1.

Table 7.4.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability
INVALID_MBS_SERVICE_INFO	400 Bad Request	The provided MBS Service Information is invalid (e.g. invalid QoS reference), incorrect or insufficient to perform MBS policy authorization.	
FILTER_RESTRICTIONS_NOT_OBSERVED	400 Bad Request	The MBS IP flow(s) description provided within the MBS Service Information cannot be handled due to the restrictions defined in clause 5.3.8 of 3GPP TS 29.214 [44] not being observed.	
MBS_SERVICE_AREA_NOT_SUPPORTED	403 Forbidden	The requested MBS Service Area is not supported by the 3GPP Core Network.	
MBS_SERVICE_INFO_NOT_AUTHORIZED	403 Forbidden	The provided MBS Service Information is rejected.	

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.
3	LocalMBMS	Indicate the support of local MBMS transmission.
4	SEAL_3	This feature indicates the third set of enhancements to the SEAL Enabler Layer framework. Within this feature, the following enhancements are covered: - Support MBS resources management.

7.4.2 SS_NetworkResourceMonitoring API

7.4.2.1 API URI

The SS_NetworkResourceMonitoring service shall use the SS_NetworkResourceMonitoring 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-nrm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.4.2.2

7.4.2.2 Resources

7.4.2.2.1 Overview

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

Figure 7.4.2.2.1-1 depicts the resource URIs structure for the SS_NetworkResourceMonitoring API.

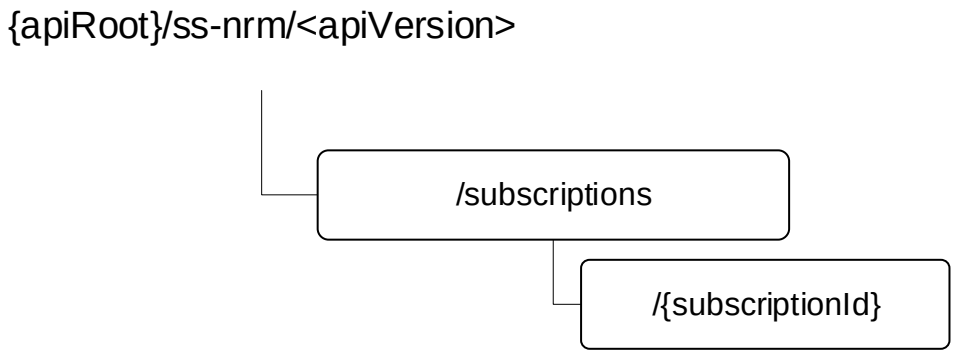

Figure 7.4.2.2.1-1: Resource URI structure of the SS_NetworkResourceMonitoring API

Table 7.4.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.4.2.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
Unicast Monitoring Subscriptions	/subscriptions	POST	Create individual unicast monitoring subscription resource or obtain unicast QoS monitoring data for VAL UEs, VAL Group, or VAL Streams.
Individual Unicast Monitoring Subscription	/subscriptions/{subscriptionId}	DELETE	Remove an existing individual unicast monitoring subscription resource according to the subscriptionId.
		GET	Read an existing individual unicast monitoring subscription resource according to the subscriptionId.
		PUT	Update an individual unicast monitoring subscription identified by the subscriptionId.
		PATCH	Modify an individual unicast monitoring subscription identified by the subscriptionId.

7.4.2.2.2 Resource: Unicast Monitoring Subscriptions

7.4.2.2.2.1 Description

7.4.2.2.2.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 7.4.2.2.2.2-1.

Table 7.4.2.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.4.2.1.

7.4.2.2.2.3 Resource Standard Methods

7.4.2.2.2.3.1 POST

This method enables a VAL Server to request the creation of a unicast QoS monitoring subscription at the NRM server. This method shall support the URI query parameters specified in table 7.4.2.2.2.3.1-1.

Table 7.4.2.2.2.3.1-1: 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 7.4.2.2.2.3.1-2 and the response data structures and response codes specified in table 7.4.2.2.2.3.1-3.

Table 7.4.2.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MonitoringSubscription	M	1	

Table 7.4.2.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MonitoringSubscription	M	1	201 Created	The requested individual monitoring subscription resource is successfully created and a representation of the created resource is returned in the response body.
MonitoringReport	M	1	200 OK	The requested unicast QoS monitoring data is returned.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.2.2.2.3.1-4: 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-nrm/<apiVersion>/subscriptions{subscriptionId}

7.4.2.2.4 Resource Custom Operations

None.

7.4.2.2.3 Resource: Individual Unicast Monitoring Subscription

7.4.2.2.3.1 Description

7.4.2.2.3.2 Resource Definition

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

This resource shall support the resource URI variables defined in table 7.4.2.2.3.2-1.

Table 7.4.2.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.4.2.1.
subscriptionId	string	Represents the identifier of an individual unicast monitoring subscription resource.

7.4.2.2.3.3 Resource Standard Methods

7.4.2.2.3.3.1 DELETE

This operation deletes the Individual Unicast Monitoring Subscription resource. This method shall support the URI query parameters specified in table 7.4.2.2.3.3.1-1.

Table 7.4.2.2.3.3.1-1: 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 7.4.2.2.3.3.1-2 and the response data structures and response codes specified in table 7.4.2.2.3.3.1-3.

Table 7.4.2.2.3.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.2.2.3.3.1-3: 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 Unicast Monitoring Subscription resource matching the subscriptionId is deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.4.2.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NRM server.

Table 7.4.2.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NRM server.

7.4.2.2.3.3.2 GET

This operation reads the individual unicast monitoring subscription resource. This method shall support the URI query parameters specified in table 7.4.2.2.3.3.2-1.

Table 7.4.2.2.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.4.2.2.3.3.2-2 and the response data structures and response codes specified in table 7.4.2.2.3.3.2-3.

Table 7.4.2.2.3.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.4.2.2.3.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MonitoringSubscription	M	1	200 OK	The requested individual unicast monitoring subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.4.2.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NRM server.

Table 7.4.2.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative NRM server.

7.4.2.2.3.3 PUT

This operation updates the "Individual Unicast Monitoring Subscription". This method shall support the URI query parameters specified in table 7.4.2.2.3.3.3-1.

Table 7.4.2.2.3.3.3-1: 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 7.4.2.2.3.3.3-2 and the response data structures and response codes specified in table 7.4.2.2.3.3.3-3.

Table 7.4.2.2.3.3.3-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MonitoringSubscription	M	1	Updated details of the unicast QoS monitoring subscription. The target identifiers, i.e., the "valUeIds", "valGroupId", and "valStreamIds" attributes shall not be changed in the MonitoringSubscription data structure.

Table 7.4.2.2.3.3.3-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MonitoringSubscription	M	1	200 OK	The subscription is updated successfully, and the updated subscription information returned in the response.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative NRM server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.4.2.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

Table 7.4.2.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative location management server.

7.4.2.2.3.3.4 PATCH

This operation modifies the "Individual Unicast Monitoring Subscription". This method shall support the URI query parameters specified in table 7.4.2.2.3.3.4-1.

Table 7.4.2.2.3.3.4-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.4.2.2.3.3.4-2 and the response data structures and response codes specified in table 7.4.2.2.3.3.4-3.

Table 7.4.2.2.3.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MonitoringSubscriptionPatch	M	1	Contains the modifications to be applied to the individual unicast QoS monitoring subscription resource.

Table 7.4.2.2.3.3.4-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MonitoringSubscription	M	1	200 OK	Individual unicast QoS monitoring subscription resource is modified successfully and representation of the modified individual unicast QoS monitoring subscription resource is returned.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.4.2.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.4.2.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

7.4.2.3 Notifications

7.4.2.3.1 General

Table 7.4.2.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Individual Unicast Monitoring Notification	{notifUri}	POST	Notify on updates of the individual monitoring resource accodring to the requested reporting settings.

7.4.2.3.2 Individual Unicast Monitoring Notification

7.4.2.3.2.1 Description

7.4.2.3.2.2 Notification definition

Callback URI: {**notifUri**}

This method shall support the URI query parameters specified in table 7.4.2.3.2.2-1.

Table 7.4.2.3.2.2-1: 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 7.4.2.3.2.2-2 and the response data structures and response codes specified in table 7.4.2.3.2.2-3.

Table 7.4.2.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MonitoringReport	M	1	Represents the reported monitoring data.

Table 7.4.2.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The notification is successfully received.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative VAL server where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.4.2.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

Table 7.4.2.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative VAL server towards which the notification should be redirected.

7.4.2.4 Data Model

7.4.2.4.1 General

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

Table 7.4.2.4.1-1 specifies the data types defined specifically for the SS_NetworkResourceMonitoring API service.

Table 7.4.2.4.1-1: SS_NetworkResourceMonitoring API specific Data Types

Data type	Section defined	Description	Applicability
FailureReport	7.4.2.4.2.9	Represents the failure report indicating the VAL UE(s) or VAL Stream ID(s) for which the NRM server failed to obtain the requested data.	
FailureReason	7.4.2.4.3.3	Represents the failure reason.	
MeasurementData	7.4.2.4.2.3	Presents the aggregated measurement data.	
MeasurementDataType	7.4.2.4.3.1	Indicates the requested measurement data type.	
MeasurementPeriod	7.4.2.4.2.4	Indicates the measurement time period.	
MeasurementRequirements	7.4.2.4.2.6	Indicates the measurement requirements.	
MonitoringReport	7.4.2.4.2.2	Indicates the monitoring report for VAL UEs list, VAL Group, or VAL Stream.	
MonitoringSubscription	7.4.2.4.2.7	The monitoring subscription request.	
MonitoringSubscriptionPatch	7.4.2.4.2.11	Represents the monitoring subscription modification request.	UpdateSupport
ReportingRequirements	7.4.2.4.2.5	Indicates the requested requirements of reporting.	
ReportingThreshold	7.4.2.4.2.10	Indicates a requested reporting threshold.	
TerminationMode	7.4.2.4.3.2	Indicates the termination mode.	
ThresholdHandlingMode	7.4.2.4.3.4	Indicates the multi-parameter threshold handling mode.	

Table 7.4.2.4.1-2 specifies data types re-used by the SS_NetworkResourceMonitoring API service.

Table 7.4.2.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AverWindow	3GPP TS 29.571 [21]	Used to represent an aggregation window.	
BitRate	3GPP TS 29.571 [21]	Used to represent a bit rate measurement value.	
DateTime	3GPP TS 29.571 [21]	Used to represent a date and time.	
DurationSec	3GPP TS 29.571 [21]	Used to represent a measurement timestamp and measurement start time.	
MatchingDirection	3GPP TS 29.520 [33]	Used to indicate a threshold matching direction.	
NotificationMethod	3GPP TS 29.508 [32]	Used to indicate the reporting mode.	
PacketLossRate	3GPP TS 29.571 [21]	Used to represent a packet loss rate measurement value.	
SupportedFeatures	3GPP TS 29.571 [21]	Used to negotiate the supported optional features of the API.	
Uinteger	3GPP TS 29.571 [21]	Used to represent integer attributes within MeasurementData and ReportingRequirements data structures.	
Uri	3GPP TS 29.571 [21]	Used to indicate the notification URI.	
ValTargetUe	clause 7.3.1.4.2.3	Used to identify either a VAL User ID or a VAL UE ID.	
WebsockNotifConfig	3GPP TS 29.122 [3]	Used to indicate the configuration parameters to set up notification delivery over Websocket protocol.	

7.4.2.4.2 Structured data types

7.4.2.4.2.1 Introduction

7.4.2.4.2.2 Type: MonitoringReport

Table 7.4.2.4.2.2-1: Definition of type MonitoringReport

Attribute name	Data type	P	Cardinality	Description	Applicability
valUeIds	array(ValTargetUe)	C	1..N	List of VAL UEs whose measurement data is provided (NOTE).	
valGroupId	string	C	0..1	The group ID used for the VAL group for which measurement data is provided (NOTE).	
valStreamIds	array(string)	C	1..N	List of VAL stream IDs whose measurement data (NOTE).	
measData	MeasurementData	M	1	The aggregated measurement data.	
timestamp	DateTime	M	1	The timestamp of the measurement.	
failureRep	array(FailureReport)	C	1..N	The failure report from the NRM server indicating the VAL UE(s) or VAL Stream ID(s) whose measurement data is not obtained successfully and is not provided in the monitoring report. This attribute shall be provided by the NRM server when the requested measurement data is not obtained successfully for all the requested VAL UE(s) or VAL Stream ID(s).	
NOTE: Only one of these attributes shall be provided.					

7.4.2.4.2.3 Type: MeasurementData

Table 7.4.2.4.2.3-1: Definition of type MeasurementData

Attribute name	Data type	P	Cardinality	Description	Applicability
dlDelay	Uinteger	O	0..1	The downlink packet delay in milliseconds (NOTE).	
ulDelay	Uinteger	O	0..1	The uplink packet delay in milliseconds (NOTE).	
rtDelay	Uinteger	O	0..1	The round trip packet delay in milliseconds (NOTE).	
avgPlr	PacketLossRate	O	0..1	The average packet loss rate (NOTE).	
avgDataRate	BitRate	O	0..1	The average data rate (NOTE).	
maxDataRate	BitRate	O	0..1	The maximum data rate (NOTE).	
avrDlTrafficVol	Uinteger	O	0..1	The average traffic volume for downlink in bytes (NOTE).	
avrUlTrafficVol	Uinteger	O	0..1	The average traffic volume for uplink in bytes (NOTE).	
NOTE: At least one of the measurement indexes shall be provided.					

7.4.2.4.2.4 Type: MeasurementPeriod

Table 7.4.2.4.2.4-1: Definition of type MeasurementPeriod

Attribute name	Data type	P	Cardinality	Description	Applicability
measStartTime	DateTime	M	1	Indicate the starting time for the measurement.	
measDuration	DurationSec	M	1	Indicate the duration for the measurement starting from the measStartTime.	

7.4.2.4.2.5 Type: ReportingRequirements

Table 7.4.2.4.2.5-1: Definition of type ReportingRequirements

Attribute name	Data type	P	Cardinality	Description	Applicability
reportingMode	NotificationMethod	M	1	The indication of the requested reporting option: one-time, periodic or event-triggered (i.e. "ON_EVENT_DETECTION") This attribute may be set to the value "ONE_TIME" only if the "immRep" attribute is provided and set to "true"..	
reportingPeriod	DurationSec	C	0..1	Identifies the reporting time interval for the periodic reporting. (NOTE 1).	
reportingThrs	array(ReportingThreshold)	C	1..N	Identifies reporting threshold corresponding to the measurement index(es). (NOTE 2).	
immRep	boolean	O	0..1	It indicates immediate reporting. When included and set to true, it indicates that immediate reporting of the subscribed event(s) is requested.	
repTerminMode	TerminationMode	O	0..1	The indication of the requested reporting termination mode: time-triggered, event-triggered (number of reports reached), event-triggered (threshold reached) or user-triggered. If absent, user-triggered reporting is used as the default termination mode.	
expirationTimer	DurationSec	C	0..1	Identifies the reporting time interval for the time triggered termination mode. (NOTE 3).	
maxNumRep	Uinteger	C	0..1	Indicates the maximum number of reports (number of reports reached). (NOTE 4).	
termThr	MeasurementData	C	0..1	Indicates the reporting termination threshold(s) corresponding to the measurement index(ex). (NOTE 5, NOTE 6, NOTE 7).	
termThrMode	ThresholdHandlingMode	C	0..1	Indicates the multi-parameter threshold handling for the event-triggered threshold reached reporting termination. (NOTE 8).	

NOTE 1: The "reportingPeriod" attribute shall be present only when the "reportingMode" attribute is set to "PERIODIC".
NOTE 2: The "reportingThr" attribute shall be present only when the "reportingMode" attribute is set to "ON_EVENT_DETECTION".
NOTE 3: The "expirationTimer" attribute shall be present only if the "repTerminMode" attribute is present and set to "TIME_TRIGGERED".
NOTE 4: The "maxNumRep" attribute shall be present only if the "repTerminMode" attribute is present and set to "EVENT_TRIGGERED_NUM_REPORTS_REACHED".
NOTE 5: The "termThr" attributes shall be present only when the "repTerminMode" attribute is present and set to "EVENT_TRIGGERED_MEAS_THR_REACHED".
NOTE 6: The event-triggered reporting termination condition for the "dlDelay", "ulDelay", "rtDelay" and "avgPlr" attributes within the MeasurementData data structure is met when the measured value is greater than or equal to the given threshold.
NOTE 7: The event-triggered reporting termination condition for the "avgDataRate", "maxDataRate", "avrDlTrafficVol" and "avrUlTrafficVol" attributes within the MeasurementData data structure is met when the measured value is less than or equal to the given threshold.
NOTE 8: The "termThrMode" attribute shall be present only when the "repTerminMode" attribute is present and set to "EVENT_TRIGGERED_MEAS_THR_REACHED" and the "termThr" contains more than one threshold.

7.4.2.4.2.6 Type: MeasurementRequirements

Table 7.4.2.4.2.6-1: Definition of type MeasurementRequirements

Name	Data type	P	Cardinality	Description	Applicability
measDataTypes	array(MeasurementDataType)	M	1..N	Indicates the required types of measurement data. At least one measurement data type shall be present in the array structure.	
measAggrGranWnd	AverWindow	O	0..1	It indicates the aggregation granularity window for the measured data (NOTE 1). The aggregation granularity window shall not exceed the duration of the measurement time period defined in the "measPeriod" attribute.	
measPeriod	MeasurementPeriod	O	0..1	It indicates the required measurement time period (NOTE 2).	
NOTE 1: If absent, 1 minute shall be used as default setting. NOTE 2: If absent, current time and 5 minutes duration shall be used as default setting.					

7.4.2.4.2.7 Type: MonitoringSubscription

Table 7.4.2.4.2.7-1: Definition of type MonitoringSubscription

Name	Data type	P	Cardinality	Description	Applicability
valUeIds	array(ValTargetUe)	C	1..N	List of VAL UEs which measurement data reporting is requested (NOTE 1).	
valGroupId	string	C	0..1	The group ID used for the VAL group for which measurement data reporting is requested (NOTE 1).	
valStreamIds	array(string)	C	1..N	List of VAL streams for which measurement data reporting is requested (NOTE 1)	
measReqs	MeasurementRequirements	O	0..1	It indicates the measurement requirements (NOTE 2).	
reportReqs	ReportingRequirements	O	0..1	It indicates the requested requirements of reporting (NOTE 3).	
notifUri	Uri	C	0..1	It indicates the URI where the notification should be delivered to. The notifUri attribute shall be presented for subscription without immediate report.	
monRep	MonitoringReport	C	0..1	Contains the unicast QoS monitoring data reporting. The NRM server shall provide this attribute when immediate reporting is requested and the requested data is available.	
reqTestNotif	boolean	O	0..1	Set to true to request the VAL server to send a test notification as defined in clause 6.6. 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 6.6.	Notification_websocket
suppFeat	SupportedFeatures	C	0..1	This parameter shall be supplied by VAL server in the POST request that request the creation of an individual measurement resource and shall be supplied in the reply of corresponding request.	
NOTE 1: Only one of these attributes shall be provided. NOTE 2: If absent, the default values shall be used. NOTE 3: If absent, the default event triggered reporting is used.					

7.4.2.4.2.8 Void

7.4.2.4.2.9 Type: FailureReport

Table 7.4.2.4.2.9-1: Definition of type FailureReport

Attribute name	Data type	P	Cardinality	Description	Applicability
valUeIds	array(ValTargetUe)	C	1..N	List of VAL UE(s) whose measurement data is not obtained successfully and is not provided (NOTE). The VAL UE(s) may be member(s) of the VAL group identified by the "valGroupId" attribute in the MonitoringReport data structure.	
valStreamIds	array(string)	C	1..N	List of VAL stream ID(s) whose measurement data is not obtained successfully and is not provided (NOTE).	
failureReason	FailureReason	M	1	Identifies the failure reason.	
measDataType	MeasurementDataType	C	0..1	The indication of the measurement data type that is not obtained successfully and is not provided in the monitoring report. This attribute shall be provided if the failure reason does not apply to all the requested measurement data types.	
NOTE: Only one of these attributes shall be provided.					

7.4.2.4.2.10 Type: ReportingThreshold

Table 7.4.2.4.2.10-1: Definition of type ReportingThreshold

Name	Data type	P	Cardinality	Description	Applicability
measThrValues	MeasurementData	M	1	Indicates the value(s) for the measurement threshold index(es).	
thrDirection	MatchingDirection	M	1	Indicates the threshold matching direction for the measurement threshold index(es) provided in the "measThrValues" attribute.	

7.4.2.4.2.11 Type: MonitoringSubscriptionPatch

Table 7.4.2.4.2.11-1: Definition of type MonitoringSubscriptionPatch

Name	Data type	P	Cardinality	Description	Applicability
measReqs	MeasurementRequirements	O	0..1	Indicates the measurement requirements.	
reportReqs	ReportingRequirements	O	0..1	Indicates the reporting requirements.	
notifUri	Uri	O	0..1	Indicates the URI where the notification should be delivered to.	

7.4.2.4.3 Simple data types and enumerations

7.4.2.4.3.1 Enumeration: MeasurementDataType

Table 7.4.2.4.3.1-1: Enumeration MeasurementDataType

Enumeration value	Description	Applicability
DL_DELAY	The indication for requesting the downlink packet delay data type.	
UL_DELAY	The indication for requesting the uplink packet delay data type.	
RT_DELAY	The indication for requesting the round trip packet delay data type.	
AVG_PLR	The indication for requesting the average packet loss rate data type.	
AVG_DATA_RATE	The indication for requesting the average data rate data type.	
MAX_DATA_RATE	The indication for requesting the maximum data rate data type.	
AVG_DL_TRAFFIC_VOLUME	The indication for requesting the average traffic volume for downlink data type.	
AVG_UL_TRAFFIC_VOLUME	The indication for requesting the average traffic volume for uplink data type.	

7.4.2.4.3.2 Enumeration: TerminationMode

Table 7.4.2.4.3.2-1: Enumeration TerminationMode

Enumeration value	Description	Applicability
TIME_TRIGGERED	The time-triggered termination mode.	
EVENT_TRIGGERED_NUM_REPORTS_REACHED	The event-triggered termination number of reports reached mode.	
EVENT_TRIGGERED_MEAS_THR_REACHED	The event-triggered termination measurement index threshold reached mode.	
USER_TRIGGERED	The user-triggered termination mode.	

7.4.2.4.3.3 Enumeration: FailureReason

Table 7.4.2.4.3.3-1: Enumeration FailureReason

Enumeration value	Description	Applicability
USER_NOT_FOUND	The user is not found.	
STREAM_NOT_FOUND	The stream is not found.	
DATA_NOT_AVAILABLE	The requested data is not available.	
OTHER_REASON	Other reason (unspecified).	

7.4.2.4.3.4 Enumeration: ThresholdHandlingMode

Table 7.4.2.4.3.4-1: Enumeration ThresholdHandlingMode

Enumeration value	Description	Applicability
ALL_REACHED	The decision criterion is met when all the provided thresholds are reached.	
ANY_REACHED	The decision criterion is met when any of the provided threshold(s) is reached.	

7.4.2.5 Error Handling

7.4.2.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.4.2.5.2 Protocol Errors

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

7.4.2.5.3 Application Errors

The application errors defined for SS_NetworkResourceMonitoring API are listed in table 7.4.2.5.3-1.

Table 7.4.2.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.4.2.6 Feature negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.4.2.6-1 lists the supported features for SS_NetworkResourceMonitoring API.

Table 7.4.2.6-1: 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.
3	UpdateSupport	Indicates the support of the Update_Unicast_QoS_Monitoring_Subscription service operation. This feature enables the support of both HTTP PUT and HTTP PATCH methods for the SS_NetworkResourceMonitoring API.

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

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

Figure 7.5.1.2.1-1 depicts the resource URIs structure for the SS_Events API.

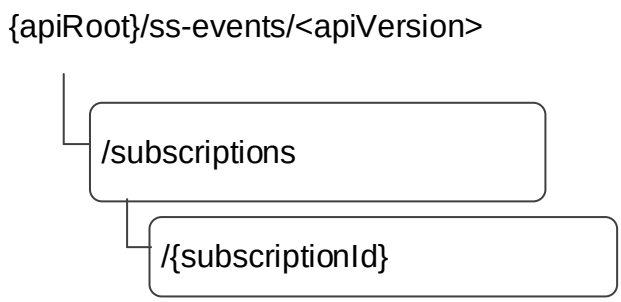

Figure 7.5.1.2.1-1: Resource URI structure of the SS_Events API

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.
		PATCH	Modifies an individual SEAL Event subscription identified by the subscriptionId.
		PUT	Updates 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

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
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.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.5.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.5.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

7.5.1.2.3.3.2 PATCH

This method shall support the URI query parameters specified in table 7.5.1.2.3.3.2-1.

Table 7.5.1.2.3.3.2-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.5.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.5.1.2.3.3.2-3.

Table 7.5.1.2.3.3.2-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SEALEventSubscriptionPatch	M	1	Contains the modifications to be applied to the SEAL Event subscription resource.

Table 7.5.1.2.3.3.2-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SEALEventSubscription	M	1	200 OK	SEAL Events Subscription resource is modified successfully and representation of the modified SEAL Event subscription is returned.
n/a			204 No Content	The SEAL Events Subscription is updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.5.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.5.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

7.5.1.2.3.3.3 PUT

This method requests fully replacement of an existing Individual SEAL Events Subscription at the SEAL server. The request shall not udpate the values of the "subscriberId", "requestTestNotification" (if previously provisioned), "websockNotifConfig" (if previously provisioned) and/or "suppFeat" attributes within the SEALEventSubscription data type. This method shall support the URI query parameters specified in table 7.5.1.2.3.3.3-1.

Table 7.5.1.2.3.3.3-1: 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 7.5.1.2.3.3.3-2 and the response data structures and response codes specified in table 7.5.1.2.3.3.3-3.

Table 7.5.1.2.3.3.3-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SEALEventSubscription	M	1	Contains the SEAL Event subscription to be updated.

Table 7.5.1.2.3.3.3-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SEALEventSubscription	M	1	200 OK	SEAL Event Subscription resource is updated successfully and representation of the modified SEAL Event subscription is returned.
n/a			204 No Content	The SEAL Events Subscription is updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] also apply.				

Table 7.5.1.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

Table 7.5.1.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative SEAL server.

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.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.5.1.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.5.1.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

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
EventSubscription	7.5.1.4.2.4	Represents the subscription to a single SEAL event.	
PartialEventSubscFailRep	7.5.1.4.2.23	Represents the partial failure report during the subscription creation.	PartialFailureSupport
IdentityFilter	7.5.1.4.2.7	Represents a filter of VAL User / UE identities belonging to a VAL service.	
LMInformation	7.5.1.4.2.8	The location information for a VAL User ID or a VAL UE ID.	
LocationAreaMonReport	7.5.1.4.2.20	Represents the event report to notify the VAL UEs moving in or moving out from a given location.	
LocationDevMonReport	7.5.1.4.2.15	Represents the event report to notify the VAL UE/User's location deviation from a given location.	
LocationInfoCriteria	7.5.1.4.2.18	Represents the location information to be monitored. It includes the geographic location information or a reference UE along with the application defined proximity range from the reference UE.	
LocDevNotification	7.5.1.4.3.4	Enumeration of location deviation notification reports.	
MessageFilter	7.5.1.4.2.9	The message filter information applicable to member VAL UEs or Users of the VAL group in the group change notification.	
MonitorEvents	7.5.1.4.2.11	Represents the details of the monitoring and analytics events.	NRM_EventMonitor
MonitorEventsReport	7.5.1.4.2.12	Represents the monitoring and analytics events information related to VAL UE or User.	NRM_EventMonitor
MonitorFilter	7.5.1.4.2.10	Represents the filter information VAL User or UEs and the related events to be monitored.	NRM_EventMonitor
MonitorLocationInterestFilter	7.5.1.4.2.14	Filter information to subscribe for monitoring the VAL UE/User location in a given area of interest.	
MonLocAreaInterestFltr	7.5.1.4.2.17	Filter information to subscribe for location area monitoring information for a given area of interest.	
MonLocTriggerEvent	7.5.1.4.3.5	Identifies the triggering event in the location area monitor filtering.	
MoveInOutUEDetails	7.5.1.4.2.21	Represents the list of UEs either moved into the location area or moved out of the location area.	
ReferenceUEDetail	7.5.1.4.2.19	Represents the reference UE details	
SEALEvent	7.5.1.4.3.3	Represents the type of SEAL events that can be subscribed.	
SEALEventDetail	7.5.1.4.2.5	Represents the SEAL event detail.	
SEALEventNotification	7.5.1.4.2.3	Represents an individual SEAL Event Subscription Notification.	
SEALEventSubscription	7.5.1.4.2.2	Represents an individual SEAL Event Subscription resource.	
SEALEventSubscriptionPatch	7.5.1.4.2.22	Represents the parameters to request the modification of a SEAL Event subscription resource.	SubscUpdate
TempGroupInfo	7.5.1.4.2.16	Represents the created temporary VAL group information.	GM_TempGroup
VALGroupFilter	7.5.1.4.2.6	Represents a filter of VAL group identifiers belonging to a VAL service.	
ValidityConditions	7.5.1.4.2.13	Represents the temporal and/or spatial conditions applied for the events to be monitored.	NRM_EventMonitor

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
AnalyticsEvent	3GPP TS 29.522 [28]	Analytics event in NWDAF.	NRM_EventMonitor
DateTime	3GPP TS 29.571 [21]	Used to indicate a timestamp.	
DurationSec	3GPP TS 29.571 [21]	Used to indicate the notification interval in the location monitoring filter.	
Float	3GPP TS 29.571 [21]	Used to represent the fractional part of the proximity range in the reference UE details.	
GeographicArea	3GPP TS 29.572 [31]	Identifies the geographical information of the user(s).	
LocationArea5G	3GPP TS 29.122 [3]	User location area when the UE is attached to 5G.	NRM_EventMonitor
LocationInfo	3GPP TS 29.122 [3]	Location information	
LocationQoS	3GPP TS 29.572 [31]	Identifies QoS requested by VAL server.	LM_LocationInfoChange_Extension1
MonitoringType	3GPP TS 29.122 [3]	Monitoring event type in 3GPP system core network.	NRM_EventMonitor
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.	
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	
ScheduledCommunicationTime	3GPP TS 29.122 [3]	Used to define the time frame for message filters.	
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.	
TimeWindow	3GPP TS 29.122 [3]	Time window identified by a start time and a stop time.	NRM_EventMonitor
Uinteger	3GPP TS 29.571 [21]	Used to represent maximum number of messages in MesageFilter data type.	
Uri	3GPP TS 29.122 [3]	Used to indicate a notification URI.	

VALGroupDocument	Clause 7.2.1.4.2.2	Used to send VAL group document as part of event detail in the event notification.	
ValSvcAreaId	Clause 7.1.3.4.3.2	Used to represent the VAL service area identifier.	ValSrvArea
ValTargetUe	7.3.1.4.2.3	Used to identify a VAL user ID or a VAL UE ID.	
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.	

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
monFltr	array(MonitorFilter)	C	1..N	Each element of the array represents the event monitoring request details that the subscriber wishes to monitor the events related to a set of VAL UEs, VAL group and/or VAL service. This parameter shall be present only if the event subscribed is "NRM_MONITOR_UE_USER_EVENTS"	NRM_EventMonitor
areaInt	array(MonitorLocationInterestFilter)	C	1..N	Each element represent the list of VAL User / UE IDs and the area of interest information for which the subscriber wishes to monitor the location deviation of the VAL User / UEs. This parameter shall be present only if the subscribed event is "LM_LOCATION_DEVIATION_MONITOR".	LM_LocationDeviation
locAreaMon	array(MonLocAreaInterestFltr)	C	1..N	Each element represent the location area monitoring details that the subscriber wishes to monitor for the VAL UEs moving in or moving out of the provided location area. This parameter shall be present only if the subscribed event is "LM_LOCATION_AREA_MONITOR".	LM_LocationAreaMonitor
partialFailRep	PartialEventSubscFailRep	C	0..1	The partial failure report from the SEAL server indicating the target identifier(s) whose event subscription is not created/updated successfully. This attribute shall be provided only if the PartialFailureSupport feature is supported and the event subscription is not created/updated successfully for all requested target identifier(s).	PartialFailureSupport
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
msgFltrs	array(MessageFilter)	C	1..N	The message filters applicable to various member VAL User or UEs of the VAL group. This parameter may be present only if the event in the even notification is "GM_GROUP_INFO_CHANGE"	GM_MessageFilter
monRep	array(MonitorEventsReport)	C	1..N	The events report with details of the events related to VAL UE(s). This parameter shall be present only if the event in the event notification is "NRM_MONITOR_UE_USER_EVENTS"	NRM_EventMonitor
locAdhr	array(LocationDevMonReport)	C	1..N	The location deviation information for the interested VAL User IDs or VAL UE IDs in a given location. This parameter shall be present only if the event in event notification is "LM_LOCATION_DEVIATION_MONITOR".	LM_LocationDeviation
tempGroupInfo	TempGroupInfo	C	0..1	Contains the created temporary VAL group information. This attribute shall be present only if the "eventId" attribute is set to the value "GM_TEMP_GROUP_FORMATION".	GM_TempGroup
locAreaMonRep	array(LocationAreaMonReport)	C	1..N	The location area monitoring information of the given area of interest. This parameter shall be present only if the event in event notification is "LM_LOCATION_AREA_MONITOR".	LM_LocationAreaMonitor
valGroupIds	array(string)	C	1..N	Contains the identifier(s) of the delated VAL Group(s). This attribute shall be present only if the reported event within the "eventId" attribute is "GM_GROUP_DELETION".	GM_GroupDeletion

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".	
suppLoc	boolean	O	0..1	Indication to request for supplementary location information of the VAL UE IDs. Set to true by Subscriber to request the SEAL server to send supplementary location information from the 3GPP core network. Set to false or omitted otherwise. This parameter may be present if the event subscribed is "LM_LOCATION_INFO_CHANGE".	LM_SuppLoc
locQos	LocationQoS	O	0..1	Indicates the expected location QoS requirement for which the location information is requested. This parameter may be present if the event subscribed is "LM_LOCATION_INFO_CHANGE".	LM_LocationInfoChange_Extension1

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.	
timeStamp	DateTime	O	0..1	Timestamp of the location report	
valSvcId	string	O	0..1	The VAL service ID of the VAL application for which the location information is subscribed.	

7.5.1.4.2.9 MessageFilter

Table 7.5.1.4.2.9-1: Definition of type MessageFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
reqUe	ValTarget Ue	M	1	Identity of the VAL User ID or UE ID that the message filter information is related to.	
tgtUe	array(ValT argetUe)	O	1..N	List of VAL USER or UE IDs whose messages will be sent to the VAL User or UE in reqUe attribute.	
maxMsgs	Uinteger	O	0..1	Total number of messages allowed to be sent to the VAL User or UE in the given time frame in the filter.	
scheds	array(Sch eduledCo mmunicati onTime)	O	1..N	Time frame associated to the total number of messages in mxMsgs attribute.	
msgTypes	array(strin g)	O	1..N	List of message types be sent to VAL UE.	

7.5.1.4.2.10 MonitorFilter

Table 7.5.1.4.2.10-1: Definition of type MonitorFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
idnts	array(ValT argetUe)	C	1..N	Identities of the VAL Users or UEs whose events monitoring is requested. (NOTE 1)	
valSvcId	string	O	0..1	Identity of the VAL service.	
valGrpId	string	C	0..1	Identity of the VAL group of the target UEs whose events monitoring is requested. (NOTE 1)	
profId	string	C	0..1	The monitoring profile ID identifying a list of monitoring and/or analytics events. (NOTE 2)	
valCnds	array(Vali dityConditi ons)	O	1..N	The temporal and/or spatial conditions applied for the events to be considered as valid.	
evntDets	array(Moni torEvents)	C	1..N	List of monitoring and/or analytics events that the VAL server is interested in. (NOTE 2)	
NOTE 1: Either VAL users/UEs or a VAL group identifying VAL UEs shall be present. NOTE 2: Either event details or monitoring profile ID shall be present in the subscription request. The monitoring profile ID shall present in the subscription response when event details are provided in the subscription request.					

7.5.1.4.2.11 MonitorEvents

Table 7.5.1.4.2.11-1: Definition of type MonitorEvents

Attribute name	Data type	P	Cardinality	Description	Applicability
cnEvnts	array(Moni toringType)	O	1..N	List of monitoring events related to VAL UE.	
anlEvnts	array(Anal yticsEvent)	O	1..N	List of analytics events related to VAL UE.	

7.5.1.4.2.12 MonitorEventsReport

Table 7.5.1.4.2.12-1: Definition of type MonitorEventsReport

Attribute name	Data type	P	Cardinality	Description	Applicability
tgtUe	ValTargetUe	M	1	VAL UE for which the events are related.	
evnts	array(MonitorEvents)	M	1..N	List of monitoring and analytics events related to VAL UE.	

7.5.1.4.2.13 ValidityConditions

Table 7.5.1.4.2.13-1: Definition of type ValidityConditions

Attribute name	Data type	P	Cardinality	Description	Applicability
locArea	LocationArea5G	O	0..1	Spatial validity conditions.	
tmWdws	array(TimeWindow)	O	1..N	Time window validity conditions	

7.5.1.4.2.14 MonitorLocationInterestFilter

Table 7.5.1.4.2.14-1: Definition of type MonitorLocationInterestFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
tgtUes	array(ValTargetUe)	M	1..N	List of VAL User(s) or UE ID(s) for which location monitoring is requested for the given location information.	
locInt	LocationInfo	C	0..1	Location information where the VAL server wishes to monitor the target VAL UE(s) location deviation. (NOTE)	
valSvcId	ValSvcAreaId	C	0..1	Identifier of the VAL service area where the VAL server wishes to monitor the target VAL UE(s) location deviation. (NOTE)	ValSrvArea
notInt	DurationSec	M	1	Periodic time interval in which the LM server needs to notify the VAL UE's location information.	
NOTE: If the "ValSrvArea" feature is supported, then one of "locInt" or "valSvcId" attributes shall be provided; otherwise the "locInt" attribute shall be provided.					

7.5.1.4.2.15 LocationDevMonReport

Table 7.5.1.4.2.15-1: Definition of type LocationDevMonReport

Attribute name	Data type	P	Cardinality	Description	Applicability
tgtUes	array(ValTargetUe)	M	1..N	VAL User ID(s) or UE ID(s) to which the report is related.	
locInfo	LocationInfo	M	1	The location information associated with the valTgtUe.	
notifType	LocDevNotification	M	1	Notification about the deviation of the VAL UE(s) in "valTgtUe" attribute to the location in "locInfo" attribute.	

7.5.1.4.2.16 TempGroupInfo

Table 7.5.1.4.2.16-1: Definition of type TempGroupInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
valGrpIds	array(string)	M	1..N	Contains a list of the identifiers of the VAL groups constituting the created temporary VAL group.	
tempValGrpId	string	M	1	Contains the identifier of the created temporary VAL group.	
valServIds	array(string)	O	1..N	Contains a list of the identifiers of the VAL services for which communications are to be enabled on the created temporary VAL group.	

7.5.1.4.2.17 MonLocAreaInterestFltr

Table 7.5.1.4.2.17-1: Definition of type MonLocAreaInterestFltr

Attribute name	Data type	P	Cardinality	Description	Applicability
locInfoCri	LocationInfoCriteria	M	1	Location area information where the VAL server wishes to monitor the VAL UE(s) moving in or moving out	
trigEvnts	array(MonLocTriggerEvent)	O	1..N	Identifies the triggering events when to send the notification.	

7.5.1.4.2.18 LocationInfoCriteria

Table 7.5.1.4.2.18-1: Definition of type LocationInfoCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
geoArea	GeographicArea	C	0..1	Geographic location information where the VAL server wishes to monitor the VAL UE(s) moving in or moving out.	
valSvcAreaId	ValSvcAreaId	C	0..1	Identifier of the VAL service area.	ValSrvArea
refUe	ReferenceUEDetail	C	0..1	Reference UE details with proximity range where the VAL server wishes to monitor the VAL UE(s) moving in or moving out.	
NOTE: Either "geoArea" or "refUe" shall be provided.					

7.5.1.4.2.19 ReferenceUEDetail

Table 7.5.1.4.2.19-1: Definition of type ReferenceUEDetail

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.	
proxRange	Uinteger	M	1	Proximity range of the area around the VAL target UE in meters. This attribure represents the integer part of the proximity range value.	
proxRangeFrac	Float	O	0..1	The fractional part of the proximity range value in meters. The minimum value of this attribute is 0. The maximum value of this attribute is 1.	

7.5.1.4.2.20 LocationAreaMonReport

Table 7.5.1.4.2.20-1: Definition of type LocationAreaMonReport

Attribute name	Data type	P	Cardinality	Description	Applicability
curPreUEs	array(ValTargetUe)	O	1..N	List of the identities of all VAL UEs who are currently present in the given location area.	
moveInOutUEs	MoveInOutUEDetails	O	0..1	List of UEs either moved in to the location area or moved out of the location area.	
trigEvnt	MonLocTriggerEvent	O	0..1	Event that triggered the sending of the notification.	
NOTE: For first notification report "curPreUEs" shall be provided, for next notification report either "curPreUEs" or "moveInOutUEs" shall be present.					

7.5.1.4.2.21 MoveInOutUEDetails

Table 7.5.1.4.2.21-1: Definition of type MoveInOutUEDetails

Attribute name	Data type	P	Cardinality	Description	Applicability
moveInUEs	array(ValTargetUe)	O	1..N	List of the identities of the VAL UEs who moved in to the given location area since previous notification.	
moveOutUEs	array(ValTargetUe)	O	1..N	List of the identities of the VAL UEs who moved out of the given location area since previous notification.	

7.5.1.4.2.22 SEALEventSubscriptionPatch

Table 7.5.1.4.2.22-1: Definition of type SEALEventSubscriptionPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(EventSubscription)	O	1..N	Subscribed events.	
eventReq	ReportingInformation	O	0..1	Represents the reporting requirements of the event subscription.	
notificationDestination	Uri	O	0..1	URI where the notification should be delivered to.	

7.5.1.4.2.23 PartialEventSubscFailRep

Table 7.5.1.4.2.23-1: Definition of type PartialEventSubscFailRep

Attribute name	Data type	P	Cardinality	Description	Applicability
valTgtUes	array(ValTargetUe)	O	1..N	List of VAL user(s) / VAL UE(s) whose identifier(s) is not found. This attribute may be present only if the subscribed event is "CM_USER_PROFILE_CHANGE", "LM_LOCATION_INFO_CHANGE", "NRM_MONITOR_UE_USER_EVENTS", or "LM_LOCATION_DEVIATION_MONITOR".	
valGrpIds	array(string)	O	1..N	List of VAL group(s) whose identifier(s) is not found. This attribute may be present only if the subscribed event is "GM_GROUP_INFO_CHANGE".	
NOTE: Either the "valTgtUes" attribute or the "valGrpIds" attribute shall be present.					

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
NRM_MONITOR_UE_USER_EVENTS	Monitoring and analytic events related to VAL UEs, users or VAL group from the Network Resource Management Server.	NRM_EventMonitor
LM_LOCATION_DEVIATION_MONITOR	Events from Location Management Server, related to the deviation of the VAL User(s) / UE(s) location from an area of interest.	LM_LocationDeviation
GM_TEMP_GROUP_FORMATION	Events related to the formation of new temporary VAL groups from the Group Management Server.	GM_TempGroup
LM_LOCATION_AREA_MONITOR	Events from Location Management Server, related to the list of UEs moving in or moving out of the specific location.	LM_LocationAreaMonitor
GM_GROUP_DELETION	Events related to deletion of existing VAL Group(s) from the GM Server.	GM_GroupDeletion

7.5.1.4.3.4 Enumeration: LocDevNotification

Table 7.5.1.4.3.4-1: Enumeration LocDevNotification

Enumeration value	Description	Applicability
NOTIFY_MISMATCH_LOCATION	This value indicates that the location information of the VAL UE(s) from the SEAL LM client and the core network are not matching.	
NOTIFY_ABSENCE	This value indicates that the current location information of the VAL UE(s) is deviating from the VAL server's area of interest.	
NOTIFY_PRESENCE	This value indicates that the current location information of the VAL UE(s) is within the VAL server's area of interest.	

7.5.1.4.3.5 Enumeration: MonLocTriggerEvent

Table 7.5.1.4.3.5-1: Enumeration MonLocTriggerEvent

Enumeration value	Description	Applicability
DISTANCE_TRAVELLED	Trigger event for the location area monitoring based on the distance travelled by the reference UE.	

7.5.1.5 Error Handling

7.5.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.5.1.5.2 Protocol Errors

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

7.5.1.5.3 Application Errors

The application errors defined for SS_Events API are listed in table 7.5.1.5.3-1.

Table 7.5.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

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	GM_MessageFilter	This feature supports the message filter information in group information change event.
8	NRM_EventMonitor	This feature supports the monitoring of events related to VAL UEs or Users.
9	LM_LocationDeviation	This feature supports the monitoring of VAL UE / User's deviation from a given area of interest.
10	GM_TempGroup	This feature supports the functionality of temporary VAL group formation within a VAL system.
11	LM_LocationAreaMonitor	This feature supports the monitoring of VAL UEs which are moving in or moving out from a given area of interest.
12	SubscUpdate	Indicates the support for updating an SEAL event subscription resource.
13	LM_SuppLoc	This feature indicates the support of supplementary location information. This feature requires the support of the LM_LocationInfoChange feature.
14	enNB1	This feature indicates the support of enhancements to this application layer API in Rel-18.
15	PartialFailureSupport	Indicates the support of the partial failure cases during a SEAL event subscription creation/update.
16	ValSrvArea	This feature indicates the support of VAL service area ID functionality as part of the phase-3 of the enhancements to the SEAL framework. The following functionalities are supported: - Support the usage of the VAL service area identifier to identify a VAL service area.
17	LM_LocationInfoChange_Extension1	This feature indicates the support of the enhancement to location information change event as part of the 5G-enabled fused location service capability exposure. The following functionalities are supported: - Support location information requests with expected location QoS requirements. This feature requires the support of the LM_LocationInfoChange feature.
18	GM_GroupDeletion	This feature indicates the support of group deletion event notifications as part of the enhancements to this application layer API.

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

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

Figure 7.6.1.2.1-1 depicts the resource URIs structure for the SS_KeyInfoRetrieval API.

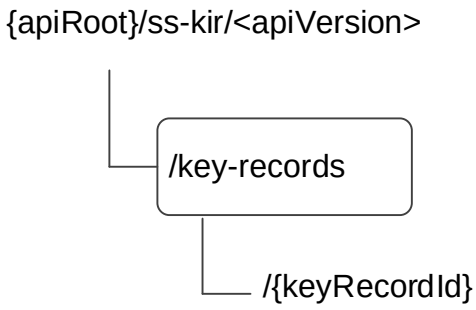

Figure 7.6.1.2.1-1: Resource URI structure of the SS_KeyInfoRetrieval API

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

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 7.6.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.6.1.2.2.3.1 -3.

Table 7.6.1.2.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.6.1.2.2.3.1-3: 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.
n/a			307 Temporary Redirect	Temporary redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative key management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative key management server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.6.1.2.2.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative key management server.

Table 7.6.1.2.2.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative key management server.

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	ValTarget Ue	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

7.6.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.6.1.5.2 Protocol Errors

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

7.6.1.5.3 Application Errors

The application errors defined for SS_KeyInfoRetrieval API are listed in table 7.6.1.5.3-1.

Table 7.6.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

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

7.6.2 SS_KMParametersProvisioning API

7.6.2.1 Introduction

The SS_KMParametersProvisioning service shall use the SS_KMParametersProvisioning API.

The API URI of the SS_KMParametersProvisioning API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure as defined in clause 6.5, i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5.
- The <apiName> shall be "ss-kpp".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.6.2.2.

7.6.2.3 Usage of HTTP

The provisions of clause 6.3 shall apply for the SS_KMParametersProvisioning API.

7.6.2.3 Resources

There are no resources defined for this resource in this release of the sepcifciation.

7.6.2.4 Custom operations without associated resources

7.6.2.4.1 Overview

The structure of the custom operation URIs of the SS_KMParametersProvisioning API is shown in Figure 7.6.2.4.1-1.

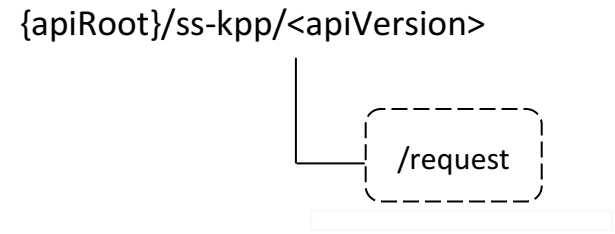

Figure 7.6.2.4.1-1: Custom operation URI structure of the SS_KMParametersProvisioning API

Table 7.6.2.4.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the SS_KMParametersProvisioning API.

Table 7.6.2.4.1-1: Custom operations without associated resources

Custom operation name	Custom operation URI	Mapped HTTP method	Description
Request	/request	POST	Enables a service consumer to request key parameters provisioning to the SEAL KM Server.

The custom operations shall support the URI variables defined in table 7.6.2.4.1-2.

Table 7.6.2.4.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 7.6.2.1.

7.6.2.4.2 Operation: Request

7.6.2.4.2.1 Description

The custom operation enables a service consumer to request key parameters provisioning to the SEAL KM Server.

7.6.2.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 7.6.2.4.2.2-1 and the response data structures and response codes specified in table 7.6.2.4.2.2-2.

Table 7.6.2.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
VALKeyPpReq	M	1	Contains the key management parameters to provisioned.

Table 7.6.2.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALKeyPpResp			200 OK	Successful case. The requested key management parameters are successfully received, processed and provisioned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative SEAL KM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative SEAL KM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3]
NOTE: The manadatory HTTP error status code for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.6.2.4.2.2-3: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative SEAL KM Server.

Table 7.6.2.4.2.2-4: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative SEAL KM Server.

7.6.2.5 Notifications

There are no notifications defined for this API in this release of the sepcifciation.

7.6.2.6 Data Model

7.6.2.6.1 General

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

Table 7.6.2.6.1-1 specifies the data types defined specifically for the SS_KMParametersProvisioning API service.

Table 7.6.2.6.1-1: SS_KMParametersProvisioning API specific Data Types

Data type	Section defined	Description	Applicability
VALKeyPpReq	7.6.2.5.2.2	Represents the VAL key management parameters to be provisioned.	
VALKeyPpReq	7.6.2.5.2.2	Represents the response to a key management parameters provisioning request.	

Table 7.6.2.6.1-2 specifies data types re-used by the SS_KMParametersProvisioning API service.

Table 7.6.2.6.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.571 [21]	Represents a string formatted as a sequence of bytes.	
SupportedFeatures	3GPP TS 29.571 [21]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
Uri	3GPP TS 29.571 [21]	Represents a URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Represents the identifier of the targeted VAL UE or VAL User.	

7.6.2.6.2 Structured data types

7.6.2.6.2.1 Introduction

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

7.6.2.6.2.2 Type: VALKeyPpReq

Table 7.6.2.6.2.2-1: Definition of type VALKeyPpReq

Attribute name	Data type	P	Cardinality	Description	Applicability
skmcUri	Uri	M	1	Contains the URI of the SEAL KM Client (residing in the VAL Server) that is initiating the request.	
valServiceId	string	M	1	Contains the identifier of the VAL service to which the provisioned key management parameters are related.	
valTgtUe	ValTarget Ue	O	0..1	Contains the identifier of the VAL User or VAL UE for which the provisioned key management parameters are related.	
payloadId	string	O	0..1	Contains the identifier of the provisioned key management parameters.	
payload	Bytes	C	0..1	Contains the provisioned key management parameters information.	
suppFeat	Supported Features	C	0..1	Contains the list of supported features among the ones defined in clause 7.6.2.8. This attribute shall be present only when feature negotiation needs to take place.	

7.6.2.6.2.2 Type: VALKeyPpResp

Table 7.6.2.6.2.2-1: Definition of type VALKeyPpResp

Attribute name	Data type	P	Cardinality	Description	Applicability
skmcUri	Uri	M	1	Contains the URI of the SEAL Key Management Client (residing in the VAL Server) that initiated the corresponding request.	
valServiceId	string	M	1	Contains the identifier of the VAL service to which the provisioned key management parameters are related.	
skmsId	string	O	0..1	Contains the identifier of the SEAL KM Server that is sending the response.	
valTgtUe	ValTarget Ue	O	0..1	Contains the identifier of the VAL User or VAL UE for which the provisioned key management parameters are related.	
payloadId	string	O	0..1	Contains the identifier of the provisioned key management parameters.	
suppFeat	Supported Features	O	0..1	Contains the list of supported features among the ones defined in clause 7.6.2.8. This attribute shall be present only when feature negotiation needs to take place.	

7.6.2.6.3 Simple data types and enumerations

7.6.2.6.3.1 Introduction

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

7.6.2.6.3.2 Simple data types

The simple data types defined in table 6.3.6.3.2-1shall be supported.

Table 7.6.2.6.3.2-1: Simple data types

Type name	Description

7.6.2.6.4 Data types describing alternative data types or combinations of data types

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

7.6.2.6.5 Binary data

7.6.2.6.5.1 Binary Data Types

Table 7.6.2.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

7.6.2.7 Error Handling

7.6.2.7.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.6.2.7.2 Protocol Errors

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

7.6.2.7.3 Application Errors

The application errors defined for SS_KMParametersProvisioning API are listed in table 7.6.2.7.3-1.

Table 7.6.2.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.6.2.8 Feature negotiation

The optional features listed in table 7.6.2.8-1 are defined for the SS_KMParametersProvisioning API. They shall be negotiated using the extensibility mechanism defined in clause 6.8.

Table 7.6.2.8-1: Supported Features

Feature number	Feature Name	Description

7.7 Network Slice Capability Enablement APIs

NSCE APIs are defined in 3GPP TS 29.435 [42].

7.8 Identity management APIs

7.8.1 SS_IdmParameterProvisioning API

7.8.1.1 API URI

The SS_IdmParameterProvisioning service shall use the SS_IdmParameterProvisioning API.

The API URI of the SS_IdmParameterProvisioning API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure as defined in clause 6.5, i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5.
- The <apiName> shall be "ss-ipp".

- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.8.1.2.

7.8.1.2 Resources

7.8.1.2.1 Overview

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

Figure 7.8.1.2.1-1 depicts the resource URIs structure for the SS_IdmParameterProvisioning API.

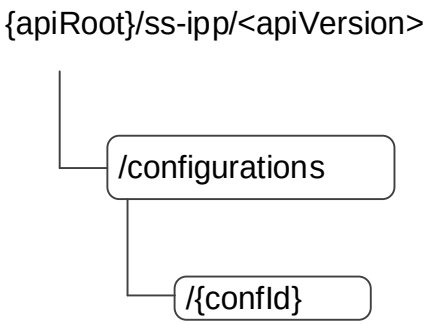

Figure 7.8.1.2.1-1: Resource URI structure of the SS_IdmParameterProvisioning API

Table 7.8.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.8.1.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
VAL Services Configurations	/configurations	POST	Request the creation of a VAL Services Configuration.
		GET	Retrieve one or several VAL services configuration(s).
Individual VAL Services Configuration	/configurations/{confId}	GET	Retrieve an existing "Individual VAL Services Configuration" resource.
		PUT	Update an "Individual VAL Services Configuration" resource.
		PATCH	Modify an existing "Individual VAL Services Configuration" resource.
		DELETE	Delete an existing "Individual VAL Services Configuration" resource.

7.8.1.2.2 Resource: VAL Services Configurations

7.8.1.2.2.1 Description

This resource represents the collection of VAL Services Configurations managed by the IM Server.

7.8.1.2.2.2 Resource Definition

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

This resource shall support the resource URI variables defined in the table 7.8.1.2.2.2-1.

Table 7.8.1.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.8.1.2.2.3 Resource Standard Methods

7.8.1.2.2.3.1 POST

The HTTP POST method enables to request the creation of a VAL Services Configuration to the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.2.3.1-1.

Table 7.8.1.2.2.3.1-1: 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 7.8.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.8.1.2.2.3.1-3.

Table 7.8.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
VALServicesConfig	M	1	Represents the VAL services configurations that needs to be created.

Table 7.8.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALServicesConfig	M	1	201 Created	Successful case. The requested VAL services configuration is successfully created. The URI of the created "Individual VAL Services Configuration" resource shall be returned in the "Location" HTTP header.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.2.3.1-4: 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-ipp/<apiVersion>/configurations/{confId}

7.8.1.2.2.3.2 GET

The HTTP GET method enables to retrieve one or several VAL services configuration(s) satisfying filtering criteria at the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.2.3.2-1.

Table 7.8.1.2.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
val-server-id	string	O	0..1	Contains the identifier of the VAL Server.
config-ids	array(string)	O	1..N	Contains the list of the identifier(s) of the targeted "Individual VAL Services Configuration" resource(s).
supp-feats	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.8.1.7. This query parameter shall be present only when feature negotiation needs to take place.

This method shall support the request data structures specified in table 7.8.1.2.2.3.2-2 and the response data structures and response codes specified in table 7.8.1.2.2.3.2-3.

Table 7.8.1.2.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.8.1.2.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
array(VALServicesConfig)	M	0..N	200 OK	Successful case. The requested VAL services configuration(s) matching the received query parameter(s) shall be returned. If there are no active VAL services configuration(s) matching the received query parameter(s), an empty array is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.2.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

Table 7.8.1.2.2.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

7.8.1.2.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the sepcifciation.

7.8.1.2.3 Resource: Individual VAL Services Configuration

7.8.1.2.3.1 Description

This resource represents an "Individual VAL Services Configuration" resource managed by the IM Server.

7.8.1.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-ipp/<apiVersion>/configurations/{confId}**

This resource shall support the resource URI variables defined in the table 7.8.1.2.3.2-1.

Table 7.8.1.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.
confId	string	Represents an "Individual VAL Services Configuration" resource.

7.8.1.2.3.3 Resource Standard Methods

7.8.1.2.3.3.1 GET

The HTTP GET method enables to retrieve an "Individual VAL Services Configuration" resource at the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.3.3.1-1.

Table 7.8.1.2.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.8.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.8.1.2.3.3.1-3.

Table 7.8.1.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.8.1.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALServicesConfig	M	1	200 OK	Successful case. The requested "Individual VAL Services Configuration" resource shall be returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

Table 7.8.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

7.8.1.2.3.3.2 PUT

The HTTP PUT method enables to update an existing "Individual VAL Services Configuration" resource at the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.3.3.2-1.

Table 7.8.1.2.3.3.2-1: 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 7.8.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.8.1.2.3.3.2-3.

Table 7.8.1.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
VALServicesConfig	M	1	Represents the updated representation of the "Individual VAL Services Configuration" resource.

Table 7.8.1.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALServicesConfig	M	1	200 OK	Successful case. The VAL services configuration is successfully updated and a representation of the updated "Individual VAL Services Configuration" resource is returned in the response body.
n/a			204 No Content	Successful case. The VAL services configuration is successfully updated and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

Table 7.8.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

7.8.1.2.3.3.3 PATCH

The HTTP PATCH method enables to modify an existing "Individual VAL Services Configuration" resource at the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.3.3.3-1.

Table 7.8.1.2.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.8.1.2.3.3.3-2 and the response data structures and response codes specified in table 7.8.1.2.3.3.3-3.

Table 7.8.1.2.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
VALServicesConfigPatch	M	1	Represents the requested modifications to be applied to the "Individual VAL Services Configuration" resource.

Table 7.8.1.2.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
VALServicesConfig	M	1	200 OK	Successful case. The VAL services configuration is successfully modified and a representation of the updated "Individual VAL Services Configuration" resource is returned in the response body.
n/a			204 No Content	Successful case. The VAL services configuration is successfully modified and no content is returned in the response body.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.3.3.3-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

Table 7.8.1.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

7.8.1.2.3.3.4 DELETE

The HTTP DELETE method enables to delete an existing "Individual VAL Services Configuration" resource at the IM Server.

This method shall support the URI query parameters specified in table 7.8.1.2.3.3.4-1.

Table 7.2.1.2.3.3.4-1: 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 7.8.1.2.3.3.4-2 and the response data structures and response codes specified in table 7.8.1.2.3.3.4-3.

Table 7.8.1.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.8.1.2.3.3.4-3: 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 VAL Services Configuration" is successfully deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative IM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.8.1.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

Table 7.8.1.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative IM Server.

7.8.1.2.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the sepcifciation.

7.8.1.3 Custom operations without associated resources

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

7.8.1.4 Notifications

There are no notifications defined for this API in this release of the sepcifciation.

7.8.1.5 Data Model

7.8.1.5.1 General

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

Table 7.8.1.5.1-1 specifies the data types defined specifically for the SS_IdmParameterProvisioning API service.

Table 7.8.1.5.1-1: SS_IdmParameterProvisioning API specific Data Types

Data type	Section defined	Description	Applicability
VALServicesConfig	7.8.1.5.2.2	Represents a VAL services configuration.	
VALServicesParams	7.8.1.5.2.3	Represents VAL services configuration information.	
VALServicesConfigPatch	7.8.1.5.2.4	Represents of the requested modifications to a VAL services configuration.	

Table 7.8.1.5.1-2 specifies data types re-used by the SS_IdmParameterProvisioning API service.

Table 7.8.1.5.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
SupportedFeatures	3GPP TS 29.571 [21]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
ValTargetUe	Clause 7.3.1.4.2.3	Represents the identifier of a VAL User or a VAL UE.	

7.8.1.5.2 Structured data types

7.8.1.5.2.1 Introduction

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

7.8.1.5.2.2 Type: VALServicesConfig

Table 7.8.1.5.2.2-1: Definition of type VALServicesConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcConf	array(VALServiceParams)	M	1..N	Contains the list of VAL services configuration information.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 7.8.1.7. This attribute shall be present only when feature negotiation needs to take place.	

7.8.1.5.2.3 Type: VALServiceParams

Table 7.8.1.5.2.3-1: Definition of type VALServiceParams

Attribute name	Data type	P	Cardinality	Description	Applicability
valServiceId	string	M	1	Contains the identifier of the VAL service to which the provisioned VAL service configuration, information is provisioned.	
idList	array(ValTargetUe)	M	1..N	Contains the list of VAL User ID(s) or VAL UE ID(s) that are provisioned for the VAL service identified by the "valServiceId" attribute.	

7.8.1.5.2.4 Type: VALServicesConfigPatch

Table 7.8.1.5.2.4-1: Definition of type VALServicesConfigPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcConf	array(VALServiceParams)	O	1..N	Contains the updated list of VAL services configuration information.	

7.8.1.5.3 Simple data types and enumerations

7.8.1.5.3.1 Introduction

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

7.8.1.5.3.2 Simple data types

The simple data types defined in table 7.8.1.5.3.2-1 shall be supported.

Table 7.8.1.5.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

7.8.1.5.4 Data types describing alternative data types or combinations of data types

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

7.8.1.5.5 Binary data

7.8.1.5.5.1 Binary Data Types

Table 7.8.1.5.5.1-1: Binary Data Types

Name	Clause defined	Content type

7.8.1.6 Error Handling

7.8.1.6.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.8.1.6.2 Protocol Errors

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

7.8.1.6.3 Application Errors

The application errors defined for SS_IDMParameterProvisioning API are listed in table 7.8.1.6.3-1.

Table 7.8.1.6.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.8.1.7 Feature negotiation

The optional features in table 7.8.1.7-1 are defined for the SS_IDMParameterProvisioning API. They shall be negotiated using the extensibility mechanism defined in clause 6.8.

Table 7.8.1.7-1: Supported Features

Feature number	Feature Name	Description

7.9 Data Delivery APIs

SEALDD APIs are defined in 3GPP TS 29.548 [35].

7.10 Application data analytics enablement service configuration APIs

7.10.1 SS_ADAE_VALPerformanceAnalytics API

7.10.1.1 API URI

The SS_ADAE_VALPerformanceAnalytics service shall use the SS_ADAE_VALPerformanceAnalytics API.

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

- The <apiName> shall be "ss-adae-pa".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.1.2.

7.10.1.2 Resources

7.10.1.2.1 Overview

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

Figure 7.10.1.2.1-1 depicts the resource URIs structure for the SS_ADAE_VALPerformanceAnalytics API.

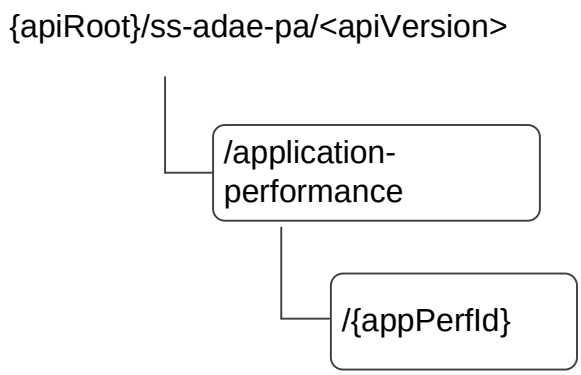

Figure 7.10.1.2.1-1: Resource URI structure of the SS_ADAE_VALPerformanceAnalytics API

Table 7.10.1.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.1.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Application performance event subscription	/application-performance	POST	Subscription to VAL performance analytics.
Individual application performance event subscription	/application-performance/{appPerfId}	GET	Request the retrieval of an existing "Individual application performance event subscription" resource identified by "appPerfId".
		DELETE	Removal of VAL performance analytics subscription identified by "appPerfId".

7.10.1.2.2 Resource: Application performance event subscription

7.10.1.2.2.1 Description

The subscription to the event of the VAL (application) performance analytics.

7.10.1.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-pa/<apiVersion>/application-performance**

This resource shall support the resource URI variables defined in the table 7.10.1.2.2.2-1.

Table 7.10.1.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.1.2.2.3 Resource Standard Methods

7.10.1.2.2.3.1 POST

This method to subscribe to the event of the VAL performance analytics and shall support the URI query parameters specified in table 7.10.1.2.2.3.1-1.

Table 7.10.1.2.2.3.1-1: 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 7.10.1.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.1.2.2.3.1-3.

Table 7.10.1.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AppPerfSub	M	1	Subscription to the event of VAL performance analytics.

Table 7.10.1.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppPerfSub	M	1	201 Created	The subscription to the VAL performance analytics is created.
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 7.10.1.2.2.3.1-4: 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-adae-pa/<apiVersion>/application-performance/{appPerfId}

7.10.1.2.4 Resource Custom Operations

None.

7.10.1.2.3 Resource: Individual application performance event subscription

7.10.1.2.3.1 Description

The Individual application performance event subscription resource represents an individual event subscription of a service consumer to the application performance analytics of the ADAE server.

7.10.1.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-pa/<apiVersion>/application-performance/{appPerfId}**

This resource shall support the resource URI variables defined in the table 7.10.1.2.3.2-1.

Table 7.10.1.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5
appPerfId	string	Identifies an Individual Events Subscription

7.10.1.2.3.3 Resource Standard Methods

7.10.1.2.3.3.1 GET

This operation retrieves an individual application performance event subscription resource. This method shall support the URI query parameters specified in table 7.10.1.2.3.3.1-1.

Table 7.10.1.2.3.3.1-1: 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 7.10.1.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.1.2.3.3.1-3.

Table 7.10.1.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.1.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AppPerfSub	M	1	200 OK	The requested individual application performance event subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.1.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.1.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.1.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.1.2.3.3.2-1.

Table 7.10.1.2.3.3.2-1: 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 7.10.1.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.1.2.3.3.2-3.

Table 7.10.1.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.1.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual subscription is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.1.2.3.4 Resource Custom Operations

None.

7.10.1.3 Notifications

7.10.1.3.1 General

Table 7.10.1.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Application performance event notification	{notifUri}	POST	Notification on VAL performance analytics.

7.10.1.3.2 Application performance event notification

7.10.1.3.2.1 Description

Application performance event notification is to notify on the event of the VAL performance analytics.

7.10.1.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.1.3.2.2-1.

Table 7.10.1.3.2.2-1: 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 7.10.1.3.2.2-2 and the response data structures and response codes specified in table 7.10.1.3.2.2-3.

Table 7.10.1.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AppPerfNotif	M	1	Notification on VAL performance analytics.

Table 7.10.1.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The notification for the VAL performance analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.10.1.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.1.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.1.4 Data Model

7.10.1.4.1 General

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

Table 7.10.1.4.1-1 specifies the data types defined specifically for the SS_ADAE_VALPerformanceAnalytics API service.

Table 7.10.1.4.1-1_SS_ADAE_VALPerformanceAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
AppPerfSub	7.10.1.4.2.2	Subscription to the VAL application performance analytics	
AppPerfNotif	7.10.1.4.2.3	Notification information of the application performance analytics.	
ProdProfileInfo	7.10.1.4.2.4	Information about the data producer's support data collection and its access to the produced data	
AnalyticsCategory	7.10.1.4.3.3	Represents the category of analytics.	
AnalyticsType	7.10.1.4.2.6	Represents the type of analytics.	
ProducerCap	7.10.1.4.3.5	Indicates data producer capabilities for this data type.	
ProducerType	7.10.1.4.3.4	Type of the data producer.	
ProducerData	7.10.1.4.3.5	Type of the data produced by the data producer.	
ProducerRole	7.10.1.4.3.6	The role of the data producer.	

Table 7.10.1.4.1-2 specifies data types re-used by the SS_ADAE_VALPerformanceAnalytics API service:

Table 7.10.1.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
BitRate	3GPP TS 29.571 [21]	Represents a bit rate measurement value.	
DurationSec	3GPP TS 29.122 [3]	Represents a period of time in units of seconds.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
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	
ScheduledCommunicationTime	3GPP TS 29.122 [3]	Used to define the time frame for message filters.	
SupportedFeatures	3GPP TS 29.571 [21]	Represents the supported features.	
TimeWindow	3GPP TS 29.122 [3]	Represents a time window.	
Uinteger	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [3]	Represents a URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Used to indicate either VAL User ID or VAL UE ID.	

7.10.1.4.2 Structured data types

7.10.1.4.2.1 Introduction

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

7.10.1.4.2.2 Type: AppPerfSub

Table 7.10.1.4.2.2-1: Definition of type AppPerfSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Represents the notification URI.	
analyticsType	AnalyticsType	M	1	Identifies the type of the VAL application performance analytics.	
valServiceId	string	M	1	The identifier of the VAL service, to which the performance analytics subscription is applied.	
valUeIds	array(ValTargetUe)	O	1..N	A list of identities of one or more VAL UEs, whose performance analytics are subscribed to.	
valServerId	string	O	0..1	If the consumer is different from the VAL server, this identifier represents the VAL server to which the VAL performance analytics subscription is applied.	
dataProdProfile	ProdProfileInfo	O	0..1	Characteristics of the data producer to be used.	
confLevel	Uinteger	O	0..1	Indicates the preferred confidence level of the prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	The geographical or service area to which the VAL performance analytics subscription is applied.	
timeValidity	TimeWindow	O	0..1	The time validity of the subscription.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirement of the VAL performance analytics subscription.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported features of the API as defined in clause 7.10.1.6. This attribute shall be provided in the HTTP POST response of successful subscription creation if it was provided in the request.	

7.10.1.4.2.3 Type: AppPerfNotif

Table 7.10.1.4.2.3-1: Definition of type AppPerfNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
output	string	M	1	Predicted (or computed, for statistics) change or sustainability of the VAL performance for a VAL server or a VAL session. (NOTE 2)	
valServerId	string	M	1	Identity of the VAL server, the data collection is related to, in the case of the notification is on the VAL performance data collection.	
valUeIds	array(ValTargetUe)	O	1..N	A list of identities of one or more VAL UEs, the data collection is related to, in the case of the notification is on the VAL performance data collection.	
confLevel	Uinteger	C	0..1	Indicates the achieved confidence level in the case of prediction. Minimum = 0. Maximum = 100. (NOTE)	
timeHorizon	TimeWindow	C	0..1	The time window to which the predictive analytics apply. (NOTE 1)	
NOTE 1: This attribute shall be provided if the "analyticsType" attribute in the subscription was set to "PREDICTIVE" and it may not be provided otherwise. NOTE 2: The content of "output" attribute is not defined in this Release of the specification.					

7.10.1.4.2.4 Type: ProdProfileInfo

Table 7.10.1.4.2.4-1: Definition of type ProdProfileInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
prodId	string	M	1	Identity of the data producer	
prodType	ProducerType	M	1	Type of the data producer.	
dataType	ProducerData	M	1	Type of information that can be provided by the data producer.	
prodRole	ProducerRole	O	0..1	Role of the data producer.	
origProdIds	array(string)	O	1..N	Identifies the identity of the original data producer if the prod-role is not set to the value "ORIGINAL_PRODUCER"or "GENERATING_ENTITY". If the type of the data producer is that value of “A_DCCF”, this attribute is a list of identities of data producers.	
dataFresh	integer	O	0..1	It is set to the duration of the time (in seconds) elapsed time after the data generated if the producer-role does not have the value "ORIGINAL_PRODUCER"or "GENERATING_ENTITY".	
producerCap	ProducerCap	O	0..1	Represents data producer capability.	

7.10.1.4.2.5 Type: ProducerCap

Table 7.10.1.4.2.5-1: Definition of type ProducerCap

Attribute name	Data type	P	Cardinality	Description	Applicability
durationTime	DurationSec	O	0..1	Duration time that the data can be stored	
anonymization	boolean	O	0..1	The value "true" means that anonymization is supported, while the value "false" means that anonymization is not supported. The default value is "false" if omitted.	
dataRate	BitRate	O	0..1	Rate of data generation.	
schedule	ScheduledCommunicationTime	O	0..1	Represents scheduling.	

7.10.1.4.2.6 Type: AnalyticsType

Table 7.10.1.4.2.6-1: Definition of type AnalyticsType

Attribute name	Data type	P	Cardinality	Description	Applicability
category	AnalyticsCategory	M	1	Represents the analytics category.	

7.10.1.4.3 Simple data types and enumerations

7.10.1.4.3.1 Introduction

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

7.10.1.4.3.2 Simple data types

None.

7.10.1.4.3.3 Enumeration: AnalyticsCategory

Table 7.10.1.4.3.3-1: Enumeration AnalyticsCategory

Enumeration value	Description	Applicability
PREDICTIVE	The event for the VAL application performance analytics is for predictive analytics.	
STATISTICS	The event for the VAL application performance analytics is for statistics analytics.	

7.10.1.4.3.4 Enumeration: ProducerType

Table 7.10.1.4.3.4-1: Enumeration ProducerType

Enumeration value	Description	Applicability
ADAE_CLIENT	The data producer is ADAE client.	
A_DCCF	The data producer is A-DDCF.	
VAL_SERVER	The data producer is VAL server.	
SEAL_SERVER	The data producer is SEAL server.	
SEAL_CLIENT	The data producer is SEAL client.	
EES	The data producer is EES.	
EAS	The data producer is EAS.	

7.10.1.4.3.5 Enumeration: ProducerData

Table 7.10.1.4.3.5-1: Enumeration ProducerData

Enumeration value	Description	Applicability
PERFORMANCE_INDICATOR	The data type of the data producer is performance indictor.	
REPRODUCER_USAGE_DATA	The data type of the data producer is reproducer usage data.	
SERVER_LOAD_DATA	The data type of the data producer is server load data.	
APPLICATION_PERFORMANCE	The data type of the data producer is application performance.	
EDGE_LOAD	The data type of the data producer is edge load.	

7.10.1.4.3.6 Enumeration: ProducerRole

Table 7.10.1.4.3.6-1: Enumeration ProducerRole

Enumeration value	Description	Applicability
GENERATING_ENTITY	The role of the data producer is generating entity.	
ORIGINAL_PRODUCER	The role of the data producer is origina producer.	
RESPOSITORY	The role of the data producer is repository.	

7.10.1.4.3.7 Void

7.10.1.5 Error Handling

7.10.1.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.1.5.2 Protocol Errors

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

7.10.1.5.3 Application Errors

The application errors defined for SS_ADAE_VALPerformanceAnalytics API are listed in table 7.10.1.5.3-1.

Table 7.10.1.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.1.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.1.6-1 lists the supported features for SS_ADAE_VALPerformanceAnalytics API.

Table 7.10.1.6-1: Supported Features

Feature number	Feature Name	Description

7.10.2 SS_ADAE_SlicePerformanceAnalytics API

7.10.2.1 API URI

The SS_ADAE_SlicePerformanceAnalytics service shall use the SS_ADAE_SlicePerformanceAnalytics API.

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

- The <apiName> shall be "ss-adae-sspa".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.2.2.

7.10.2.2 Resources

7.10.2.2.1 Overview

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

Figure 7.10.2.2.1-1 depicts the resource URIs structure for the SS_ADAE_SlicePerformanceAnalytics API.

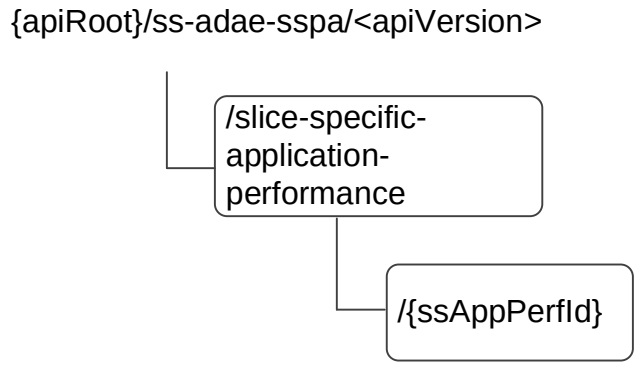

Figure 7.10.2.2.1-1: Resource URI structure of the SS_ADAE_SlicePerformanceAnalytics API

Table 7.10.2.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.2.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Slice specific application performance event subscription	/slice-specific-application-performance	POST	Subscription to the event of the slice-specific application performance analytics.
Individual slice specific application performance event subscription	/slice-specific-application-performance/{ssAppPerfId}	GET	Request the retrieval of an existing "Individual slice specific application performance event subscription" resource identified by {ssAppPerfId}.
		DELETE	Request the deletion of an existing subscription to slice-specific application performance analytics identified by {ssAppPerfId}.

7.10.2.2.2 Resource: Slice-specific application performance event subscription

7.10.2.2.2.1 Description

The subscription to the event of the slice-specific application performance analytics.

7.10.2.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-sspa/<apiVersion>/slice-specific-application-performance**

This resource shall support the resource URI variables defined in the table 7.10.2.2.2.2-1.

Table 7.10.2.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.2.2.2.3 Resource Standard Methods

7.10.2.2.2.3.1 POST

This method to subscribe to the event of the slice-specific application performance analytics and shall support the URI query parameters specified in table 7.10.2.2.2.3.1-1.

Table 7.10.2.2.2.3.1-1: 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 7.10.2.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.2.2.2.3.1-3.

Table 7.10.2.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SliceAppPerfSub	M	1	Subscription to the slice-specific application performance analytics event.

Table 7.10.2.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SliceAppPerfSub	M	1	201 Created	Subscription to the slice-specific application performance analytics is created.
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 7.10.2.2.2.3.1-4: 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-adae-sspa/<apiVersion>/slice-specific-application-performance/{ssAppPerfId}

7.10.2.2.4 Resource Custom Operations

None.

7.10.2.2.3 Resource: Individual slice-specific application performance event subscription

7.10.2.2.3.1 Description

The Individual slice-specific application performance event subscription resource represents an individual event subscription of a service consumer to the slice-specific application performance analytics of the ADAE server.

7.10.2.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-pa/<apiVersion>/slice-specific-application-performance/{ssAppPerfId}**

This resource shall support the resource URI variables defined in the table 7.10.2.2.3.2-1.

Table 7.10.2.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5
ssAppPerfId	string	Identifies an Individual Events Subscription

7.10.2.2.3.3 Resource Standard Methods

7.10.2.2.3.3.1 GET

This operation retrieves an individual slice-specific application performance event subscription resource. This method shall support the URI query parameters specified in table 7.10.2.2.3.3.1-1.

Table 7.10.2.2.3.3.1-1: 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 7.10.2.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.2.2.3.3.1-3.

Table 7.10.2.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.2.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SliceAppPerfSub	M	1	200 OK	The requested individual slice-specific application performance event subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.2.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.2.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.2.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.2.2.3.3.2-1.

Table 7.10.2.2.3.3.2-1: 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 7.10.2.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.2.2.3.3.2-3.

Table 7.10.2.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.2.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual subscription is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.2.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.2.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.2.2.3.4 Resource Custom Operations

None.

7.10.2.3 Notifications

7.10.2.3.1 General

Table 7.10.2.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Slice-specific application performance event notification	{notifUri}	POST	Notification on the slice-specific application performance analytics

7.10.2.3.2 Slice-specific application performance event notification

7.10.2.3.2.1 Description

Slice-specific application performance event notification is to notify on the event of the slice-specific application performance analytics.

7.10.2.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.2.3.2.2-1.

Table 7.10.2.3.2.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

If the notification is on the slice-specific application performance analytics, this method shall support the request data structures specified in table 7.10.2.3.2.2-2 and the response data structures and response codes specified in table 7.10.2.3.2.2-3.

Table 7.10.2.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SliceAppPerfNotif	M	1	Notification information of the slice-specific application performance analytics.

Table 7.10.2.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Notification for the slice-specific application performance analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.10.2.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.2.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.2.4 Data Model

7.10.2.4.1 General

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

Table 7.10.2.4.1-1 specifies the data types defined specifically for the SS_ADAE_SlicePerformanceAnalytics API service.

Table 7.10.2.4.1-1_SS_ADAE_SlicePerformanceAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
SliceAppPerfSub	7.10.2.4.2.2	Subscription to the slice-specific application performance analytics	
SliceAppPerfNotif	7.10.2.4.2.3	Notification information of the slice specific application performance analytics.	

Table 7.10.2.4.1-2 specifies data types re-used by the SS_ADAE_SlicePerformanceAnalytics API service:

Table 7.10.2.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AnalyticsType	Clause 7.10.1.4.2.6	Represents the type of analytics.	
Dnn	3GPP TS 29.571 [21]	Used to Identify a DNN.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
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	
Snssai	3GPP TS 29.571 [21]	Used to Identify the S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [21]	Represents the supported features.	
TimeWindow	3GPP TS 29.122 [3]	Represents a time window.	
Uinteger	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [3]	Represents a URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Used to indicate either VAL User ID or VAL UE ID.	

7.10.2.4.2 Structured data types

7.10.2.4.2.1 Introduction

This clause defines the data structures to be used in resource representations of this service.

7.10.2.4.2.2 Type: SliceAppPerfSub

Table 7.10.2.4.2.2-1: Definition of type SliceAppPerfSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Represents the notification URI.	
analyticsType	AnalyticsType	M	1	Identifies the type of the slice-specific application performance analytics.	
sliceId	Snssai	M	1	The identifier of the slice or slice instance to which the performance analytics subscription is applied.	
dnn	Dnn	O	0..1	Associated DNN.	
valUeIds	array(ValTargetUe)	O	1..N	A list of identities of one or more VAL UEs whose slice-specific performance analytics are subscribed to.	
valServerId	string	O	0..1	If the consumer is different from the VAL server, this identifier represents the VAL server to which the slice-specific performance analytics subscription is applied.	
confLevel	Uinteger	O	0..1	Indicates the preferred confidence level of the prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	The geographical or service area to which the slice specific application performance analytics subscription is applied.	
timeValidity	TimeWindow	O	0..1	The time validity of the subscription in seconds.	
timeHorizon	TimeWindow	O	0..1	The time horizon for predictive analytics.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirement of the slice-specific performance analytics subscription.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported features of the API as defined in clause 7.10.2.6. This attribute shall be provided in the HTTP POST response of successful subscription creation if it was provided in the request.	

7.10.2.4.2.3 Type: SliceAppPerfNotif

Table 7.10.2.4.2.3-1: Definition of type SliceAppPerfNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
output	string	M	1	Predicted or expected performance change or sustainability of the slice-specific performance for a VAL server or a VAL session. (NOTE 2)	
confLevel	Uinteger	C	0..1	Indicates the achieved confidence level in the case of prediction. Minimum = 0. Maximum = 100. (NOTE 1)	
timeHorizon	TimeWindow	C	0..1	The time window to which the predictive analytics apply. (NOTE 1)	
NOTE 1: This attribute shall be provided if the "analyticsType" attribute in the subscription was set to "PREDICTIVE" and it may not be provided otherwise. NOTE 2: The content of "output" attribute is not defined in this Release of the specification.					

7.10.2.5 Error Handling

7.10.2.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.2.5.2 Protocol Errors

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

7.10.2.5.3 Application Errors

The application errors defined for SS_ADAE_SlicePerformanceAnalytics API are listed in table 7.10.2.5.3-1.

Table 7.10.2.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.2.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.2.6-1 lists the supported features for SS_ADAE_SlicePerformanceAnalytics API.

Table 7.10.2.6-1: Supported Features

Feature number	Feature Name	Description

7.10.3 SS_ADAE_Ue2UePerformanceAnalytics API

7.10.3.1 API URI

The SS_ADAE_Ue2UePerformanceAnalytics service shall use the SS_ADAE_Ue2UePerformanceAnalytics API.

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

- The <apiName> shall be "ss-adae-uupa".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.3.2.

7.10.3.2 Resources

7.10.3.2.1 Overview

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

Figure 7.10.3.2.1-1 depicts the resource URIs structure for the SS_ADAE_Ue2UePerformanceAnalytics API.

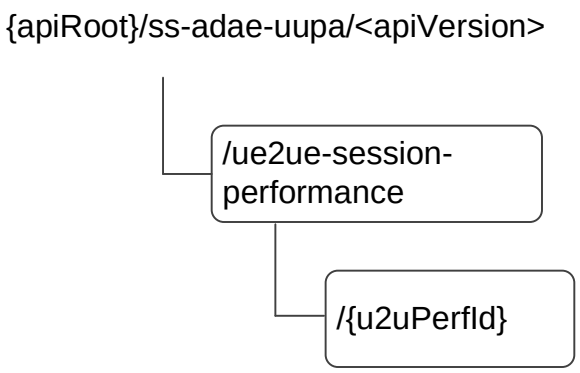

Figure 7.10.3.2.1-1: Resource URI structure of the SS_ADAE_Ue2UePerformanceAnalytics API

Table 7.10.3.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.3.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
UE-to-UE Session Performance Event Subscription	/ue2ue-session-performance	POST	Create an individual UE-to-UE session performance analytics event subscription.
Individual UE-to-UE Session Performance Event Subscription	/ue2ue-session-performance/{u2uPerfId}	GET	Read the individual UE-to-UE session performance analytics event subscription.
		DELETE	Remove the individual UE-to-UE session performance analytics event subscription.

7.10.3.2.2 Resource: UE-to-UE session performance event subscription

7.10.3.2.2.1 Description

The UE-to-UE session performance event subscription to the event of the UE-to-UE session performance analytics.

7.10.3.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-uupa/<apiVersion>/ue2ue-session-performance**

This resource shall support the resource URI variables defined in the table 7.10.3.2.2.2-1.

Table 7.10.3.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.3.2.2.3 Resource Standard Methods

7.10.3.2.2.3.1 POST

This method to subscribe to the event of the UE-to-UE session performance analytics and shall support the URI query parameters specified in table 7.10.3.2.2.3.1-1.

Table 7.10.3.2.2.3.1-1: 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 7.10.3.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.3.2.2.3.1-3.

Table 7.10.3.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
U2UPerfSub	M	1	Subscription to the UE-to-UE session performance analytics event.

Table 7.10.3.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
U2UPerfSub	M	1	201 Created	Subscription to the UE-to-UE session performance analytics is created.
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.10.3.2.2.3.1-4: 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-adae-uupa/<apiVersion>/ue2ue-session-performance/{u2uPerfId}

7.10.3.2.2.4 Resource Custom Operations

None.

7.10.3.2.3 Resource: Individual UE-to-UE Session Performance Event Subscription

7.10.3.2.3.1 Description

7.10.3.2.3.2 Resource Definition

Resource URI: {**apiRoot**}/**ss-adae-uupa**/<**apiVersion**>/**ue2ue-session-performance**/{**u2uPerfId**}

This resource shall support the resource URI variables defined in table 7.10.3.2.3.2-1.

Table 7.10.3.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.
u2uPerfId	string	Represents the identifier of an individual UE-to-UE session performance event subscription.

7.10.3.2.3.3 Resource Standard Methods

7.10.3.2.3.3.1 GET

This operation reads the individual unicast monitoring subscription resource. This method shall support the URI query parameters specified in table 7.10.3.2.3.3.1-1.

Table 7.10.3.2.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.10.3.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.3.2.3.3.1-3.

Table 7.10.3.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.3.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
U2UPerfSub	M	1	200 OK	The requested individual UE-to-UE session performance event subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.10.3.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

Table 7.10.3.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

7.10.3.2.3.3.2 DELETE

This operation deletes the Individual UE-to-UE Session Performance Event Subscription resource. This method shall support the URI query parameters specified in table 7.10.3.2.3.3.2-1.

Table 7.10.3.2.3.3.2-1: 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 7.10.3.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.3.2.3.3.2-3.

Table 7.10.3.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.3.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual UE-to-UE session performance event subscription matching the u2uPerfId is deleted.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.3.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE Server.

Table 7.10.3.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

7.10.3.3 Notifications

7.10.3.3.1 General

Table 7.10.3.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
UE-to-UE session performance event notification	{notifUri}	POST	Notification on the UE-to-UE session performance analytics

7.10.3.3.2 UE-to-UE session performance event notification

7.10.3.3.2.1 Description

UE-to-UE session performance event notification is to notify on the event of the UE-to-UE session performance analytics.

7.10.3.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.3.3.2.2-1.

Table 7.10.3.3.2.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

If the notification is on the UE-to-UE session performance analytics, this method shall support the request data structures specified in table 7.10.3.3.2.2-2 and the response data structures and response codes specified in table 7.10.3.3.2.2-3.

Table 7.10.3.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
U2UPerfNotif	M	1	Notification information of the UE-to-UE session performance analytics.

Table 7.10.3.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Notification for the UE-to-UE session performance analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.10.3.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.3.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.3.4 Data Model

7.10.3.4.1 General

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

Table 7.10.3.4.1-1 specifies the data types defined specifically for the SS_ADAE_Ue2UePerformanceAnalytics API service.

Table 7.10.3.4.1-1: SS_ADAE_Ue2UePerformanceAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
U2UAnalytics	7.10.3.4.3.1	Represents the UE-to-UE analytics types.	
U2UAnalyticsData	7.10.3.4.2.6	Represents the UE-to-UE analytics data.	
U2UPair	7.10.3.4.2.7	Represents the UE-to-UE pair.	
U2UPerfNotif	7.10.3.4.2.3	Represents the UE-to-UE session performance analytics notification.	
U2UPerfSub	7.10.3.4.2.2	Represents the UE-to-UE session performance analytics subscription.	
U2UReportingGranularity	7.10.3.4.3.2	Represents the UE-to-UE reporting granularity.	
U2UThreshold	7.10.3.4.2.5	Represents the threshold for UE-to-UE session performance analytics.	

Table 7.10.3.4.1-2 specifies data types re-used by the SS_ADAE_Ue2UePerformanceAnalytics API service:

Table 7.10.3.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AnalyticsType	Clause 7.10.1.4.2.6	Type of analytics for the event of the VAL application performance analytics.	
DurationSec	3GPP TS 29.122 [3]	Represents a period of time in units of seconds.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
MatchingDirection	3GPP TS 29.520 [33]	Used to indicate a threshold matching direction.	
NotificationMethod	3GPP TS 29.508 [32]	Used to indicate the reporting mode.	
PacketErrRate	3GPP TS 29.571 [21]	Used to represent packet error rate.	
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 supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [3]	Used to indicate the time window.	
Uinteger	3GPP TS 29.571 [21]	Used to represent integer attributes.	
Uri	3GPP TS 29.122 [3]	Used to indicate the notification URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Used to indicate either VAL User ID or VAL UE ID.	

7.10.3.4.2 Structured data types

7.10.3.4.2.1 Introduction

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

7.10.3.4.2.2 Type: U2UPerfSub

Table 7.10.3.4.2.2-1: Definition of type U2UPerfSub

Attribute name	Data type	P	Cardinality	Description	Applicability
analyticsType	AnalyticsType	M	1	Represents the type of the UE-to-UE session performance analytics.	
valUeIds	array(ValTargetUe)	M	1..N	Represent the list of VAL UEs, whose UE-to-UE session analytics are subscribed to.	
valServiceId	string	O	0..1	Represents the VAL service for which the subscription applies.	
confLevel	Uinteger	O	0..1	Indicates the preferred accuracy level for the UE-to-UE session prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	Represents the geographical or service area, to which the UE-to-UE session performance analytics subscription is applied.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirements of the subscription.	
reportingInds	array(U2UAnalytics)	O	1..N	Indicates the list of the requested analytics.	
reportingThrs	array(U2UThreshold)	C	1..N	Identifies reporting threshold corresponding to the application QoS index(es). (NOTE)	
reportingGrn	U2UReportingGranularity	O	0..1	Indicates the reporting granularity.	
notifUri	Uri	M	1	Represents the notification URI.	
timeInterval	TimeWindow	O	0..1	The time interval as the start time and end time, to which the UE-to-UE session performance analytics subscription is applied.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	
NOTE: These attributes may be provided if the "notifMethod" attribute within the ReportingInformation data type provided in the "repReq" attribute is set to "ON_EVENT_DETECTION".					

7.10.3.4.2.3 Type: U2UPerfNotif

Table 7.10.3.4.2.3-1: Definition of type U2UPerfNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
analyticsOutput	array(U2UAnalyticsData)	M	1..N	UE-to-UE session performance analytics for prediction or statistics depending on the type.	
confLevel	Uinteger	C	0..1	Indicates the confidence of the prediction. This attribute shall be provided if the "analyticsType" attribute in the request is set to "PREDICTIVE". Minimum = 0. Maximum = 100.	

7.10.3.4.2.4 Void

7.10.3.4.2.5 Type: U2UThreshold

Table 7.10.3.4.2.5-1: Definition of type U2UThreshold

Attribute name	Data type	P	Cardinality	Description	Applicability
value	U2UAnalyticsData	M	1	Indicates the value for the analytics threshold.	
thrDirect	MatchingDirection	M	1	Indicates the threshold matching direction for the analytics threshold provided in the "value" attribute.	

7.10.3.4.2.6 Type: U2UAnalyticsData

Table 7.10.3.4.2.6-1: Definition of type U2UAnalyticsData

Attribute name	Data type	P	Cardinality	Description	Applicability
valUes	U2UPair	O	0..1	Represent the pair of VAL UEs, whose UE-to-UE session analytics are observed. This attribute shall represent a sub-set of the VAL UEs defined in the "valUeIds" attribute within the U2UPerfSub data type. If omitted, the analytics data is applied for all active VAL UE sessions.	
avgLatency	Uinteger	O	0..1	The average latency in milliseconds (NOTE).	
avgPer	PacketErrRate	O	0..1	The average packet error rate (NOTE).	
avgDataRate	BitRate	O	0..1	The average data rate (NOTE).	
jitter	Float	O	0..1	The jitter (NOTE).	
NOTE: At least one of the indexes shall be provided.					

7.10.3.4.2.7 Type: U2UPair

Table 7.10.3.4.2.7-1: Definition of type U2UPair

Attribute name	Data type	P	Cardinality	Description	Applicability
valUeA	ValTargetUe	M	1	Represent the first VAL UE in the pair.	
valUeB	ValTargetUe	M	1	Represent the second VAL UE in the pair.	

7.10.3.4.3 Simple data types and enumerations

7.10.3.4.3.1 Enumeration: U2UAnalytics

Table 7.10.3.4.3.1-1: Enumeration U2UAnalytics

Enumeration value	Description	Applicability
AVG_LATENCY	The indication for requesting the average latency analytics.	
AVG_PER	The indication for requesting the average packet error rate analytics.	
AVG_DATA_RATE	The indication for requesting the average data rate analytics.	
JITTER	The indication for requesting the jitter analytics.	

7.10.3.4.3.2 Enumeration: U2UReportingGranularity

Table 7.10.3.4.3.2-1: Enumeration U2UReportingGranularity

Enumeration value	Description	Applicability
GROUP	The indication for requesting the analytics for all VAL UE-to-UE application sessions.	
INDIVIDUAL	The indication for requesting the analytics for individual VAL UE-to-UE application sessions.	

7.10.3.5 Error Handling

7.10.3.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.3.5.2 Protocol Errors

In this release of the specification, there are no additional protocol errors applicable for the SS_ADAE_Ue2UePerformanceAnalytics API.

7.10.3.5.3 Application Errors

The application errors defined for SS_ADAE_Ue2UePerformanceAnalytics API are listed in table 7.10.3.5.3-1.

Table 7.10.3.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.3.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.3.6-1 lists the supported features for SS_ADAE_Ue2UePerformanceAnalytics API.

Table 7.10.3.6-1: Supported Features

Feature number	Feature Name	Description

7.10.4 SS_ADAE_LocationAccuracyAnalytics API

7.10.4.1 API URI

The SS_ADAE_LocationAccuracyAnalytics service shall use the SS_ADAE_LocationAccuracyAnalytics API.

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

- The <apiName> shall be "ss-adae-laa".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.4.2.

7.10.4.2 Resources

7.10.4.2.1 Overview

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

Figure 7.10.4.2.1-1 depicts the resource URIs structure for the SS_ADAE_LocationAccuracyAnalytics API.

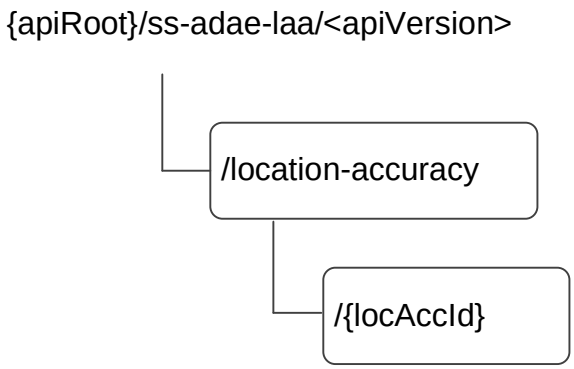

Figure 7.10.4.2.1-1: Resource URI structure of the SS_ADAE_LocationAccuracyAnalytics API

Table 7.10.4.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.4.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Location accuracy event subscription	/location-accuracy	POST	Subscription to the event of the location accuracy performance analytics.
Individual location accuracy event subscription	/location-accuracy/{locAccId}	GET	Request the retrieval of an existing "Individual location accuracy event subscription" resource.
		DELETE	Request the deletion of an existing "Individual location accuracy event subscription" resource.

7.10.4.2.2 Resource: Location accuracy event subscription

7.10.4.2.2.1 Description

Subscription to the event of the location accuracy analytics.

7.10.4.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-laa/<apiVersion>/location-accuracy**

This resource shall support the resource URI variables defined in the table 7.10.4.2.2.2-1.

Table 7.10.4.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.4.2.2.3 Resource Standard Methods

7.10.4.2.2.3.1 POST

This method to subscribe to the event of the location accuracy analytics and shall support the URI query parameters specified in table 7.10.4.2.2.3.1-1.

Table 7.10.4.2.2.3.1-1: 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 7.10.4.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.4.2.2.3.1-3.

Table 7.10.4.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocAccurSub	M	1	Subscription to the location accuracy analytics event.

Table 7.10.4.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocAccurSub	M	1	201 Created	Subscription to the location accuracy analytics is created.
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 7.10.4.2.2.3.1-4: 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-adae-laa/<apiVersion>/location-accuracy/{locAccId}

7.10.4.2.2.4 Resource Custom Operations

None.

7.10.4.2.3 Resource: Individual location accuracy event subscription

7.10.4.2.3.1 Description

The Individual location accuracy event subscription resource represents an individual event subscription of a service consumer to the location accuracy analytics of the ADAE server.

7.10.4.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-laa/<apiVersion>/location-accuracy/{locAccId}**

This resource shall support the resource URI variables defined in the table 7.10.4.2.3.2-1.

Table 7.10.4.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5
locAccId	string	Identifies an Individual Events Subscription

7.10.4.2.3.3 Resource Standard Methods

7.10.4.2.3.3.1 GET

This operation retrieves an individual location accuracy event subscription resource. This method shall support the URI query parameters specified in table 7.10.4.2.3.3.1-1.

Table 7.10.4.2.3.3.1-1: 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 7.10.4.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.4.2.3.3.1-3.

Table 7.10.4.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.4.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocAccurSub	M	1	200 OK	The requested individual location accuracy event subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.4.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.4.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.4.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.4.2.3.3.2-1.

Table 7.10.4.2.3.3.2-1: 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 7.10.4.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.4.2.3.3.2-3.

Table 7.10.4.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.4.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual subscription is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.4.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.4.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.4.2.3.4 Resource Custom Operations

None.

7.10.4.3 Notifications

7.10.4.3.1 General

Table 7.10.4.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Location accuracy event notification	{notifUri}	POST	Notification on the location accuracy analytics

7.10.4.3.2 Location accuracy event notification

7.10.4.3.2.1 Description

Location accuracy event notification is to notify on the event of the location accuracy analytics.

7.10.4.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.4.3.2.2-1.

Table 7.10.4.3.2.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

If the notification is on the location accuracy analytics, this method shall support the request data structures specified in table 7.10.4.3.2.2-2 and the response data structures and response codes specified in table 7.10.4.3.2.2-3.

Table 7.10.4.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocAccurNotif	M	1	Notification information of the location accuracy analytics.

Table 7.10.4.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Notification for the location accuracy analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.10.4.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.4.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.4.4 Data Model

7.10.4.4.1 General

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

Table 7.10.4.4.1-1 specifies the data types defined specifically for the SS_ADAE_LocationAccuracyAnalytics API service.

Table 7.10.4.4.1-1_SS_ADAE_LocationAccuracyAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
LocAccurSub	7.10.4.4.2.2	Subscription to the location accuracy analytics event	
LocAccurNotif	7.10.4.4.2.3	Notification information of the location accuracy analytics event	

Table 7.10.4.4.1-2 specifies data types re-used by the SS_ADAE_LocationAccuracyAnalytics API service:

Table 7.10.4.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
Accuracy	3GPP TS 29.122 [3]	Represent the desired level of accuracy of the requested location information.	
AnalyticsType	Clause 7.10.1.4.2.6	Represents the type of analytics.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
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]	Represents the supported features.	
UeMobility	3GPP TS 29.520 [33]	Represents UE Mobility and route information	
Uinteger	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [3]	Represents a URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Indicate either VAL User ID or VAL UE ID.	

7.10.4.4.2 Structured data types

7.10.4.4.2.1 Introduction

This clause defines the data structures to be used in resource representations of this service.

7.10.4.4.2.2 Type: LocAccurSub

Table 7.10.4.4.2.2-1: Definition of type LocAccurSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Represents the notification URI.	
analyticsType	AnalyticsType	M	1	Identifies the type of the location accuracy analytics.	
valUeIds	array(ValTargetUe)	M	1..N	A list of identities of one or more VAL UEs whose location accuracy analytics are subscribed to.	
accuracy	Accuracy	M	1	Represents the desired level of accuracy of the requested location information.	
valServiceId	string	O	0..1	The identifier of the VAL service for which location accuracy analytics is requested.	
confLevel	Uinteger	O	0..1	Indicates the preferred confidence level of the prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	The geographical or service area to which the location accuracy analytics subscription is applied.	
timeValidity	TimeWindow	O	0..1	The time validity of the location accuracy analytics subscription.	
ueMobs	array(UeMobility)	O	1..N	Mobility and route information of the one or more target VAL UE.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirement of the location accuracy analytics subscription.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported features of the API as defined in clause 7.10.4.6. This attribute shall be provided in the HTTP POST response of successful subscription creation if it was provided in the request.	

7.10.4.4.2.3 Type: LocAccurNotif

Table 7.10.4.4.2.3-1: Definition of type LocAccurNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
output	string	M	1	Location accuracy analytics output. (NOTE)	
confLevel	Uinteger	C	0..1	Indicates the achieved confidence level in the case of prediction. This attribute shall be provided if the "analyticsType" attribute in the subscription is set to "PREDICTIVE". Minimum = 0. Maximum = 100.	
NOTE: The content of "output" attribute is not defined in this Release of the specification.					

7.10.4.5 Error Handling

7.10.4.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.4.5.2 Protocol Errors

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

7.10.4.5.3 Application Errors

The application errors defined for SS_ADAE_LocationAccuracyAnalytics API are listed in table 7.10.4.5.3-1.

Table 7.10.4.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.4.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.4.6-1 lists the supported features for SS_ADAE_LocationAccuracyAnalytics API.

Table 7.10.4.6-1: Supported Features

Feature number	Feature Name	Description

7.10.5 SS_ADAE_ServiceApiAnalytics API

7.10.5.1 API URI

The SS_ADAE_ServiceApiAnalytics service shall use the SS_ADAE_ServiceApiAnalytics API.

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

- The <apiName> shall be "ss-adae-sa".
- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 7.10.5.2.

7.10.5.2 Resources

7.10.5.2.1 Overview

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

Figure 7.10.5.2.1-1 depicts the resource URIs structure for the SS_ADAE_ServiceApiAnalytics API.

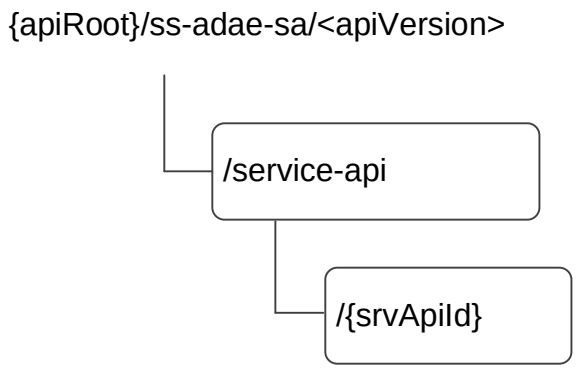

Figure 7.10.5.2.1-1: Resource URI structure of the SS_ADAE_ServiceApiAnalytics API

Table 7.10.5.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.5.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Service API event subscription	/service-api	POST	Subscription to the event of the service API analytics.
Individual service API event subscription	/service-api/{srvApiId}	GET	Request the retrieval of an existing "Individual service API event subscription" resource.
		DELETE	Request the deletion of an existing "Individual service API event subscription" resource.

7.10.5.2.2 Resource: Service API event subscription

7.10.5.2.2.1 Description

Subscription to the event of the service API analytics.

7.10.5.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-sa/<apiVersion>/service-api**

This resource shall support the resource URI variables defined in the table 7.10.5.2.2.2-1.

Table 7.10.5.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.5.2.2.3 Resource Standard Methods

7.10.5.2.2.3.1 POST

This method to subscribe to the event of the service API analytics and shall support the URI query parameters specified in table 7.10.5.2.2.3.1-1.

Table 7.10.5.2.2.3.1-1: 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 7.10.5.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.5.2.2.3.1-3.

Table 7.10.5.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SrvApiSub	M	1	Subscription to the service API analytics event.

Table 7.10.5.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SrvApiSub	M	1	201 Created	Subscription to the service API analytics is created.
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 7.10.5.2.2.3.1-4: 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-adae-sa/<apiVersion>/service-api/{srvApiId}

7.10.5.2.2.4 Resource Custom Operations

None.

7.10.5.2.3 Resource: Individual Service API event subscription

7.10.5.2.3.1 Description

The Individual Service API event subscription resource represents an individual event subscription of a service consumer to the Service API analytics of the ADAE server.

7.10.5.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-laa/<apiVersion>/service-api/{srvApiId}**

This resource shall support the resource URI variables defined in the table 7.10.5.2.3.2-1.

Table 7.10.5.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5
srvApiId	string	Identifies an Individual Events Subscription

7.10.5.2.3.3 Resource Standard Methods

7.10.5.2.3.3.1 GET

This operation retrieves an individual service API event subscription resource. This method shall support the URI query parameters specified in table 7.10.5.2.3.3.1-1.

Table 7.10.5.2.3.3.1-1: 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 7.10.5.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.5.2.3.3.1-3.

Table 7.10.5.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.5.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SrvApiSub	M	1	200 OK	The requested individual service API event subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.5.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.5.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.5.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.5.2.3.3.2-1.

Table 7.10.5.2.3.3.2-1: 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 7.10.5.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.5.2.3.3.2-3.

Table 7.10.5.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.5.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual subscription is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.5.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.5.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.5.2.3.4 Resource Custom Operations

None.

7.10.5.3 Notifications

7.10.5.3.1 General

Table 7.10.5.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Service API event notification	{notifUri}	POST	Notification on the service API analytics

7.10.5.3.2 Service API event notification

7.10.5.3.2.1 Description

Service API event notification is to notify on the event of the service API analytics.

7.10.5.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.5.3.2.2-1.

Table 7.10.5.3.2.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

If the notification is on the service API analytics, this method shall support the request data structures specified in table 7.10.5.3.2.2-2 and the response data structures and response codes specified in table 7.10.5.3.2.2-3.

Table 7.10.5.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SrvApiNotif	M	1	Notification information of the service API analytics.

Table 7.10.5.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Notification for the service API analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.10.5.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.5.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.5.4 Data Model

7.10.5.4.1 General

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

Table 7.10.5.4.1-1 specifies the data types defined specifically for the SS_ADAE_ServiceApiAnalytics API service.

Table 7.10.5.4.1-1: SS_ADAE_ServiceApiAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
SrvApiNotif	7.10.5.4.2.3	Notification information of the service API analytics event.	
SrvApiSub	7.10.5.4.2.2	Subscription to the service API analytics event.	

Table 7.10.5.4.1-2 specifies data types re-used by the SS_ADAE_ServiceApiAnalytics API service:

Table 7.10.5.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AnalyticsType	Clause 7.10.1.4.2.6	Type of analytics for the event of the VAL application performance analytics.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
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]	Represents the supported features.	
TimeWindow	3GPP TS 29.122 [3]	Represents a time window.	
Uinteger	3GPP TS 29.571 [21]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [3]	Represents a URI.	

7.10.5.4.2 Structured data types

7.10.5.4.2.1 Introduction

This clause defines the data structures to be used in resource representations of this service.

7.10.5.4.2.2 Type: SrvApiSub

Table 7.10.5.4.2.2-1: Definition of type SrvApiSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Represents the notification URI.	
analyticsType	AnalyticsType	M	1	Identifies the type of the service API analytics.	
eventCriteria	string	M	1	Criteria matching the service API analytics event.	
serviceApiName	string	C	0..1	The Service API name. (NOTE)	
serviceApiType	string	C	0..1	The Service API type. (NOTE)	
area	LocationArea5G	O	0..1	The geographical or service area to which the service API analytics subscription is applied.	
timeValidity	TimeWindow	O	0..1	The time validity of the service API analytics subscription.	
timeHorizon	TimeWindow	O	0..1	Time horizon for the predictions.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirement of the service API analytics subscription.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported features of the API as defined in clause 7.10.5.6. This attribute shall be provided in the HTTP POST response of successful subscription creation if it was provided in the request.	
NOTE: Only one of these attributes shall be provided.					

7.10.5.4.2.3 Type: SrvApiNotif

Table 7.10.5.4.2.3-1: Definition of type SrvApiNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
requestorId	string	M	1	The identifier of the requestor of these analytics.	
output	string	M	1	Service API analytics for prediction or statistics depending on the type. (NOTE)	
area	LocationArea5G	O	0..1	The geographical or service area to which the service API analytics subscription is applied.	
confLevel	Uinteger	C	0..1	Indicates the achieved confidence level in the case of prediction. This attribute shall be provided if the "analyticsType" is set to "PREDICTIVE". Minimum = 0. Maximum = 100.	
NOTE: The content of "output" attribute is not defined in this Release of the specification.					

7.10.5.4.3 Simple data types and enumerations

7.10.5.4.3.1 Introduction

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

7.10.5.4.3.2 Simple data types

None.

7.10.5.5 Error Handling

7.10.5.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.5.5.2 Protocol Errors

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

7.10.5.5.3 Application Errors

The application errors defined for SS_ADAE_ServiceApiAnalytics API are listed in table 7.10.5.5.3-1.

Table 7.10.5.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.5.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.5.6-1 lists the supported features for SS_ADAE_ServiceApiAnalytics API.

Table 7.10.5.6-1: Supported Features

Feature number	Feature Name	Description

7.10.6 SS_ADAE_SliceUsagePatternAnalytics API

7.10.6.1 API URI

The SS_ADAE_SliceUsagePatternAnalytics service shall use the SS_ADAE_SliceUsagePatternAnalytics API.

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

- The <apiName> shall be "ss-adae-sup".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.6.2.

7.10.6.2 Resources

7.10.6.2.1 Overview

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

Figure 7.10.6.2.1-1 depicts the resource URIs structure for the SS_ADAE_SliceUsagePatternAnalytics API.

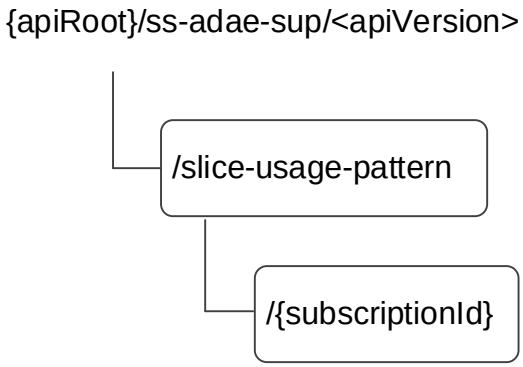

Figure 7.10.6.2.1-1: Resource URI structure of the SS_ADAE_SliceUsagePatternAnalytics API

Table 7.10.6.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.6.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Slice usage pattern event subscription	/slice-usage-pattern	POST	Subscriptions to the event of the slice usage pattern analytics
Individual slice usage pattern event subscription	/slice-usage-pattern/{subscriptionId}	GET	Request the retrieval of an existing "Individual slice usage pattern event subscription" resource identified by {subscriptionId}.
		DELETE	Request the deletion of an existing "Individual slice usage pattern event subscription" resource identified by {subscriptionId}.

7.10.6.2.2 Resource: Slice usage pattern event subscriptions

7.10.6.2.2.1 Description

Slice usage pattern event subscriptions to the event of the slice usage pattern analytics.

7.10.6.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-sup/<apiVersion>/slice-usage-pattern**

This resource shall support the resource URI variables defined in the table 7.10.6.2.2.2-1.

Table 7.10.6.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5

7.10.6.2.2.3 Resource Standard Methods

7.10.6.2.2.3.1 POST

This method is used to subscribe to the event of the slice usage pattern analytics and shall support the URI query parameters specified in table 7.10.6.2.2.3.1-1.

Table 7.10.6.2.2.3.1-1: 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 7.10.6.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.6.2.2.3.1-3.

Table 7.10.6.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SUPSub	M	1	Subscription to the slice usage pattern analytics event.

Table 7.10.6.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SUPSub	M	1	201 Created	Subscription to the slice usage pattern analytics is created.
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 7.10.6.2.2.3.1-4: 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-adae-sup/<apiVersion>/slice-usage-pattern/{subscriptionId}

7.10.6.2.2.4 Resource Custom Operations

None.

7.10.6.2.3 Resource: Individual slice usage pattern event subscription

7.10.6.2.3.1 Description

The Individual Slice usage pattern event subscription resource represents an individual event subscription of a service consumer to the slice usage pattern analytics of the ADAE server.

7.10.6.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-sup/<apiVersion>/slice-usage-pattern/{subscriptionId}**

This resource shall support the resource URI variables defined in the table 7.10.6.2.3.2-1.

Table 7.10.6.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5
subscriptionId	string	Identifies an Individual Events Subscription

7.10.6.2.3.3 Resource Standard Methods

7.10.6.2.3.3.1 GET

This operation retrieves an individual slice usage pattern event subscription resource. This method shall support the URI query parameters specified in table 7.10.6.2.3.3.1-1.

Table 7.10.6.2.3.3.1-1: 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 7.10.6.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.6.2.3.3.1-3.

Table 7.10.6.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.6.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SUPSub	M	1	200 OK	The requested individual slice usage pattern subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.6.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.6.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.6.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.6.2.3.3.2-1.

Table 7.10.6.2.3.3.2-1: 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 7.10.6.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.6.2.3.3.2-3.

Table 7.10.6.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.6.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual subscription is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource deletion. The response shall include a Location header field containing an alternative URI of the resource located in an alternative server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.6.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

Table 7.10.6.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server.

7.10.6.2.3.4 Resource Custom Operations

None.

7.10.6.3 Notifications

7.10.6.3.1 General

Table 7.10.6.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Slice usage pattern event notification	{notifUri}	POST	Notification on the slice usage pattern analytics

7.10.6.3.2 Slice usage pattern event notification

7.10.6.3.2.1 Description

Slice usage pattern event notification is to notify on the event of the slice usage pattern analytics.

7.10.6.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.6.3.2.2-1.

Table 7.10.6.3.2.2-1: 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 7.10.6.3.2.2-2 and the response data structures and response codes specified in table 7.10.6.3.2.2-3.

Table 7.10.6.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SUPNotif	M	1	Notification information of the slice usage pattern analytics

Table 7.10.6.3.2.2-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Notification for the slice usage pattern analytics event is accepted.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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 7.10.6.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.6.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.6.4 Data Model

7.10.6.4.1 General

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

Table 7.10.6.4.1-1 specifies the data types defined specifically for the SS_ADAE_SliceUsagePatternAnalytics API service.

Table 7.10.6.4.1-1_SS_ADAE_SliceUsagePatternAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
SUPSub	7.10.6.4.2.2	Subscription to the slice usage pattern analytics event.	
SUPNotif	7.10.6.4.2.3	Notification information of the slice usage pattern analytics event.	

Table 7.10.6.4.1-2 specifies data types re-used by the SS_ADAE_SliceUsagePatternAnalytics API service:

Table 7.10.6.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AnalyticsType	Clause 7.10.1.4.2.6	Represents the type of analytics.	
Dnn	3GPP TS 29.571 [21]	Identifies a DNN.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
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	
Snssai	3GPP TS 29.571 [21]	Identifies the S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [21]	Supported features.	
TimeWindow	3GPP TS 29.122 [3]	A time window.	
Uinteger	3GPP TS 29.571 [21]	Unsigned integer.	
Uri	3GPP TS 29.122 [3]	Represents a URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Indicate either VAL User ID or VAL UE ID.	

7.10.6.4.2 Structured data types

7.10.6.4.2.1 Introduction

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

7.10.6.4.2.2 Type: SUPSub

Table 7.10.6.4.2.2-1: Definition of type SUPSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Represents the notification URI.	
analyticsType	AnalyticsType	M	1	Identifies the type of the slice usage pattern analytics. Only the "mode" attribute is applicable.	
sliceId	Snssai	M	1	Identity of the network slice.	
dnn	Dnn	O	0..1	Associated target DNN.	
valUeIds	array(ValTargetUe)	O	1..N	A list of identities of one or more VAL UEs, whose slice usage patterns are subscribed to.	
valServerId	string	O	0..1	If the consumer is different from the VAL server, this identifier represents the VAL server, to which the slice usage pattern analytics subscription is applied.	
confLevel	Uinteger	O	0..1	Indicates the preferred confidence level of the prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	The geographical or service area, to which the slice usage pattern analytics subscription is applied.	
timeValidity	TimeWindow	O	0..1	The time validity of the subscription.	
historicTimeInt	TimeWindow	C	0..1	The historic time interval as the start and the end time, to which the slice usage pattern analytics subscription is applied. This attribute shall be provided in case immediate reporting of statistics is requested.	
repReq	ReportingInformation	O	0..1	Represents the reporting requirement of the slice usage pattern analytics subscription.	
immNotif	SUPNotif	C	0..1	Immediate notifications. It shall only be provided in the subscription request, if immediate reporting is requested and the outputs are available.	
dataId	string	C	0..1	Identity of the slice usage statistics data which is to be collected. It shall be provided if immediate reporting of statistics is requested and may not be provided otherwise.	
valServiceId	string	C	0..1	The identifier of the VAL service, for which the request applies. It shall be provided if immediate reporting of statistics is requested and may not be provided otherwise.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the supported features of the API as defined in clause 7.10.6.6. This attribute shall be provided in the HTTP POST response of successful subscription creation if it was provided in the request.	

7.10.6.4.2.3 Type: SUPNotif

Table 7.10.6.4.2.3-1: Definition of type SUPNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
output	string	M	1	Slice usage pattern analytics. The format is up to the implementation.	
confLevel	Uinteger	C	0..1	Indicates the achieved confidence level in the case of prediction. This attribute shall be provided if the "analyticsType" attribute in the subscription is set to "PREDICTIVE". Minimum = 0. Maximum = 100.	

7.10.6.4.2.4 Void

7.10.6.4.2.5 Void

7.10.6.4.3 Simple data types and enumerations

7.10.6.4.3.1 Introduction

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

7.10.6.4.3.2 Simple data types

None.

7.10.6.4.3.3 Void

7.10.6.5 Error Handling

7.10.6.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.6.5.2 Protocol Errors

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

7.10.6.5.3 Application Errors

The application errors defined for SS_ADAE_SliceUsagePatternAnalytics API are listed in table 7.10.6.5.3-1.

Table 7.10.6.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.6.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.6.6-1 lists the supported features for SS_ADAE_SliceUsagePatternAnalytics API.

Table 7.10.6.6-1: Supported Features

Feature number	Feature Name	Description

7.10.7 SS_ADAE_EdgeLoadAnalytics API

7.10.7.1 API URI

The SS_ADAE_EdgeLoadAnalytics service shall use the SS_ADAE_EdgeLoadAnalytics API.

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

- The <apiName> shall be "ss-adae-el".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.7.2.

7.10.7.2 Resources

7.10.7.2.1 Overview

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

Figure 7.10.7.2.1-1 depicts the resource URIs structure for the SS_ADAE_EdgeLoadAnalytics API.

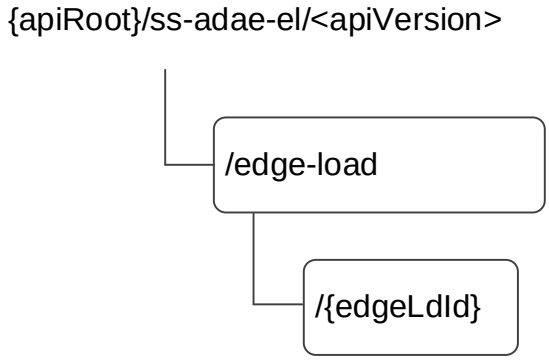

Figure 7.10.7.2.1-1: Resource URI structure of the SS_ADAE_EdgeLoadAnalytics API

Table 7.10.7.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.7.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method	Description
Edge Load Event Subscription	/edge-load	POST	Creates a new individual Event Subscription for edge load analytics.
Individual Edge Load Event Subscription	/edge-load/{edgeLdId}	GET	Retrieve an individual edge load analytics according to query parameter on the resource identified by {edgeLdId}. If there are no query parameter, fetch the whole edge load resource identified by {edgeLdId}.
		DELETE	Deletes an individual Event Subscription identified by the {edgeLdId}.

7.10.7.2.2 Resource: Edge Load Event Subscription

7.10.7.2.2.1 Description

The edge load event subscription to the event of the edge load analytics.

7.10.7.2.2.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-el/<apiVersion>/edge-load**

This resource shall support the resource URI variables defined in the table 7.10.7.2.2.2-1.

Table 7.10.7.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.10.7.2.2.3 Resource Standard Methods

7.10.7.2.2.3.1 POST

This method to subscribe to the event of the edge load analytics and shall support the URI query parameters specified in table 7.10.7.2.2.3.1-1.

Table 7.10.7.2.2.3.1-1: 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 7.10.7.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.7.2.2.3.1-3.

Table 7.10.7.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EdgeSub	M	1	Create a new individual Event Subscription to the event of edge load analytics.

Table 7.10.7.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EdgeSub	M	1	201 Created	Edge load Event 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] shall also apply.				

Table 7.10.7.2.2.3.1-4: 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-adae-el/<apiVersion>/edge-load/{edgeLdId}

7.10.7.2.2.4 Resource Custom Operations

None.

7.10.7.2.3 Resource: Individual Edge Load Event Subscription

7.10.7.2.3.1 Description

The Individual Edge Load Event Subscription resource represents an individual event subscription of the edge load analytics.

7.10.7.2.3.2 Resource Definition

Resource URI: **{apiRoot}/ss-adae-el/<apiVersion>/edge-load/{edgeLdId}**

This resource shall support the resource URI variables defined in the table 7.10.7.2.3.2-1.

Table 7.10.7.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.
edgeLdId	string	Identifies an Individual Edge Load Events Subscription.

7.10.7.2.3.3 Resource Standard Methods

7.10.7.2.3.3.1 GET

This operation reads the individual edge load subscription resource. This method shall support the URI query parameters specified in table 7.10.7.2.3.3.1-1.

Table 7.10.7.2.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 7.10.7.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.7.2.3.3.1-3.

Table 7.10.7.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.7.2.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
EdgeSub	M	1	200 OK	The requested individual edge load subscription is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.10.7.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

Table 7.10.7.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

7.10.7.2.3.3.2 DELETE

This method shall support the URI query parameters specified in table 7.10.7.2.3.3.2-1.

Table 7.10.7.2.3.3.2-1: 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 7.10.7.2.3.3.2-2 and the response data structures and response codes specified in table 7.10.7.2.3.3.2-3.

Table 7.10.7.2.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.7.2.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The individual Edge Load Events Subscription matching the edgeLdId is deleted.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ADAE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.7.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

Table 7.10.7.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative ADAE server.

7.10.7.2.3.4 Resource Custom Operations

None.

7.10.7.3 Notifications

7.10.7.3.1 General

Table 7.10.7.3.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Edge load event notification	{notifUri}	POST	Notification on the event of the edge load analytics or the edge load analytics data.

7.10.7.3.2 Edge load event notification

7.10.7.3.2.1 Description

Edge load event notification is to notify on the event of the edge load analytics or the edge load analytics data.

7.10.7.3.2.2 Notification definition

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

Callback URI: **{notifUri}**

This method shall support the URI query parameters specified in table 7.10.7.3.2.2-1.

Table 7.10.7.3.2.2-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

If the notification is on the edge load analytics and the edge load analytics data, this method shall support the request data structures specified in table 7.10.7.3.2.2-2 and the response data structures and response codes specified in table 7.10.7.3.2.2-3.

Table 7.10.7.3.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
EdgeNotif	M	1	Notification information on edge load analytics or edge load analytics data.

Table 7.10.7.3.2.2-3: 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.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [3] shall also apply.				

Table 7.10.7.3.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

Table 7.10.7.3.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI representing the end point of an alternative notification destination towards which the notification should be redirected.

7.10.7.4 Data Model

7.10.7.4.1 General

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

Table 7.10.7.4.1-1 specifies the data types defined specifically for the SS_ADAE_EdgeLoadAnalytics API service.

Table 7.10.7.4.1-1: SS_ADAE_EdgeLoadAnalytics API specific Data Types

Data type	Section defined	Description	Applicability
EdgeNotif	7.10.7.4.2.3	Notification information of the edge load analytics event.	
EdgeSub	7.10.7.4.2.2	Represents the subscription to the edge load event.	

Table 7.10.7.4.1-2 specifies data types re-used by the SS_ADAE_EdgeLoadAnalytics API service:

Table 7.10.7.4.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
AnalyticsType	Clause 7.10.1.4.2.6	Type of analytics for the event of the edge load analytics.	
Dnai	3GPP TS 29.571 [21]	Identifies a user plane access to one or more DN(s).	
Dnn	3GPP TS 29.571 [21]	Identifies a DNN.	
LocationArea5G	3GPP TS 29.122 [3]	Represents location information.	
NotificationMethod	3GPP TS 29.508 [32]	Used to indicate the reporting mode.	
ProdProfileInfo	Clause 7.10.1.4.2.4	Information about the data producer's support data collection and its access to the produced data.	
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 supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [3]	Represents a period of time with start time and end time.	
Uinteger	3GPP TS 29.571 [21]	Used to represent integer attributes.	
Uri	3GPP TS 29.122 [3]	Used to indicate the notification URI.	

7.10.7.4.2 Structured data types

7.10.7.4.2.1 Introduction

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

7.10.7.4.2.2 Type: EdgeSub

Table 7.10.7.4.2.2-1: Definition of type EdgeSub

Attribute name	Data type	P	Cardinality	Description	Applicability
analyticsType	AnalyticsType	M	1	Represents the anaytics type of the edge load analytics.	
destinationEasInfo	string	O	0..1	Represents the information for the destination EAS, including destination EAS ID and detination EAS address. (NOTE 1)	
destinationEesId	string	O	0..1	The identifier of the destination EES. (NOTE 1)	
dnai	Dnai	O	0..1	Represents the Data Network Access Identifier of user plane access to DN(s) which the subscription applies. (NOTE 1)	
dnn	Dnn	O	0..1	Represents the target DNN which the subscription applies. (NOTE 1)	
dataProdProfile	ProdProfileInfo	O	0..1	Represents the characteristics of the data producer to be used.	
confLevel	Uinteger	O	0..1	Represents the accuracy level for the edge load analytics in case of prediction. Minimum = 0. Maximum = 100.	
area	LocationArea5G	O	0..1	Represents the geographical or service area, to which the edge load analytics subscription is applied.	
notifUri	Uri	M	1	Represents the notification URI.	
report	EdgeNotif	C	0..1	Indicates the reporting data for one-time immediate report. It shall be provided if one-time immediate reporting is requested by indicated in the "reportReq" attribute, and the outputs are available.	
reportReq	ReportingInformation	O	0..1	Represents the reporting requirements of the subscription. (NOTE 2)	
timeInterval	TimeWindow	O	0..1	The time interval as the start and the end time, to which the edge load analytics subscription applies.	
suppFeat	SupportedFeatures	C	0..1	Used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

NOTE 1: At least one of the attributes, "destinationEasInfo", "destinationEesId", and either "dnai" or "dnn", shall be present.
NOTE 2: If absent, the applied reporting parameters are based on local configuration.

7.10.7.4.2.3 Type: EdgeNotif

Table 7.10.7.4.2.3-1: Definition of type EdgeNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
analyticsOutput	string	M	1	Represents the edge load analytics. (NOTE)	
confLevel	Uinteger	C	0..1	Represents the accuracy level of the edge load analytics in case of prediction. Minimum = 0. Maximum = 100. This attribute shall be provided if the analyticsType in the subscription request is set to "PREDICTIVE".	
NOTE: The content of "analyticsOutput" attribute is not defined in this Release of the specification.					

7.10.7.4.2.4 Void

7.10.7.4.2.5 Void

7.10.7.4.2.6 Void

7.10.7.4.3 Simple data types and enumerations

7.10.7.4.3.1 Introduction

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

7.10.7.4.3.2 Simple data types

None.

7.10.7.5 Error Handling

7.10.7.5.1 General

HTTP error handling shall be supported as specified in clause 6.7.

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

7.10.7.5.2 Protocol Errors

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

7.10.7.5.3 Application Errors

The application errors defined for SS_ADAE_EdgeLoadAnalytics API are listed in table 7.10.7.5.3-1.

Table 7.10.7.5.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.7.6 Feature Negotiation

General feature negotiation procedures are defined in clause 6.8. Table 7.10.7.6-1 lists the supported features for SS_ADAE_EdgeLoadPatternAnalytics API.

Table 7.10.7.6-1: Supported Features

Feature number	Feature Name	Description

7.10.8 SS_AADRF_DataManagement API

7.10.8.1 API URI

The SS_AADRF_DataManagement service shall use the SS_AADRF_DataManagement API.

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

- The <apiName> shall be "ss-aadrf-datamanagement".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 7.10.8.2

7.10.8.2 Resources

7.10.8.2.1 Overview

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

Figure 7.10.8.2.1-1 depicts the resource URIs structure for the SS_AADRF_DataManagement API.

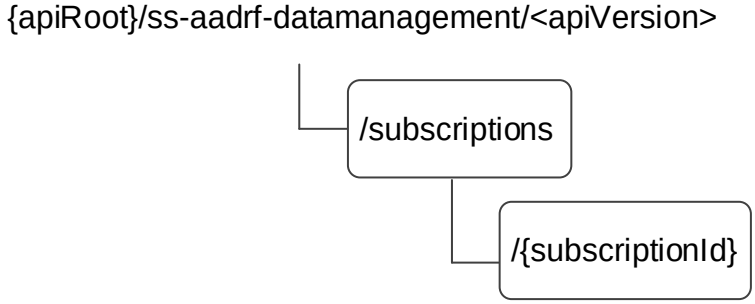

Figure 7.10.8.2.1-1: Resource URI structure of the SS_AADRF_DataManagement API

Table 7.10.8.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.10.8.2.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
A-ADRF Data Management Subscriptions	/subscriptions	POST	Creates a new Individual A-ADRF Data Management Subscription resource.
Individual A-ADRF Data Management Subscription	/subscriptions/{subscriptionId}	DELETE	Deletes an Individual A-ADRF Data Management Subscription identified by {subscriptionId}.

7.10.8.2.2 Resource: A-ADRF Data Management Subscriptions

7.10.8.2.2.1 Description

The A-ADRF Data Management Subscriptions resource represents all the subscriptions stored at A-ADRF. The resource allows an NF service consumer to create a new Individual A-ADRF Data Management Subscription resource.

7.10.8.2.2.2 Resource Definition

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

This resource shall support the resource URI variables defined in the table 7.10.8.2.2.2-1.

Table 7.10.8.2.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5.

7.10.8.2.2.3 Resource Standard Methods

7.10.8.2.2.3.1 POST

This method shall support the URI query parameters specified in table 7.10.8.2.2.3.1-1.

Table 7.10.8.2.2.3.1-1: 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 7.10.8.2.2.3.1-2 and the response data structures and response codes specified in table 7.10.8.2.2.3.1-3.

Table 7.10.8.2.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DataManageSub	M	1	Create a new Individual A-ADRF Data Management Subscription resource.

Table 7.10.8.2.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DataManageSub	M	1	201 Created	The creation of an Individual A-ADRF Data Management Subscription resource is confirmed and a representation of that resource is returned.
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.				

Table 7.10.8.2.2.3.1-4: 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-aadrf-datamanagement/<apiVersion>/subscriptions/{subscriptionId}

7.10.8.2.2.4 Resource Custom Operations

None in this release of the specification.

7.10.8.2.3 Resource: Individual A-ADRF Data Management Subscription

7.10.8.2.3.1 Description

The Individual A-ADRF Data Management Subscription resource represents a single subscription to the SS_AADRF_DataManagement Service at a given A-ADRF.

7.10.8.2.3.2 Resource definition

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

The <apiVersion> shall be set as described in clause 7.10.8.2.3.2-1.

This resource shall support the resource URI variables defined in table 7.10.8.2.3.2-1.

Table 7.10.8.2.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.5.
subscriptionId	string	Identifies a subscription to the SS_AADRF_DataManagement Service.

7.10.8.2.3.3 Resource Standard Methods

7.10.8.2.3.3.1 DELETE

This method shall support the URI query parameters specified in table 7.10.8.2.3.3.1-1.

Table 7.10.8.2.3.3.1-1: 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 7.10.8.2.3.3.1-2 and the response data structures and response codes specified in table 7.10.8.2.3.3.1-3.

Table 7.10.8.2.3.3.1-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.10.8.2.3.3.1-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case: The Individual A-ADRF Data Management Subscription resource matching the subscriptionId was deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative A-ADRF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative A-ADRF. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.8.2.3.3.1-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative A-ADRF.

Table 7.10.8.2.3.3.1-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	An alternative URI of the resource located in an alternative server-ADRF.

7.10.8.2.3.4 Resource Custom Operations

None in this release of the specification.

7.10.8.3 Custom Operations without associated resources

None.

7.10.8.4 Notifications

7.10.8.4.1 General

Table 7.10.8.4.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Event Notification	{notifUri}	POST	Report the subscribed data.

7.10.8.4.2 Event Notification

7.10.8.4.2.1 Description

The Event Notification is used by the A-ADRF to report the subscribed data to an NF service consumer that has subscribed to such Notifications.

7.10.8.4.2.2 Notification definition

Callback URI: **{notifUri}**

The operation shall support the callback URI variables defined in Table 7.10.8.4.2.2-1, the request data structures specified in table 7.10.8.4.2.2-2 and the response data structure and response codes specified in Table 7.10.8.4.2.2-3.

Table 7.10.8.4.2.2-1: Callback URI variables

Name	Data type	Definition
notifUri	Uri	The Notification Uri is assigned within the Individual A-ADRF Data Management Subscription Resource and described within the DataManageSub type.

Table 7.10.8.4.2.2-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DataManageNotification	M	1	Provides information about the requested data.

Table 7.10.8.4.2.2-3: 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.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3].
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.				

Table 7.10.8.4.2.2-4: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination towards which the notification is redirected.

Table 7.10.8.4.2.2-5: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative notification destination instance towards which the notification is redirected.

7.10.8.5 Data Model

7.10.8.5.1 General

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

Table 7.10.8.5.1-1 specifies the data types defined specifically for the SS_AADRF_DataManagement API service.

Table 7.10.8.5.1-1: SS_AADRF_DataManagement API specific Data Types

Data type	Section defined	Description	Applicability
AadrfEvent	7.10.8.5.3.1	Indicates the subscribed events.	
ApiLogInfo	7.10.8.5.2.7	Represents the API log data.	
ApiLogReq	7.10.8.5.2.5	Represents the API log request requirement.	
DataManageNotification	7.10.8.5.2.6	Represents the notification to the consumer.	
DataManageSub	7.10.8.5.2.2	Represents the events subscription.	
EdgeInfo	7.10.8.5.2.8	Represents the EDGE related data.	
EdgeReq	7.10.8.5.2.4	Represents the EDGE data request requirement.	
EventSubscription	7.10.8.5.2.3	Represents the event subscription.	
ExposureLevel	7.10.8.5.3.2	Indicates the exposure level.	

Table 7.10.8.5.1-2 specifies data types re-used by the SS_AADRF_DataManagement API service.

Table 7.10.8.5.1-2: Re-used Data Types

Data type	Reference	Comments	Applicability
Dnai	3GPP TS 29.571 [21]	Identifies a user plane access to one or more DN(s).	
Dnn	3GPP TS 29.571 [21]	Used to Identify a DNN.	
Float	3GPP TS 29.571 [21]	Used to represent the fractional part of the proximity range in the reference UE details.	
Snssai	3GPP TS 29.571 [21]	Used to Identify the S-NSSAI.	
SupportedFeatures	3GPP TS 29.571 [21]	Used to negotiate the applicability of optional features.	
Uinteger	3GPP TS 29.571 [21]	Used to represent integer attributes within MeasurementData and ReportingRequirements data structures.	
Uri	3GPP TS 29.571 [21]	Used to indicate the notification URI.	
ValTargetUe	Clause 7.3.1.4.2.3	Used to indicate either VAL User ID or VAL UE ID.	
ValidityConditions	7.5.1.4.2.13	Represents the temporal and/or spatial conditions applied for the events to be monitored.	

7.10.8.5.2 Structured data types

7.10.8.5.2.1 Introduction

7.10.8.5.2.2 Type: DataManageSub

Table 7.10.8.5.2.2-1: Definition of type DataManageSub

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubscriptions	array(EventSubscription)	M	1..N	Subscribed events.	
notifUri	Uri	M	1	Identifies the recipient of Notifications sent by the A-ADRF.	
notifCorrId	string	O	0..1	Notification correlation identifier.	
supportedFeatures	SupportedFeatures	C	0..1	List of Supported features used as described in clause 7.10.8.7. This parameter shall be supplied by NF service consumer in the POST request that request the creation of an A-ADRF Event Subscriptions resource and shall be supplied by the A-ADRF in the reply of corresponding request.	

7.10.8.5.2.3 Type: EventSubscription

Table 7.10.8.5.2.3-1: Definition of type EventSubscription

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AadrfEvent	M	1	The event that is subscribed.	
dataCollectReq	string	O	0..1	The requirements for data collection. (NOTE)	
dataProducerIds	array(string)	O	1..N	The list of Data Producer IDs.	
valUes	array(ValTargetUe)	O	1..N	The target VAL UE(s) identifiers.	
valServerId	string	O	0..1	Identifies the target VAL server for which the data collection subscription applies.	
valServiceId	string	O	0..1	The VAL service ID of the VAL application.	
profileCriteria	string	O	0..1	The characteristics of the data producers to be used. (NOTE)	
validConds	ValidityConditions	O	0..1	Represents the temporal and/or spatial conditions applied for the request.	
edgeReq	EdgeReq	O	0..1	The EDGE data collection requirement. This attribute may be present if the subscribed event is "EDGE_DATA".	
snssais	array(Snssai)	C	1..N	Identification(s) of network slice(s) to which the subscription applies. This attribute shall be present if the subscribed event is "NETWORK_SLICE".	
apiLogReq	ApiLogReq	O	0..1	The historical service API logs requirement. This attribute may be present if the subscribed event is "HISTORICAL_SERVICEAPI".	
NOTE: The format of this attribute is not specified in this release of the specification and is up to implementation.					

7.10.8.5.2.4 Type: EdgeReq

Table 7.10.8.5.2.4-1: Definition of type EdgeReq

Attribute name	Data type	P	Cardinality	Description	Applicability
dnais	array(Dnai)	C	1..N	Identifiers the DN Access Identifier representing location of the service flow. (NOTE)	
destEasId	string	C	0..1	Identifier for the destination EAS, for which the edge load analytics subscription or the edge load data collection subscription, is requested. (NOTE)	
destEesId	string	C	0..1	Identifier for the destination EES, for which the edge load analytics subscription or the edge load data collection subscription, is requested. (NOTE)	
dnns	array(Dnn)	C	1..N	Identifiers of the DNNs. (NOTE)	
NOTE: At least one of these attributes shall be present.					

7.10.8.5.2.5 Type: ApiLogReq

Table 7.10.8.5.2.5-1: Definition of type ApiLogReq

Attribute name	Data type	P	Cardinality	Description	Applicability
apiRequestorInfo	string	M	1	Identifier of the originated application querying service API log request.	
apiId	string	O	0..1	String identifying the API invoked.	
apiName	string	O	0..1	Name of the API which was invoked, it is set as {apiName} part of the URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [3].	
apiVersion	string	O	0..1	Version of the API which was invoked.	
inputParameters	string	O	0..1	List of input parameters. (NOTE)	
result	string	O	0..1	For HTTP protocol, it contains HTTP status code of the invocation.	
apiInvokerId	string	O	0..1	Identity of the API invoker which invoked the service API.	
exposureLvl	ExposureLevel	O	0..1	The level of exposure requirement for the logs to be exposed.	
apiAggreInfo	string	O	0..1	The aggregation or abstraction/filtering requirement needs to be applied. (NOTE)	
NOTE: The content of "apiAggreInfo" and "inputParameters" attributes is not defined in this Release of the specification.					

7.10.8.5.2.6 Type: DataManageNotification

Table 7.10.1.4.2.6-1: Definition of type DataManageNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AadrfEvent	M	1	The event that is subscribed.	
notifCorrId	string	O	0..1	Notification correlation identifier.	
valServerId	string	O	0..1	Identifies the target VAL server for which the data collection subscription applies. This attribute shall be present if the subscribed event is "HISTORICAL_SERVICEAPI".	
valServiceId	string	O	0..1	The VAL service ID of the VAL application.	
valUeIds	array(ValTargetUe)	O	1..N	The target VAL UE(s) identifiers.	
locAccuracy	string	O	0..1	The requested location analytics/data. (NOTE)	
validConds	ValidityConditions	O	0..1	Represents the temporal and/or spatial conditions applied for the request.	
apiLogs	array(ApiLogInfo)	O	1..N	The API logs information. This attribute may be present if the subscribed event is "HISTORICAL_SERVICEAPI".	
rttDeviation	Float	O	0..1	Indicates the deviation value of RTT. This attribute may be present if the subscribed event is "NETWORK_SLICE".	
snssais	array(Snssai)	O	1..N	Identification(s) of network slice(s) to which the subscription applies. This attribute may be present if the subscribed event is "NETWORK_SLICE".	
edgeInfo	EdgeInfo	O	0..1	The EDGE related information. This attribute may be present if the subscribed event is "EDGE_DATA".	
NOTE: The format of this attribute is not specified in this release of the specification and it is up to the implementation.					

7.10.8.5.2.7 Type: ApiLogInfo

Table 7.10.1.4.2.7-1: Definition of type ApiLogInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
apiId	string	M	1	String identifying the API invoked.	
apiName	string	O	0..1	Name of the API which was invoked, it is set as {apiName} part of the URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [3].	
failNum	Uinteger	O	0..1	Indicates the number of failure API invocations.	
apiAvailableInd	boolean	O	0..1	Indicates the API availability. Set to "true" to indicate that the API is available. Default value is "false" if omitted.	
apiVerChgNum	Uinteger	O	0..1	Indicates the number of API version changes.	
apiLocChg	boolean	O	0..1	Indicates the API location changes for the target API. Set to "true" to indicate that the API location has changed. Default value is "false" if omitted.	
apiThrottlingEvents	string	O	0..1	Indicates the API throttling events. (NOTE)	
invokeNum	Uinteger	O	0..1	Indicates the number of API invocations.	
apiVersion	string	O	0..1	Version of the API which was invoked.	
NOTE: The format of this attribute is not specified in this release of the specification and it is up to the implementation.					

7.10.8.5.2.8 Type: EdgeInfo

Table 7.10.8.5.2.8-1: Definition of type EdgeInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
edgeReq	EdgeReq	O	0..1	Indicates the DNAI, EAS and EES information which the data applies.	
output	string	O	0..1	The reported data. (NOTE)	
NOTE: The content of "output" attribute is not defined in this Release of the specification.					

7.10.8.5.3 Simple data types and enumerations

7.10.8.5.3.1 Enumeration: AadrfEvent

Table 7.10.8.5.3.1-1: Enumeration AadrfEvent

Enumeration value	Description	Applicability
HISTORICAL_SERVICEAPI	The event for historical service API logs.	
NETWORK_SLICE	The event for the network slice data.	
EDGE_DATA	The event for the EDGE related data.	
LOCATION_ACCURACY	The event for the location accuracy data.	

NOTE: The A-ADRF is not required to support all the events simultaneously. The supported events negotiation between the consumer and A-ADRF depends on SLA.

7.10.8.5.3.2 Enumeration: ExposureLevel

Table 7.10.8.5.3.2-1: Enumeration ExposureLevel

Enumeration value	Description	Applicability
READ	The exposure level for the logs to be exposed is read.	
WRITE	The exposure level for the logs to be exposed is write.	
DELETE	The exposure level for the logs to be exposed is delete.	

7.10.8.6 Error Handling

7.10.8.6.1 General

HTTP error handling shall be supported as specified in clause 6.7.

7.10.8.6.2 Protocol Errors

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

7.10.8.6.3 Application Errors

The application errors defined for SS_AADRF_DataManagement API are listed in table 7.10.8.6.3-1.

Table 7.10.8.6.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

7.10.8.7 Feature negotiation

General feature negotiation procedures are defined in clause 6.8.

Table 7.10.8.7-1: 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 not used, then TLS and OAuth 2.0 shall be supported as described in clause 5.1.1.8 of 3GPP TS 33.434 [26]. When TLS is used, mutual authentication based on client and server certificates shall be performed between the SEAL server and VAL server using TLS. After the authentication, the SEAL server determines whether the VAL server is authorized to send requests to the SEAL server. The SEAL server shall authorize the requests from VAL server using OAuth-based authorization mechanism.

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 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.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.2.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.8.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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.
      operationId: CreateLocReportingConfig
      tags:
        - SEAL Location Reporting Configurations (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocationReportConfiguration'
      responses:
        '201':
          description: Location reporting configuration 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:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    callbacks:
      NotifyLocationTriggerEvent:
        '{$request.body#/notifUri}':
          post:
            summary: Notify on location event.
            requestBody:
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/LocationReport'
            responses:
              '204':
                description: The notification is successfully received.
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /trigger-configurations/{configurationId}:
    get:
      description: Retrieves an individual SEAL location reporting configuration information.
      operationId: RetrieveLocReportingConfig
      tags:
        - Individual SEAL Location Reporting Configuration (Document)
      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'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'
  put:
    description: Updates an individual SEAL location reporting configuration.
    operationId: UpdateLocReportingConfig
    tags:
      - Individual SEAL Location Reporting Configuration (Document)
    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'
      '204':
        description: No Content
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
```

```
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  delete:
    description: Deletes an individual SEAL location reporting configuration.
    operationId: DeleteLocReportingConfig
    tags:
      - Individual SEAL Location Reporting Configuration (Document)
    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.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'
  patch:
    description: Modify an existing SEAL Location Reporting Configuration.
    operationId: ModifyLocReportingConfig
    tags:
      - Individual SEAL Location Reporting Configuration (Document)
    parameters:
      - name: configurationId
        in: path
        description: Identifier of an individual SEAL location reporting configuration.
        required: true
        schema:
          type: string
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/LocationReportConfigurationPatch'
    responses:
      '200':
        description: >
          The individual SEAL location reporting configuration is modified successfully and
          a representation of the updated SEAL location reporting configuration is returned
          in the request body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocationReportConfiguration'
      '204':
        description: >
          No Content. The individual SEAL location reporting configuration is
          modified successfully.
      '307':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    LocationReportConfiguration:
      description: Represents the location reporting configuration information.
      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'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        accuracy:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/Accuracy'
        valSvcAreaIds:
          type: array
          minItems: 1
          items:
            $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
          description: >
            Represents the VAL service area ID(s).
        triggCriteria:
          $ref: '#/components/schemas/TriggeringCriteria'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        report:
          $ref: '#/components/schemas/LocationReport'
      required:
        - valServerId
        - valTgtUe

    LocationReportConfigurationPatch:
      description: Represents the location reporting configuration information patch.
      type: object
      properties:
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        monDur:
```

```
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        repPeriod:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        accuracy:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/Accuracy'
        valSvcAreaIds:
          type: array
          minItems: 1
          items:
            $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
          description: >
            Represents the VAL service area ID(s).
        triggCriteria:
          $ref: '#/components/schemas/TriggeringCriteria'

    TriggeringCriteria:
      description: Represents the location reporting triggering criteria.
      type: object
      properties:
        reportingMode:
          $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/NotificationMethod'
        repPer:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
        locChgCond:
          $ref: '#/components/schemas/LocChangeCond'
        ioInd:
          $ref: '#/components/schemas/InsideOutsideInd'
        repSchedules:
          type: array
          minItems: 1
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/ScheduledCommunicationTime'
          description: >
            Indicates the requested reporting schedule, e.g., day(s) of the week
            and/or time period(s) for the location reporting.
      required:
        - reportingMode

    LocationReport:
      description: Represents the location trigger report.
      type: object
      properties:
        subscriptionId:
          type: string
          description: >
            Represents the identifier of the subscription to which the location
            reporting notification is related.
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        locInfo:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        timeStamp:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      required:
        - subscriptionId
        - valTgtUe
        - locInfo

# Simple data types and Enumerations
    InsideOutsideInd:
      anyOf:
      - type: string
        enum:
           - INSIDE
           - OUTSIDE
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents a desired condition of the location reporting,
        e.g., inside or outside the given area.
        Possible values are:
        - INSIDE: Indicates that the reporting shall occur when the UE is inside the given location.
        - OUTSIDE: Indicates that the reporting shall occur when the UE is outside the given
```

```
            location.

    LocChangeCond:
      anyOf:
      - type: string
        enum:
           - CELL
           - NODEB
           - TA_RA
           - WLAN_AN
           - CIVIC_ADDR
           - GPS
           - SAI
           - ECGI
           - RAT
           - VAL_SERVICE_AREA
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents a desired condition of the requested location change.
        Possible values are:
        - CELL: The condition is cell change.
        - NODEB: The condition is eNodeB or gNodeB change.
        - TA_RA: The condition is TA or RA change.
        - WLAN_AN: The condition is WLAN access network change (e.g., SSID or BSSID change).
        - CIVIC_ADDR: The condition is civic address change.
        - GPS: The condition is GPS coordinate change.
        - SAI: The condition is SAI change..
        - ECGI: The condition is ECGI change.
        - RAT: The condition is RAT change.
        - VAL_SERVICE_AREA: The condition is VAL service area change.
```

A.3 SS_GroupManagement API

```
openapi: 3.0.0

info:
  title: SS_GroupManagement
  description: |
    API for SEAL Group management.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.2.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.8.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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.
      operationId: CreateValGroupDoc
      tags:
        - VAL Group Documents (Collection)
      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
      operationId: RetrieveValGroupDocs
      tags:
        - VAL Group Documents (Collection)
      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
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

  /group-documents/{groupDocId}:
    get:
      description: Retrieves VAL group information satisfying filter criteria.
      operationId: RetrieveIndValGroupDoc
      tags:
        - Individual VAL Group Document (Document)
      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'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

    put:
      description: Updates an individual VAL group document.
      operationId: UpdateIndValGroupDoc
      tags:
        - Individual VAL Group Document (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'
        '204':
          description: No Content
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    delete:
      description: Deletes a VAL Group.
      operationId: DeleteIndValGroupDoc
      tags:
        - Individual VAL Group Document (Document)
      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.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'
    patch:
      description: Modify an existing VAL Group document.
      operationId: ModifyIndValGroupDoc
      tags:
        - Individual VAL Group Document (Document)
      parameters:
        - name: groupDocId
          in: path
          description: Identifier of an individual VAL group document.
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/VALGroupDocumentPatch'
      responses:
        '200':
          description: >
            The individual VAL Group document is modified successfully and a
            representation of the updated VAL Group document is returned in the request body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/VALGroupDocument'
        '204':
          description: No Content. The individual VAL group document is modified successfully.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    VALGroupDocument:
      description: Represents details of the VAL group document information.
      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
        valSvcInf:
          type: string
          description: VAL service specific information.
        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'
        valSvcAreaId:
          $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
        extGrpId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        com5GLanType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
      required:
        - valGroupId

    VALGroupDocumentPatch:
      description: Represents details of the partial update of VAL group document information.
      type: object
      properties:
        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
        locInfo:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        addLocInfo:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        valSvcAreaId:
          $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
        extGrpId:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/ExternalGroupId'
        com5GLanType:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PduSessionType'
```

A.4 SS_UserProfileRetrieval API

```
openapi: 3.0.0

info:
  title: SS_UserProfileRetrieval
```

```
  description: |
    API for SEAL User Profile Retrieval.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.2.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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.
      operationId: RetrieveValUserProfile
      tags:
        - VAL Services
      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
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

components:
  securitySchemes:
```

```
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    ProfileDoc:
      description: Represents the profile information associated with a VAL user ID or a VAL UE ID.
      type: object
      properties:
        profileInformation:
          type: string
          description: Profile information associated with the valUserId or valUeId.
        valTgtUe:
          $ref: '#/components/schemas/ValTargetUe'
      required:
        - profileInformation
        - valTgtUe

    ValTargetUe:
      description: Represents the information identifying a VAL user ID or a VAL UE ID.
      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: 1.2.1
  title: SS_NetworkResourceAdaptation
  description: |
    SS Network Resource Adaptation Service.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.549 V18.8.0; Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /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'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

  /mbs-resources:
    post:
```

```
    summary: Request the creation of a new MBS Resource.
    operationId: CreateMBSResource
    tags:
      - MBS Resources (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MBSResourceReq'
    responses:
      '201':
        description: >
          Created. Successfull case. The requested MBS resource is successfully created and a
          representation of the created Individual MBS Resource resource is returned in the
          response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MBSResourceResp'
        headers:
          Location:
            description: >
              Contains the URI of the created Individual MBS Resource 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. The notification was succesfully received.
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
```

```
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /mbs-resources/{mbsResId}:
    parameters:
      - name: mbsResId
        in: path
        description: Represents the identifier of the Individual MBS Resource resource.
        required: true
        schema:
          type: string

    get:
      summary: Request the retrieval of an existing Individual MBS Resource.
      operationId: GetIndivMBSResource
      tags:
        - Individual MBS Resource (Document)
      responses:
        '200':
          description: >
            OK. Successful case. A representation of the requested Individual MBS Resource resource
            is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MBSResource'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

    put:
      summary: Request the update of an existing Individual MBS Resource.
      operationId: UpdateIndivMBSResource
      tags:
        - Individual MBS Resource (Document)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MBSResource'
      responses:
        '200':
          description: >
            OK. Successful case. The targeted Individual MBS Resource resource is successfully
            updated and a representation of the updated resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MBSResource'
        '204':
```

```
        description: >
          No Content. Successful case. The targeted Individual MBS Resource resource is
          successfully updated and no content is returned in the response body.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

  patch:
    summary: Request the modification of an existing Individual MBS Resource.
    operationId: ModifyIndivMBSResource
    tags:
      - Individual MBS Resource (Document)
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/MBSResourcePatch'
    responses:
      '200':
        description: >
          OK. Successful case. The targeted Individual MBS Resource resource is successfully
          modified and a representation of the updated resource is returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MBSResource'
      '204':
        description: >
          No Content. Successful case. The targeted Individual MBS Resource resource is
          successfully modified and no content is returned in the response body.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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: Request the deletion of an existing Individual MBS Resource.
    operationId: DeleteIndivMBSResource
    tags:
      - Individual MBS Resource (Document)
    responses:
      '204':
        description: >
          No Content. Successful case. The targeted Individual MBS Resource resource is
```

```
          successfully deleted.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

/mbs-resources/{mbsResId}/activate:
  parameters:
    - name: mbsResId
      in: path
      description: Represents the identifier of the Individual MBS Resource resource.
      required: true
      schema:
        type: string

  post:
    summary: Request the activation of an existing MBS Resource.
    operationId: ActivateMBSResource
    tags:
      - Individual MBS Resource (Document)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MbsResAct'
    responses:
      '200':
        description: >
          OK. The activation request is successfully received and processed.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsResAct'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/mbs-resources/{mbsResId}/deactivate:
```

```
    parameters:
      - name: mbsResId
        in: path
        description: Represents the identifier of the Individual MBS Resource resource.
        required: true
        schema:
          type: string

    post:
      summary: Request the deactivation of an existing MBS Resource.
      operationId: DeactivateMBSResource
      tags:
        - Individual MBS Resource (Document)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MbsResDeact'
      responses:
        '200':
          description: >
            OK. The deactivation request is successfully received and processed.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MbsResDeact'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /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
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /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'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'
/tsc-stream-availability:
  get:
    summary: Discover the TSC stream availability information.
    operationId: GetTscStreamAvailability
    tags:
      - TSC stream availability discovery
    parameters:
      - name: stream-specs
        in: query
        description: >
          The MAC address(es) of the source DS-TT port(s) and the destination DS-TT port(s).
        required: true
        schema:
          type: array
          items:
            $ref: '#/components/schemas/StreamSpecification'
```

```
          minItems: 1
      responses:
        '200':
          description: OK.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/TscStreamAvailability'
                minItems: 0
        '204':
          description: No Content.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'
  /tsc-streams:
    get:
      summary: Retrieval of TSC stream data.
      operationId: GetTscStream
      tags:
        - TSC stream retrieval
      parameters:
        - name: val-stream-ids
          in: query
          description: Retrieval of TSC Stream data, identified by the VAL Stream ID(s).
          required: false
          schema:
            type: array
            items:
              type: string
            minItems: 1

      responses:
        '200':
          description: OK (successful query of TSC stream resource)
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/TscStreamData'
                minItems: 1

        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'
/tsc-streams/{valStreamId}:
  get:
    summary: "Reads an existing Individual TSC stream data information"
    operationId: GetTscStreamData
    tags:
      - Individual TSC Stream Retrieval
    parameters:
      - name: valStreamId
        in: path
        description: The VAL Stream ID identifies the TSC stream.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: OK. Resource representation is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TscStreamData'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'
  put:
    summary: Create a TSC stream identified by a VAL stream identifier.
    operationId: PutTscStream
    tags:
      - TSC stream creation
    description: Create an individual TSC stream identified by VAL Stream ID.
    parameters:
      - name: valStreamId
        in: path
        description: VAL stream identifier
        required: true
        schema:
          type: string
    requestBody:
      description: TSC stream creation request data from the VAL server to the NRM server.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/TscStreamData'
    responses:
      '201':
        description: Success
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/TscStreamData'
        headers:
          Location:
```

```
            description: Contains the URI of the created individual TSC stream 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'
    delete:
      summary: "Delete an existing Individual TSC stream"
      operationId: DeleteTscStream
      tags:
        - Individual TSC Stream Deletion
      parameters:
        - name: valStreamId
          in: path
          description: The VAL Stream ID identifies the TSC stream.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: No Content. Resource was succesfully deleted
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

  /bdt-policy-configs:
    post:
      summary: Creates a new Individual BDT Policy Configuration
      operationId: CreateBDTPolicyConfig
      tags:
        - BDT Policy Configurations (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/BdtPolConfig'
      responses:
        '201':
          description: Success
          content:
```

```
          application/json:
            schema:
              $ref: '#/components/schemas/BdtPolConfig'
        headers:
          Location:
            description: >
              Contains the URI of the created individual BDT Policy configuration 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:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    callbacks:
      BdtNotification:
        '{$request.body#/notifUri}':
          post:
            requestBody:
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/BdtNotification'
            responses:
              '204':
                description: No Content, Notification was successful
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /bdt-policy-configs/{bdtPolConfigId}:
    parameters:
      - name: bdtPolConfigId
        in: path
        description: Represents the identifier of the Individual BDT Policy Configuration.
        required: true
```

```
      schema:
        type: string

  get:
    summary: Reads an existing Individual BDT Policy Configuration
    operationId: GetBDTPolicyConfig
    tags:
      - Individual BDT Policy Configuration(Document)
    responses:
      '200':
        description: OK. Resource representation is returned
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/BdtPolConfig'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

  put:
    summary: Request the update of an existing Individual BDT Policy Configuration.
    operationId: UpdateBDTPolicyConfig
    tags:
      - Individual BDT Policy Configuration(Document)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/BdtPolConfig'
    responses:
      '200':
        description: >
          OK. Successful case. The targeted Individual BDT Policy Configuration resource
          is successfully updated and a representation of the updated resource is returned
          in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/BdtPolConfig'
      '204':
        description: >
          No Content. Successful case. The targeted Individual BDT Policy Configuration
          resource is successfully updated and no content is returned in the response body.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
```

```
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Request the modification of an existing Individual BDT Policy Configuration.
    operationId: ModifyBDTPolicyConfig
    tags:
      - Individual BDT Policy Configuration(Document)
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/BdtPolConfigPatch'
    responses:
      '200':
        description: >
          OK. Successful case. The targeted Individual BDT Policy Configuration resource
          is successfully modified and a representation of the updated resource is returned
          in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/BdtPolConfig'
      '204':
        description: >
          No Content. Successful case. The targeted Individual BDT Policy Configuration
          resource is successfully modified and no content is returned in the response body.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  delete:
    summary: Delete an existing Individual BDT policy Configuration
    operationId: DeleteBDTPolicyConfig
    tags:
      - Individual BDT Policy Configuration (Document)
    responses:
      '204':
        description: No Content. Resource was successfully deleted
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
```

```
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

/request-rel-trans:
  post:
    summary: Enables a service consumer to request reliable transmission service.
    operationId: RelTransRequest
    tags:
      - Reliable Transmission Service Request
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/RelTransReq'
    responses:
      '204':
        description: >
          No Content. The reliable transmission service request is successfully received and
          processed.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/unif-traff-subscriptions:
  post:
    summary: Creates a new Individual Unified Traffic Pattern Subscription.
    operationId: CreateUnifiedTrafficPatternSubsc
    tags:
      - Unified Traffic Pattern Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/UnfTrafficSubc'
    responses:
      '201':
        description: Success
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UnfTrafficSubc'
```

```
        headers:
          Location:
            description: >
              Contains the URI of the created individual unified traffic pattern 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:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    callbacks:
      UnfTrafficUpdNotification:
        '{$request.body#/notifUri}':
          post:
            requestBody:
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/UnfTrafficUpdNotification'
            responses:
              '204':
                description: No Content, Notification was successful
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /unif-traff-subscriptions/{unfTrffSubId}:
    parameters:
      - name: unfTrffSubId
        in: path
        description: >
          Represents the identifier of the Individual Unified Traffic Pattern Subscription resource.
        required: true
        schema:
```

```
      type: string

  get:
    summary: Reads an existing Individual Unified Traffic Pattern Subscription.
    operationId: GetUnfTrffSubc
    tags:
      - Individual Unified Traffic Pattern Subscription (Document)
    responses:
      '200':
        description: OK. Resource representation is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UnfTrafficSubc'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

  put:
    summary: Update an existing Individual Unified Traffic Pattern Subscription.
    operationId: UpdateUnfTrffSubc
    tags:
      - Individual Unified Traffic Pattern Subscription (Document)
    requestBody:
      description: Updated details of the Unified Traffic Pattern subscription.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/UnfTrafficSubc'
    responses:
      '200':
        description: >
          The subscription is updated successfully, and the updated subscription
          information returned in the response.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UnfTrafficSubc'
      '204':
        description: No Content. The subscription is updated successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
```

```
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Modify an existing Individual Unified Traffic Pattern Subscription.
    operationId: ModifyUnfTrffSubc
    tags:
      - Individual Unified Traffic Pattern Subscription (Document)
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/UnfTrafficSubcPatch'
    responses:
      '200':
        description: >
          The individual Unified Traffic Pattern subscription is
          modified successfully, and the representation of the modified resource
          is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UnfTrafficSubcPatch'
      '204':
        description: No Content. The subscription is modified successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  delete:
    summary: Delete an existing Individual Unified Traffic Pattern Subscription
    operationId: DeleteUnfTrffSubc
    tags:
      - Individual Unified Traffic Pattern Subscription (Document)
    responses:
      '204':
        description: No Content. Resource was successfully deleted
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
      description: Represents a multicast subscription.
      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'
        localMbmsInfo:
          $ref: 'TS29486_VAE_FileDistribution.yaml#/components/schemas/LocalMbmsInfo'
        localMbmsActInd:
          type: boolean
        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:
      description: Represents a unicast subscription.
      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:
    description: Represents a notification on User Plane events.
    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:
    description: Represents a notification on an individual User Plane event.
    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
      mbsResServiceArea:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
      valUeIds:
        type: array
        items:
          type: string
        minItems: 1
    required:
      - event
      - ts

  TscStreamAvailability:
    description: >
      TSC stream availability information includes the stream specification and list of traffic
      specifications. This response shall include stream specification matching one of the query
      parameters provided in the request.
    type: object
    properties:
      streamSpec:
        $ref: '#/components/schemas/StreamSpecification'
      trafficSpecs:
        type: array
        items:
          $ref: '#/components/schemas/TrafficSpecification'
        minItems: 1
    required:
      - streamSpec
      - trafficSpecs

  StreamSpecification:
    description: >
      Stream specification includes MAC addresses of the source and destination DS-TT ports.
    type: object
    properties:
      srcMacAddr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
      dstMacAddr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MacAddr48'
    required:
```

```
      - srcMacAddr
      - dstMacAddr

    TrafficSpecification:
      description: >
        The traffic classe supported by the DS-TTs and available end-to-end maximum latency value.
      type: object
      properties:
        trafficClass:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        e2eMaxLatency:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - trafficClass
        - e2eMaxLatency

    TscStreamData:
      description: TSC stream data information.
      type: object
      properties:
        streamSpec:
          $ref: '#/components/schemas/StreamSpecification'
        trafficSpecInfo:
          $ref: '#/components/schemas/TrafficSpecInformation'
      required:
        - streamSpec
        - trafficSpecInfo

    TrafficSpecInformation:
      description: >
        The traffic classe supported by the DS-TTs and available end-to-end latency
        value and Priority Code Point (PCP) value.
      type: object
      properties:
        pcpValue:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        maxFramInt:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
        maxFramSize:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        maxIntFrames:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        maxLatency:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
      required:
        - pcpValue
        - maxFramInt
        - maxFramSize
        - maxIntFrames
        - maxLatency

    MBSResourceReq:
      description: Represents the parameters to request the creation of an MBS Resource.
      type: object
      properties:
        mbsResource:
          $ref: '#/components/schemas/MBSResource'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - mbsResource

    MBSResource:
      description: Represents an MBS Resource.
      type: object
      properties:
        valGroupId:
          type: string
        valUeIdsList:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
        servAnmtMode:
          $ref: '#/components/schemas/ServiceAnnoucementMode'
        mbsResServInfo:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceInfo'
        mbsResServiceArea:
```

```
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      netSysInd:
        $ref: '#/components/schemas/NetSysIndicator'
      localMbmsInfo:
        $ref: 'TS29486_VAE_FileDistribution.yaml#/components/schemas/LocalMbmsInfo'
      localMbmsActInd:
        type: boolean
      mbsResRespInfo:
        $ref: '#/components/schemas/MBSResourceRespInfo'
    oneOf:
      - required: [valGroupId]
      - required: [valUeIdsList]
    not:
      required: [localMbmsInfo, localMbmsActInd]
    required:
      - servAnmtMode
      - mbsResServInfo
      - notifUri

  MBSResourceRespInfo:
    description: Represents NRM Server side information related to the MBS Resource.
    type: object
    properties:
      mbs5gSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
      mbmsBearerId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
      upIpv4Addr:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv4Addr'
      upIpv6Addr:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Ipv6Addr'
      upPortNum:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Port'
      mbs5GInfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSession'
      epsMbmsInfo:
        $ref: '#/components/schemas/EpsMbmsInfo'
    anyOf:
      - required: [upIpv4Addr]
      - required: [upIpv6Addr]

  MBSResourceResp:
    description: Represents a response to an MBS Resource creation/modification request.
    type: object
    properties:
      mbsResource:
        $ref: '#/components/schemas/MBSResource'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - mbsResource

  MBSResourcePatch:
    description: Represents the parameters to request the modification of an MBS Resource.
    type: object
    properties:
      mbsResServInfo:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsServiceInfo'
      mbsResServiceArea:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/ExternalMbsServiceArea'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      localMbmsInfo:
        $ref: 'TS29486_VAE_FileDistribution.yaml#/components/schemas/LocalMbmsInfo'
      localMbmsActInd:
        type: boolean
      mbsResRespInfo:
        $ref: '#/components/schemas/MBSResourceRespInfo'
    anyOf:
      - required: [mbsResServInfo]
      - required: [mbsResServiceArea]
      - required: [localMbmsInfo]
    not:
      required: [localMbmsInfo, localMbmsActInd]

  MbsResAct:
```

```
    description: Represents the parameters related to the activation of the MBS Resource.
    type: object
    properties:
      mbs5gSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - mbs5gSessionId

  MbsResDeact:
    description: Represents the parameters related to the deactivation of the MBS Resource.
    type: object
    properties:
      mbs5gSessionId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsSessionId'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - mbs5gSessionId


  BdtPolConfig:
    description: Represents the parameters related to the BDT Policy configuration.
    type: object
    properties:
      valServId:
        type: string
      valGroupId:
        type: string
      valUeIds:
        type: array
        items:
          type: string
        minItems: 1
      dataVolUe:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/UsageThreshold'
      desiredTimeWindow:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      grantTimeWindow:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      desiredGeoArea:
        $ref: '#/components/schemas/GeoArea'
      expTime:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
      policyGuidance:
        $ref: '#/components/schemas/PolicyGuidance'
      bdtPolRefId:
        type: string
      notifUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    oneOf:
      - required: [valGroupId]
      - required: [valUeIds]
    required:
      - valServId
      - notifUri
      - dataVolUe
      - desiredTimeWindow
      - desiredGeoArea

  BdtPolConfigPatch:
    description: >
      Represents the parameters to request modification of the BDT Policy configuration.
    type: object
    properties:
      dataVolUe:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/UsageThreshold'
      desiredTimeWindow:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      desiredGeoArea:
        $ref: '#/components/schemas/GeoArea'
      expTime:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
  PolicyGuidance:
    description: >
```

```
      Represents the list of Policy Guidance.
    type: object
    properties:
      policyType:
        $ref: '#/components/schemas/PolicyType'
      cost:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  GeoArea:
    description: Represents a Geographical area.
    type: object
    properties:
      geographicAreas:
        type: array
        items:
          $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
        minItems: 1
        description: Represents a list of Geographical area.
      civicAddresses:
        type: array
        items:
          $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/CivicAddress'
        minItems: 1
        description: Represents a list of Civic address of an area.


  BdtNotification:
    description: Represents a notification on update related to BDT Policy configuration resource.
    type: object
    properties:
      notifId:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      bdtConfigId:
        type: string
      grantTimeWindow:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      bdtPolicyRemoveInd:
        type: boolean
        default: false
    required:
      - notifId
      - bdtConfigId

  UnfTrafficSubc:
    description: Represents the request parameters for Unified Traffic Pattern subscription.
    type: object
    properties:
      mgmtSubs:
        type: object
        additionalProperties:
          $ref: '#/components/schemas/ManagementSubc'
        minProperties: 1
        description: >
          Contains contains the unified traffic pattern subscription(s).
          The key of the map is any unique string encoded value.
      notifUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - mgmtSubs
      - notifUri

  UnfTrafficSubcPatch:
    description: Represents the request parameters to update Unified Traffic Pattern subscription.
    type: object
    properties:
      mgmtSubs:
        type: object
        additionalProperties:
          $ref: '#/components/schemas/ManagementSubc'
        minProperties: 1
        description: >
          Contains contains the unified traffic pattern subscription(s).
          The key of the map is any unique string encoded value.
      notifUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'

  ManagementSubc:
```

```
    description: Represents the Unified Traffic Pattern subscription details.
    type: object
    properties:
      valServId:
        type: string
      valUeIds:
        type: array
        items:
          type: string
        minItems: 1
      traffPatInd:
        type: array
        items:
          $ref: '#/components/schemas/TrafficPatternIndication'
        minItems: 1
      traffPatConfig:
        $ref: '#/components/schemas/TrafficPatternConfig'
    required:
      - valServId
      - valUeIds
      - traffPatInd

  TrafficPatternConfig:
    description: Represents the traffic pattern configuration parameters.
    type: object
    properties:
      scheds:
        type: array
        items:
          $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
        minItems: 1
      expTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      stationInd:
        type: boolean
        default: false

  UnfTrafficUpdNotification:
    description: Represents a notification on update related to unified traffic pattern.
    type: object
    properties:
      valUeIds:
        type: array
        items:
          type: string
        minItems: 1
      sched:
        $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
      stationInd:
        type: boolean
        default: false
      cause:
        type: string
    required:
      - valUeIds


  RelTransReq:
    description: Represents the parameters to request reliable transmission service.
    type: object
    properties:
      requestorId:
        type: string
      appDescs:
        type: array
        items:
          $ref: '#/components/schemas/AppTraffDesc'
        minItems: 2
      valUeId:
        type: string
      valAddrInfo:
        $ref: '#/components/schemas/ValUeAddrInfo'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - requestorId

  AppTraffDesc:
```

```
      description: Represents the application traffic descriptor.
      type: object
      properties:
        connInfo:
          $ref: 'TS29548_SDD_Transmission.yaml#/components/schemas/ConnInfo'
        transProtoc:
          $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/TransportProtocol'
      required:
        - connInfo

    ValUeAddrInfo:
      description: Represents VAL UE address information.
      type: object
      properties:
        valUeIpv4Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        valUeIpv6Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        port:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Port'
      oneOf:
        - required: [valUeIpv4Addr]
        - required: [valUeIpv6Addr]


# Simple data types and Enumerations

    EpsMbmsInfo:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'

    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: |
        Indicates the service announcement mode.
        Possible values are:
        - NRM: NRM server performs the service announcement.
        - VAL: VAL server performs the service announcement.

    DeliveryMode:
      anyOf:
      - type: string
        enum:
          - UNICAST
          - MULTICAST
          - MBS_MULTICAST
          - MBS_BROADCAST
      - 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: |
        Indicates the user plane delivery mode.
        Possible values are:
        - UNICAST: Indicates Unicast delivery.
        - MULTICAST: Indicates EPS MBMS Multicast delivery.
        - MBS_MULTICAST: Indicates 5GS MBS Multicast delivery.
        - MBS_BROADCAST: Indicates 5GS MBS Broadcast 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: |
```

```
        Indicates the NRM event.
        Possible values are:
        - UP_DELIVERY_MODE: User Plane delivery mode.

    NetSysIndicator:
      anyOf:
      - type: string
        enum:
          - 5GS
          - EPS
          - 5GS_AND_EPS
      - 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: |
        Represents the network system indicator, i.e. 5GS, EPS or both.
        Possible values are:
        - 5GS: Indicates that the network system is 5GS.
        - EPS: Indicates that the network system is EPS.
        - 5GS_AND_EPS: Indicates that the network system is 5GS and EPS.

    PolicyType:
      anyOf:
      - type: string
        enum:
          - LOWEST_COST
          - HIGH_THROUGHPUT_WITH_COST
      - 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: |
        Indicates the Policy types.
        Possible values are:
        - LOWEST_COST: Indicates that the policy guidance is to consider lowest cost.
        - HIGH_THROUGHPUT_WITH_COST: Indicates that the policy guidance is to consider highest
          throughput.

    TrafficPatternIndication:
      anyOf:
      - type: string
        enum:
          - TRAFFIC_PATTERN_MANAGE
          - TRAFFIC_PATTERN_MONITOR
          - NETWORK_PARAM_COORDINATION
      - 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: |
        Represents the unified traffic pattern indication requests.
        Possible values are:
        - TRAFFIC_PATTERN_MANAGE: Indicates management of the UE unified traffic pattern request.
        - TRAFFIC_PATTERN_MONITOR: Indicates monitoring of the UE unified traffic pattern.
        - NETWORK_PARAM_COORDINATION: Indicates network parameter coordination by NRM with 5GC.
```

A.6 SS_Events API

```
openapi: 3.0.0

info:
  title: SS_Events
  description: |
    API for SEAL Events management.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.2.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.8.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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.
      operationId: CreateSealEventSubsc
      tags:
        - SEAL Events Subscriptions (Collection)
      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)
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      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.
    operationId: DeleteIndSealEventSubsc
    tags:
      - Individual SEAL Events Subscription (Document)
    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.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'
  patch:
    description: Modify an existing SEAL Event Subscription.
    operationId: ModifyIndSealEventSubsc
    tags:
      - Individual SEAL Events Subscription (Document)
    parameters:
      - name: subscriptionId
        in: path
        description: Identifier of an individual Events Subscription
        required: true
        schema:
          type: string
    requestBody:
      required: true
      content:
        application/merge-patch+json:
          schema:
            $ref: '#/components/schemas/SEALEventSubscriptionPatch'
    responses:
```

```
      '200':
        description: >
          The definition SEAL event subscription is modified successfully and
          a representation of the updated service API is returned in the request body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SEALEventSubscription'
      '204':
        description: No Content. The SEAL Event Subscription is modified successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  put:
    description: Replace an existing SEAl event subscription.
    operationId: UpdateIndSealEventSubsc
    tags:
      - Individual SEAL Events Subscription (Document)
    parameters:
      - name: subscriptionId
        in: path
        description: Identifier of an individual Events Subscription
        required: true
        schema:
          type: string
    requestBody:
      description: Individual SEAL events subscription to be replaced.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SEALEventSubscription'
    responses:
      '200':
        description: SEAL Event subscription updated successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SEALEventSubscription'
      '204':
        description: No Content. Individual SEAL event subscription was updated successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
```

```
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    SEALEventSubscription:
      description: Represents an individual SEAL Event Subscription resource.
      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

    SEALEventSubscriptionPatch:
      description: Represents the partial update of individual SEAL Event Subscription resource.
      type: object
      properties:
        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'

    SEALEventNotification:
      description: Represents notification information of a SEAL Event.
      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:
    description: Represents the subscription to a single SEAL event.
    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.
      monFltr:
        type: array
        items:
          $ref: '#/components/schemas/MonitorFilter'
        minItems: 1
        description: >
          List of event monitoring details that the subscriber wishes to mmonitor the VAL UEs,
          VAL group and/or VAL service.
      areaInt:
        type: array
        items:
          $ref: '#/components/schemas/MonitorLocationInterestFilter'
        minItems: 1
        description: >
          Represents the list of VAL User / UE IDs and the area of interest information
          which the subscriber wishes to monitor the location deviation of VAL User / UEs.
      locAreaMon:
        type: array
        items:
          $ref: '#/components/schemas/MonLocAreaInterestFltr'
        minItems: 1
        description: >
          Each element represents the location area monitoring details to monitor the
          VA UEs moving in and out of the provided location area.
      partialFailRep:
        $ref: '#/components/schemas/PartialEventSubscFailRep'
    required:
      - eventId

  SEALEventDetail:
    description: Represents the SEAL event details.
    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.
      msgFltrs:
        type: array
        items:
          $ref: '#/components/schemas/MessageFilter'
        minItems: 1
        description: >
          The message filter information for various member VAL User or UEs of the VAL group.
      monRep:
        type: array
        items:
          $ref: '#/components/schemas/MonitorEventsReport'
        minItems: 1
        description: The events reports with details of the events related to the VAL UE(s).
      locAdhr:
        type: array
        items:
          $ref: '#/components/schemas/LocationDevMonReport'
        minItems: 1
        description: >
          The location deviation information for the interested VAL User ID or UE IDs
          in a given location.
      tempGroupInfo:
        $ref: '#/components/schemas/TempGroupInfo'
      locAreaMonRep:
        type: array
        items:
          $ref: '#/components/schemas/LocationAreaMonReport'
        minItems: 1
        description: The location area monitoring of the given area of interest.
      valGroupIds:
        type: array
        items:
          type: string
        minItems: 1
        description: Contains the identifier(s) of the deleted VAL Group(s).
    required:
      - eventId

  VALGroupFilter:
    description: Represents a filter of VAL group identifiers belonging to a VAL service.
    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:
    description: Represents a filter of VAL User / UE identities belonging to a VAL service.
    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.
      suppLoc:
        type: boolean
        description: Set to true by Subscriber to request the supplementary location information.
      locQoS:
        $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/LocationQoS'

  LMInformation:
    description: Represents the location information for a VAL User ID or a VAL UE ID.
    type: object
    properties:
      valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
      locInfo:
        $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
      timeStamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      valSvcId:
        type: string
        description: Identity of the VAL service
    required:
      - locInfo
      - valTgtUe

  MessageFilter:
    description: Represents the message filters applicable to a VAL User ID or VAL UE ID.
    type: object
    properties:
      reqUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
      tgtUe:
        type: array
        items:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        minItems: 1
        description: List of VAL User or UE IDs whose message to be sent.
      maxMsgs:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      scheds:
        type: array
        items:
          $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
        minItems: 1
        description: Time frame associated with total number of messages.
      msgTypes:
        type: array
        items:
          type: string
        minItems: 1
        description: List of message types to be sent to VAL UE.
    required:
      - reqUe

  MonitorFilter:
    description: Represents the event monitoring filters applicable to a VAL User ID or VAL UE ID.
    type: object
    properties:
      idnts:
        type: array
        items:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        minItems: 1
        description: List of VAL User or UE IDs whose events monitoring is requested.
      valSvcId:
        type: string
        description: Identity of the VAL service.
      valGrpId:
        type: string
        description: Identity of the group of the target UEs.
      profId:
        type: string
        description: The monitoring profile ID identifying a list of monitoring, analytics events.
      valCnds:
        type: array
        items:
          $ref: '#/components/schemas/ValidityConditions'
```

```
        minItems: 1
        description: The temporal,spatial conditions for the events to be considered valid.
      evntDets:
        type: array
        items:
          $ref: '#/components/schemas/MonitorEvents'
        minItems: 1
        description: List of monitoring, analytics events to be monitored.

  MonitorEvents:
    description: List of event types to be monitored in the context of events monitoring service.
    type: object
    properties:
      cnEvnts:
        type: array
        items:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/MonitoringType'
        minItems: 1
        description: List of monitoring events related to VAL UE.
      anlEvnts:
        type: array
        items:
          $ref: 'TS29522_AnalyticsExposure.yaml#/components/schemas/AnalyticsEvent'
        minItems: 1
        description: List of analytics events related to VAL UE.

  MonitorEventsReport:
    description: List of monitoring and/or analytics events related to VAL UE.
    type: object
    properties:
      tgtUe:
        $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
      evnts:
        type: array
        items:
          $ref: '#/components/schemas/MonitorEvents'
        minItems: 1
        description: List of monitoring and analytics events related to VAL UE.
    required:
      - tgtUe
      - evnts

  ValidityConditions:
    description: List of monitoring and/or analytics events related to VAL UE.
    type: object
    properties:
      locArea:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
      tmWdws:
        type: array
        items:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        minItems: 1
        description: Time window validity conditions.

  MonitorLocationInterestFilter:
    description: Represents the location monitoring filter information.
    type: object
    properties:
      tgtUes:
        type: array
        items:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        minItems: 1
        description: List of VAL Users or UE IDs for which location monitoring is requested.
      locInt:
        $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
      valSvcId:
        $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
      notInt:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    required:
      - tgtUes
      - notInt
    oneOf:
      - required: [locInt]
      - required: [valSvcId]
```

```
    LocationDevMonReport:
      description: Location deviation monitoring report.
      type: object
      properties:
        tgtUes:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: List of VAL Users or UE IDs for which report is related to.
        locInfo:
          $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        notifType:
          $ref: '#/components/schemas/LocDevNotification'
      required:
        - tgtUes
        - locInfo
        - notifType

    TempGroupInfo:
      description: Represents the created temporary VAL group information.
      type: object
      properties:
        valGrpIds:
          type: array
          items:
            type: string
          minItems: 1
        tempValGrpId:
          type: string
        valServIds:
          type: array
          items:
            type: string
          minItems: 1
      required:
        - valGrpIds
        - tempValGrpId

    MonLocAreaInterestFltr:
      description: Filter information indicate the area of interest and triggering events.
      type: object
      properties:
        locInfoCri:
          $ref: '#/components/schemas/LocationInfoCriteria'
        trigEvnts:
          type: array
          items:
            $ref: '#/components/schemas/MonLocTriggerEvent'
          minItems: 1
          description: Triggering events when to send information.
      required:
        - locInfoCri

    LocationInfoCriteria:
      description: >
        Geographic location and reference UE details, where the UEs moving in and out
        to be monitored.
      type: object
      properties:
        geoArea:
          $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
        refUe:
          $ref: '#/components/schemas/ReferenceUEDetail'
        valSvcAreaId:
          $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
      oneOf:
        - required: [geoArea]
        - required: [refUe]

    ReferenceUEDetail:
      description: Reference UE details, where the UEs moving in and out to be monitored.
      type: object
      properties:
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        proxRange:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
```

```
        proxRangeFrac:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
      required:
        - valTgtUe
        - proxRange

    LocationAreaMonReport:
      description: Event report to notify the VAL UEs moving in or out from a given location.
      type: object
      properties:
        curPreUEs:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: List of identities of all VAL UEs present in the given location area.
        moveInOutUEs:
          $ref: '#/components/schemas/MoveInOutUEDetails'
        trigEvnt:
          $ref: '#/components/schemas/MonLocTriggerEvent'

    MoveInOutUEDetails:
      description: List of UEs moved in and out.
      type: object
      properties:
        moveInUEs:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: >
            List of identities of VAL UEs who moved in to given location area
            since previous notification.
        moveOutUEs:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: >
            List of identities of VAL UEs who moved out of the given location area
            since previous notification.

    PartialEventSubscFailRep:
      description: Represents the partial failure report during the subscription creation or update.
      type: object
      properties:
        valTgtUes:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: >
            List of VAL user(s) / VAL UE(s) whose identifier(s) is not found.
        valGrpIds:
          type: array
          items:
            type: string
          minItems: 1
          description: >
            List of VAL group(s) whose identifier(s) is not found.
      oneOf:
        - required: [valTgtUes]
        - required: [valGrpIds]

# Simple data types and Enumerations

    SEALEvent:
      anyOf:
      - type: string
        enum:
          - LM_LOCATION_INFO_CHANGE
          - GM_GROUP_INFO_CHANGE
          - CM_USER_PROFILE_CHANGE
          - GM_GROUP_CREATE
          - NRM_MONITOR_UE_USER_EVENTS
          - LM_LOCATION_DEVIATION_MONITOR
          - GM_TEMP_GROUP_FORMATION
          - LM_LOCATION_AREA_MONITOR
```

```
          - GM_GROUP_DELETION
      - 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: |
        Represents the type of SEAL events that can be subscribed.
        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.
        - NRM_MONITOR_UE_USER_EVENTS: Monitoring and analytic events related to VAL UEs,
          users or VAL group, from the Network Resource Management Server.
        - LM_LOCATION_DEVIATION_MONITOR: Events from Location Management server,
          related to the deviation of the VAL User(s) / UE(s) location from an area of interest.
        - GM_TEMP_GROUP_FORMATION: Events related to the formation of new temporary VAL groups
          from the Group Management Server.
        - LM_LOCATION_AREA_MONITOR: Events from Location Management server, related to the list
          of UEs moving in or moving out of the specific location.
        - GM_GROUP_DELETION: Events related to deletion of existing VAL Group(s) from the GM Server.

    LocDevNotification:
      anyOf:
      - type: string
        enum:
          - NOTIFY_MISMATCH_LOCATION
          - NOTIFY_ABSENCE
          - NOTIFY_PRESENCE
      - 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:
        Enumeration of location deviation notification reports.
        - NOTIFY_MISMATCH_LOCATION: This value indicates that the location information of
          the VAL UE(s) from the SEAL LM client and the core network are not matching.
        - NOTIFY_ABSENCE: This value indicates that the current location information of
          the VAL UE(s)is deviating from the VAL server's area of interest.
        - NOTIFY_PRESENCE: This value indicates that the current location information of
          the VAL UE(s) is within the VAL server's area of interest.

    MonLocTriggerEvent:
      anyOf:
      - type: string
        enum:
          - DISTANCE_TRAVELLED
      - 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: |
        Identifies the triggering event in the location area monitor filtering.
        Possible values are:
        - DISTANCE_TRAVELLED: This value indicates the trigger event for the location area
          monitoring based on the distance travelled by the reference UE.
```

A.7 SS_KeyInfoRetrieval API

```
openapi: 3.0.0

info:
  title: SS_KeyInfoRetrieval
  description: |
    API for SEAL Key Information Retrieval.
    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
  version: "1.1.1"

externalDocs:
  description: >
    3GPP TS 29.549 V17.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://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 management information specific to VAL service.
      operationId: RetrieveKeyMgmtInfo
      tags:
        - Key Records (Collection)
      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'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
```

```
  schemas:
    ValKeyInfo:
      description: >
        Represents key management information associated with VAL server, VAL user or VAL UE.
      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
```

A.8 SS_LocationAreaInfoRetrieval API

```
openapi: 3.0.0

info:
  title: SS_LocationAreaInfoRetrieval
  description: |
    API for SEAL Location Area Info Retrieval.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.1.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.8.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-lair/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /location-retrievals:
    get:
      description: >
        Retrieve the UE(s) information in an application defined proximity range of a location.
      operationId: RetrieveUeLocInfo
      tags:
        - Location Information (Collection)
      parameters:
        - name: location-info
          in: query
          description: Location information around which the UE(s) information is requested.
          required: true
          schema:
            $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        - name: val-svc-area-id
          in: query
          description: >
            The val service area identifier around which which the UE(s) information is requested.
          schema:
            $ref: 'TS29549_SS_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'
        - name: range
```

```
          in: query
          description: >
            The range information over which the UE(s) information is required,
            expressed in meters.
          required: true
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
      responses:
        '200':
          description: >
            The UE(s) information in an application defined proximity range of a location.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: 'TS29549_SS_Events.yaml#/components/schemas/LMInformation'
                minItems: 0
                description: >
                  The UE(s) information in an application defined proximity range of a location.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
```

A.9 Void

A.10 SS_NetworkResourceMonitoring API

```
openapi: 3.0.0
info:
  title: SS_NetworkResourceMonitoring
  description: |
    API for SEAL Network Resource Monitoring.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.1.0"
externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/
security:
```

```
  - {}
  - oAuth2ClientCredentials: []
servers:
  - url: '{apiRoot}/ss-nrm/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
paths:
  /subscriptions:
    post:
      summary: Create individual unicast monitoring subscription resource or obtain unicast QoS
monitoring data for VAL UEs, VAL Group, or VAL Streams.
      operationId: SubscribeUnicastMonitoring
      tags:
        - Unicast Monitoring Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MonitoringSubscription'
      responses:
        '201':
          description: >
            The requested individual monitoring subscription resource is successfully created
            and a representation of the created resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MonitoringSubscription'
          headers:
            Location:
              description: Contains the URI of the newly created individual monitoring resource.
              required: true
              schema:
                type: string
        '200':
          description: The requested unicast QoS monitoring data is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MonitoringReport'
        '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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        NotifyUnicastMonitoringData:
          '{$request.body#/notifUri}':
            post:
              summary: Notify on updates of the individual monitoring resorce accoring the requested
reporting settings.
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/MonitoringReport'
              responses:
```

```
                '204':
                  description: The notification is successfully received.
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  /subscriptions/{subscriptionId}:
    delete:
      summary: Remove an existing individual unicast monitoring subscription resource according to
the subscriptionId.
      operationId: UnsubscribeUnicastMonitoring
      tags:
        - Individual Unicast Monitoring Subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: >
            Represents the identifier of an individual unicast monitoring subscription resource.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            The Individual Unicast Monitoring Subscription resource matching the
            subscriptionId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
      summary: Read an existing individual unicast monitoring subscription resource according to the
subscriptionId.
      operationId: ReadUnicastMonitoringSubscription
      tags:
        - Individual Unicast Monitoring Subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: >
```

```
        Represents the identifier of an individual unicast monitoring subscription resource.
      required: true
      schema:
        type: string
  responses:
    '200':
      description: The requested individual unicast monitoring subscription returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MonitoringSubscription'
    '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'

put:
  summary: >
    Update an individual unicast monitoring subscription identified by the subscriptionId.
  operationId: UpdateUnicastMonitoring
  tags:
    - Individual Unicast Monitoring Subscription (Document)
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Represents the identifier of an individual unicast monitoring subscription resource.
      required: true
      schema:
        type: string
  requestBody:
    description: Updated details of the unicast QoS monitoring subscription.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MonitoringSubscription'
  responses:
    '200':
      description: >
        The subscription is updated successfully, and the updated subscription
        information returned in the response.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MonitoringSubscription'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
```

```
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    patch:
      summary: >
        Modify an individual unicast monitoring subscription identified
        by the subscriptionId.
      operationId: ModifyUnicastMonitoring
      tags:
        - Individual Unicast Monitoring Subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: >
            Represents the identifier of an individual unicast monitoring subscription resource.
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/MonitoringSubscriptionPatch'
      responses:
        '200':
          description: >
            Individual individual unicast QoS monitoring subscription resource is modified
            successfully and representation of the modified individual unicast QoS monitoring
            subscription resource is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MonitoringSubscription'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    MonitoringReport:
```

```
    description: Indicates the monitoring information for VAL UEs list, VAL Group, or VAL Stream.
    type: object
    properties:
      valUeIds:
        type: array
        minItems: 1
        items:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        description: List of VAL UEs whose QoS monitoring data is requested.
      valGroupId:
        type: string
        description: The VAL Group Id which QoS monitoring data is requested.
      valStreamIds:
        type: array
        minItems: 1
        items:
          type: string
        description: List of VAL streams for which QoS monitoring data is requested.
      measData:
        $ref: '#/components/schemas/MeasurementData'
      failureRep:
        type: array
        items:
          $ref: '#/components/schemas/FailureReport'
        description: >
          The failure report indicating the VAL UE(s) or VAL Stream ID(s) whose measurement
          data is not obtained successfully.
      timestamp:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    required:
      - measData
      - timestamp
    oneOf:
      - required: [valUeIds]
      - required: [valGroupId]
      - required: [valStreamIds]

  MeasurementData:
    description: Presents the aggregated measurement data.
    type: object
    properties:
      dlDelay:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      ulDelay:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      rtDelay:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      avgPlr:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketLossRate'
      avgDataRate:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
      maxDataRate:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
      avrDlTrafficVol:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      avrUlTrafficVol:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    anyOf:
      - required: [dlDelay]
      - required: [ulDelay]
      - required: [rtDelay]
      - required: [avgPlr]
      - required: [avgDataRate]
      - required: [maxDataRate]
      - required: [avrDlTrafficVol]
      - required: [avrUlTrafficVol]

  MeasurementPeriod:
    description: >
      Indicates the measurement time period.
    type: object
    properties:
      measStartTime:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
      measDuration:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    required:
      - measStartTime
```

```
      - measDuration

    ReportingRequirements:
      description: Indicates the requested frequency of reporting.
      type: object
      properties:
        reportingMode:
          $ref: 'TS29508_Nsmf_EventExposure.yaml#/components/schemas/NotificationMethod'
        reportingPeriod:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
        reportingThrs:
          type: array
          items:
            $ref: '#/components/schemas/ReportingThreshold'
          minItems: 1
        immRep:
          type: boolean
        repTerminMode:
          $ref: '#/components/schemas/TerminationMode'
        expirationTimer:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
        maxNumRep:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        termThr:
          $ref: '#/components/schemas/MeasurementData'
        termThrMode:
          $ref: '#/components/schemas/ThresholdHandlingMode'
      required:
        - reportingMode

    FailureReport:
      description: >
        Represents the failure report indicating the VAL UE(s) or VAL Stream ID(s)
        for which the NRM server failed to obtain the requested data.
      type: object
      properties:
        valUeIds:
          type: array
          minItems: 1
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          description: >
            List of VAL UE(s) whose measurement data is not obtained successfully.
        valStreamIds:
          type: array
          minItems: 1
          items:
            type: string
          description: >
            List of VAL stream ID(s) whose measurement data is not obtained successfully.
        failureReason:
          $ref: '#/components/schemas/FailureReason'
        measDataType:
          $ref: '#/components/schemas/MeasurementDataType'
      required:
        - measDataType

    MeasurementRequirements:
      description: Indicates the measurement requirements.
      type: object
      properties:
        measDataTypes:
          type: array
          items:
            $ref: '#/components/schemas/MeasurementDataType'
          minItems: 1
          description: Indicates the required the QoS measurement data types.
        measAggrGranWnd:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/AverWindow'
        measPeriod:
          $ref: '#/components/schemas/MeasurementPeriod'
      required:
        - measDataTypes

    MonitoringSubscription:
      description: The unicast monitoring subscription request.
      type: object
      properties:
```

```
        valUeIds:
          description: List of VAL UEs whose QoS monitoring data is requested.
          type: array
          minItems: 1
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        valGroupId:
          type: string
          description: The VAL Group Id which QoS monitoring data is requested.
        valStreamIds:
          type: array
          minItems: 1
          items:
            type: string
          description: List of VAL streams for which QoS monitoring data is requested.
        measReqs:
          $ref: '#/components/schemas/MeasurementRequirements'
        monRep:
          $ref: '#/components/schemas/MonitoringReport'
        reportReqs:
          $ref: '#/components/schemas/ReportingRequirements'
        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'
      oneOf:
        - required: [valUeIds]
        - required: [valGroupId]
        - required: [valStreamIds]

    ReportingThreshold:
      description: >
        Indicates the requested reporting termination threshold for the measurement index(es).
      type: object
      properties:
        measThrValues:
          $ref: '#/components/schemas/MeasurementData'
        thrDirection:
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MatchingDirection'
      required:
        - measThrValues
        - thrDirection

    MonitoringSubscriptionPatch:
      description: Represents the monitoring subscription modification request.
      type: object
      properties:
        measReqs:
          $ref: '#/components/schemas/MeasurementRequirements'
        reportReqs:
          $ref: '#/components/schemas/ReportingRequirements'
        notifUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'

# Simple data types and Enumerations
    MeasurementDataType:
      anyOf:
      - type: string
        enum:
           - DL_DELAY
           - UL_DELAY
           - RT_DELAY
           - AVG_PLR
           - AVG_DATA_RATE
           - MAX_DATA_RATE
           - AVG_DL_TRAFFIC_VOLUME
           - AVG_UL_TRAFFIC_VOLUME
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Indicates the requested measurement data type.
```

```
      Possible values are:
      - DL_DELAY: Downlink packet delay.
      - UL_DELAY: Uplink packet delay.
      - RT_DELAY: Round trip packet delay.
      - AVG_PLR: Average packet loss rate.
      - AVG_DATA_RATE: Average data rate.
      - MAX_DATA_RATE: Maximum data rate.
      - AVG_DL_TRAFFIC_VOLUME: Average downlink traffic volume.
      - AVG_UL_TRAFFIC_VOLUME: Average uplink traffic volume.

    TerminationMode:
      anyOf:
      - type: string
        enum:
          - TIME_TRIGGERED
          - EVENT_TRIGGERED_NUM_REPORTS_REACHED
          - EVENT_TRIGGERED_MEAS_THR_REACHED
          - USER_TRIGGERED
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Indicates the termination mode.
        Possible values are:
        - TIME_TRIGGERED: Time-triggered termination mode.
        - EVENT_TRIGGERED_NUM_REPORTS_REACHED: Event-triggered termination number of reports
          reached mode.
        - EVENT_TRIGGERED_MEAS_THR_REACHED: The event-triggered termination measurement index
          threshold reached mode.
        - USER_TRIGGERED: User-triggered termination mode.

    FailureReason:
      anyOf:
      - type: string
        enum:
          - USER_NOT_FOUND
          - STREAM_NOT_FOUND
          - DATA_NOT_AVAILABLE
          - OTHER_REASON
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the failure reason.
        Possible values are:
        - USER_NOT_FOUND: The user is not found.
        - STREAM_NOT_FOUND: The stream is not found.
        - DATA_NOT_AVAILABLE: The requested data is not available.
        - OTHER_REASON: Other reason (unspecified).

    ThresholdHandlingMode:
      anyOf:
      - type: string
        enum:
          - ALL_REACHED
          - ANY_REACHED
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Indicates the multi-parameter threshold handling mode.
        Possible values are:
        - ALL_REACHED: The decision criterion is met when all the provided thresholds are reached.
        - ANY_REACHED: The decision criterion is met when any of the provided threshold(s)
          is reached.
```

A.11 SS_VALServiceData API

```
openapi: 3.0.0
```

```yaml
info:
  title: SS_VALServiceData
  version: 1.0.0
  description: |
    API for VAL Service Data.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-vsd/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /val-servdata:
    get:
      summary: Retrieve VAL service data.
      operationId: RetrieveValServData
      tags:
        - VAL Service Data Sets (Collection)
      parameters:
        - name: val-tgt-ues
          in: query
          description: Identifying the list of the target VAL UE(s).
          required: false
          schema:
            type: array
            items:
              type: string
            minItems: 1
        - name: val-tgt-users
          in: query
          description: Identifying the list of the target VAL user(s).
          required: false
          schema:
            type: array
            items:
              type: string
            minItems: 1
        - name: val-service-ids
          in: query
          description: Identifies the list of the target VAL service(s).
          required: false
          schema:
            type: array
            items:
              type: string
            minItems: 1
        - name: supp-feats
          in: query
          description: >
            Contains the list of supported features among the ones defined in clause 7.3.2.7..
          required: false
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: OK. The requested VAL Service Data shall be returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ValServDataResp'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    ValServDataResp:
      description: Represents the response to a VAL service data retrieval request.
      type: object
      properties:
        valServData:
          type: array
          items:
            $ref: '#/components/schemas/ValServiceData'
          minItems: 0
        suppFeats:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - valServData

    ValServiceData:
      description: >
        Represents the VAL service data.
      type: object
      properties:
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        valServIds:
          type: array
          items:
            type: string
          minItems: 1
          description: >
            List of the VAL services associated with the VAL user or a VAL UE defined
            in the "valTgtUe" attribute.
        valServSpecInfo:
          type: string
      required:
        - valTgtUe
        - valServIds
```

A.12 SS_VALServiceAreaConfiguration API

```
openapi: 3.0.0

info:
  title: SS_VALServiceAreaConfiguration
  description: |
    API for SEAL VAL Service Area Configuration Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
```

```
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-vsac/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /areas:
    get:
      summary: Obtain the VAL service area(s) according to the provided filtering criteria.
      operationId: ObtainValServiceAreas
      tags:
        - VAL Service Areas (Collection)
      parameters:
        - name: val-svc-area-ids
          in: query
          description: Represents the requested VAL service areas.
          required: false
          schema:
            type: array
            items:
              $ref: '#/components/schemas/ValSvcAreaId'
            minItems: 1
        - name: supp-feats
          in: query
          description: To filter irrelevant responses related to unsupported features.
          required: false
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: The requested VAL service areas information is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ValServiceAreaData'
        '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'

  /areas/configure:
    post:
      summary: Configure VAL service area(s).
      operationId: ConfigureValServiceAreas
      tags:
        - Configure
      requestBody:
        required: true
        content:
```

```
        application/json:
          schema:
            $ref: '#/components/schemas/ValServiceAreaReq'
    responses:
      '200':
        description: >
          Successful case. The identifier(s) of the configured VAL service area(s) information are
          Returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaResp'
      '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'

/areas/update:
  post:
    summary: Update existing VAL service area(s).
    operationId: UpdateValServiceAreas
    tags:
      - Update
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ValServiceAreaReq'
    responses:
      '200':
        description: >
          Successful case. The identifier(s) of the updated VAL service area(s) information are
          returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaResp'
      '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'
```

```
  /areas/delete:
    post:
      summary: Delete existing VAL service area(s).
      operationId: DeleteValServiceAreas
      tags:
        - Delete
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaReq'
      responses:
        '200':
          description: >
            Successful case. The identifier(s) of the deleted VAL service area(s) information are
            returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ValServiceAreaResp'
        '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:
    post:
      summary: Create individual VAL service area change event(s) subscription.
      operationId: SubscribeChangeEvents
      tags:
        - VAL Service Area Change Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaSubsc'
      responses:
        '201':
          description: >
            The requested individual VAL service area change event(s) subscription
            resource is successfully created and a representation of the created
            resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ValServiceAreaSubsc'
          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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        NotifyValServiceAreaChange:
          '{$request.body#/notifUri}':
            post:
              summary: Notify on changes of the VAL service area(s) accodring to the requested
reporting settings.
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/ValServiceAreaNotif'
              responses:
                '204':
                  description: The notification is successfully received.
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /subscriptions/{subscriptionId}:
    parameters:
      - name: subscriptionId
        in: path
        description: >
          Represents the identifier of an individual VAL service area change event(s)
          subscription resource.
        required: true
        schema:
          type: string

    get:
      summary: Read an existing individual unicast monitoring subscription resource according to the
subscriptionId.
      operationId: ReadValServiceAreaChange
      tags:
        - Individual VAL Service Area Change Subscription (Document)
      responses:
        '200':
```

```
        description: >
          The requested individual VAL service area change event(s) subscription is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaSubsc'
      '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'

  put:
    summary: Update individual VAL service area change event(s) subscription.
    operationId: UpdateIndValServAreaChangeSubsc
    tags:
      - Individual VAL Service Area Change Subscription (Document)
    requestBody:
      description: Updated details of the unicast VAL service area change event(s) subscription.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ValServiceAreaSubsc'
    responses:
      '200':
        description: >
          The subscription is updated successfully, and the updated subscription
          information returned in the response.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaSubsc'
      '204':
        description: No Content. The subscription is updated successfully.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  patch:
    summary: Modify the individual VAL service area change event(s) subscription.
    operationId: ModifyIndValServAreaChangeSubsc
```

```
      tags:
        - Individual VAL Service Area Change Subscription (Document)
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/ValServiceAreaSubscPatch'
      responses:
        '200':
          description: >
            The individual VAL service area change event(s) subscription is
            modified successfully, and the representation of the modified resource
            is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ValServiceAreaSubsc'
        '204':
          description: No Content. The subscription is modified successfully.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      summary: Remove the existing individual VAL service area change event(s) subscription resource
according to the subscriptionId.
      operationId: UnsubscribeValServiceAreaChange
      tags:
        - Individual VAL Service Area Change Subscription (Document)
      responses:
        '204':
          description: >
            The individual VAL service area change event(s) subscription resource
            matching the subscriptionId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    ValServiceArea:
      description: Represents the VAL service area.
      type: object
      properties:
        valSvcAreaId:
          $ref: '#/components/schemas/ValSvcAreaId'
        locations:
          type: array
          description: Represents the locations associated with the VAL service area.
          minItems: 1
          items:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
      required:
        - valSvcAreaId
        - locations

    ValServiceAreaReq:
      description: Represents the VAL service area configuration/update/delete request.
      type: object
      properties:
        valSvcAreas:
          type: array
          description: Represents the VAL service area(s).
          minItems: 1
          items:
            $ref: '#/components/schemas/ValServiceArea'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - valSvcAreas

    ValServiceAreaData:
      description: Represents the VAL service area retrieval information.
      type: object
      properties:
        valSvcAreas:
          type: array
          description: Represents the requested VAL service area(s).
          minItems: 1
          items:
            $ref: '#/components/schemas/ValServiceArea'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

    ValServiceAreaResp:
      description: Represents the VAL service area configuration/update/delete response.
      type: object
      properties:
        valSvcAreaIds:
          type: array
          description: Represents the identifier(s) of the successfully handled VAL service area(s).
          minItems: 1
          items:
            $ref: '#/components/schemas/ValSvcAreaId'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - valSvcAreaIds

    ValServiceAreaSubscPatch:
      description: Represents the VAL service area change event(s) modification request.
      type: object
      properties:
        events:
          type: array
          description: Represents the subscribed VAL service area change event(s).
          items:
```

```
        $ref: '#/components/schemas/ValServiceAreaEventType'
      minItems: 1
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    subscDur:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'

ValSvcAreaId:
  type: string
  description: >
    Represents the VAL Service Area identifier encoded as a string and generated
    either based on VAL Server ID or using the Universally Unique Identifier (UUID)
    version 4 as described in IETF RFC 4122.

ValServiceAreaSubsc:
  description: Represents the VAL service area change event(s) subscription.
  type: object
  properties:
    events:
      type: array
      description: Represents the subscribed VAL service area change event(s).
      minItems: 1
      items:
        $ref: '#/components/schemas/ValServiceAreaEventType'
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    subscDur:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - events
    - notifUri

ValServiceAreaEventType:
  description: Represents the VAL service area change event type.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/ValServiceAreaEvent'
    valSvcAreaIds:
      type: array
      description: Represents the VAL service area ID(s) associated with the event.
      minItems: 1
      items:
        $ref: '#/components/schemas/ValSvcAreaId'
  required:
    - event
    - valSvcAreaIds

ValServiceAreaNotif:
  description: Represents the VAL service area change event(s) notifcation.
  type: object
  properties:
    valSvcAreaConts:
      description: Represents the VAL service area change event(s) content.
      minItems: 1
      items:
        $ref: '#/components/schemas/ValServiceAreaEventInfo'
  required:
    - valSvcAreaConts

ValServiceAreaEventInfo:
  description: Represents the VAL service area change event(s) content.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/ValServiceAreaEvent'
    valSvcAreas:
      type: array
      description: Represents the VAL service area(s) associated with the event.
      minItems: 1
      items:
        $ref: '#/components/schemas/ValServiceArea'
    valSvcAreaIds:
      type: array
      description: Represents the VAL service area(s) associated with the event.
      minItems: 1
```

```
          items:
            $ref: '#/components/schemas/ValSvcAreaId'
      required:
        - event

# Simple data types and Enumerations
    ValServiceAreaEvent:
      anyOf:
      - type: string
        enum:
           - UPDATE
           - DELETE
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the VAL service area change event.
        Possible values are:
        - UPDATE: Indicates that the VAL service area change event is VAL service area update.
        - DELETE: Indicates that the VAL service area change event is VAL service area delete.
```

A.13 SS_IdmParameterProvisioning API

```
openapi: 3.0.0

info:
  title: SS_IdmParameterProvisioning
  version: 1.0.0
  description: |
    API for SEAL Identity management.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-ipp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /configurations:
    post:
      description: Provisions VAL Services configuration information.
      operationId: CreateValServiceConf
      tags:
        - VAL Services Configurations (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/VALServicesConfig'
      responses:
        '201':
          description: VAL services configuration created sucessfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/VALServicesConfig'
          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 services configuration satisfying filter criteria
      operationId: RetrieveValServiceConf
      tags:
        - VAL Services Configurations (Collection)
      parameters:
        - name: val-server-id
          in: query
          description: String identifying the VAL server.
          required: false
          schema:
            type: string
        - name: config-ids
          in: query
          description: Identifying the list of the val services configuration resources.
          required: false
          schema:
            type: array
            items:
              type: string
            minItems: 1
        - name: supp-feats
          in: query
          description: >
            Contains the list of supported features among the ones defined in clause 7.8.1.7.
          required: false
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: >
            OK. The requested VAL services configuration(s) matching the received query parameter(s)
            shall be returned.
            If there are no active VAL services configuration(s) matching the received query
            parameter(s), an empty array is returned.
          content:
            application/json:
              schema:
                type: array
                items:
                  $ref: '#/components/schemas/VALServicesConfig'
                minItems: 0
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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'

  /configurations/{confId}:
    get:
      description: Retrieves Individual VAL services configuration information.
      operationId: RetrieveIndValServicesConf
      tags:
        - Individual VAL Services Configuration (Document)
      parameters:
        - name: confId
          in: path
          description: String identifying an individual VAL services configuration resource.
          required: true
          schema:
```

```
        type: string
    responses:
      '200':
        description: The whole Individual VAL services configuration resource.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/VALServicesConfig'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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'

  put:
    description: Updates an individual VAL services configuration resource.
    operationId: UpdateIndValServicesConf
    tags:
      - Individual VAL Services Configuration (Document)
    parameters:
      - name: confId
        in: path
        description: String identifying an individual VAL services configuration resource
        required: true
        schema:
          type: string
    requestBody:
      description: VAL services configuration to be updated in IM server.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/VALServicesConfig'
    responses:
      '200':
        description: VAL services configuration updated successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/VALServicesConfig'
      '204':
        description: No Content
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    patch:
      description: Modify an existing VAL services configuration.
      operationId: ModifyIndValServicesConf
      tags:
        - Individual VAL Services Configuration (Document)
      parameters:
        - name: confId
          in: path
          description: Identifier of an individual VAL services configuration resource.
          required: true
          schema:
            type: string
      requestBody:
        required: true
        content:
          application/merge-patch+json:
            schema:
              $ref: '#/components/schemas/VALServicesConfigPatch'
      responses:
        '200':
          description: >
            The individual VAL services configuration resource is modified successfully and a
            representation of the updated VAL services configuration resource is returned in
            the request body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/VALServicesConfig'
        '204':
          description: No Content. The individual VAL services configuration is modified
successfully.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

    delete:
      description: Deletes a VAL Services Configuration.
      operationId: DeleteIndValServicesConf
      tags:
        - Individual VAL Services Configuration (Document)
      parameters:
        - name: confId
          in: path
          description: String identifying an individual VAL Service Configuration resource.
          required: true
          schema:
            type: string
```

```
      responses:
        '204':
          description: The individual VAL services configuration matching confId was deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    VALServicesConfig:
      description: Represents a VAL services configuration.
      type: object
      properties:
        valSvcConf:
          type: array
          items:
            $ref: '#/components/schemas/VALServiceParams'
          minItems: 1
          description: The list of the provisioned VAL services configuration parameters.
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - valSvcConf

    VALServiceParams:
      description: Represents VAL services configuration information.
      type: object
      properties:
        valServiceId:
          type: string
          description: The identifier of the VAL service.
        idList:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: The list of VAL User IDs or VAL UE IDs.
      required:
        - valServiceId
        - idList

    VALServicesConfigPatch:
      description: >
        Represents of the requested modifications to a VAL services configuration.
      type: object
      properties:
        valSvcConf:
          type: array
          description: The list of the provisioned VAL services configuration parameters.
          items:
            $ref: '#/components/schemas/VALServiceParams'
          minItems: 1
```

A.14 SS_KMParametersProvisioning API

```
openapi: 3.0.0

info:
  title: SEAL KM Server Key Management Parameters Provisioning Service
  version: "1.0.0"
  description: |
    SEAL KM Server Key Management Parameters Provisioning Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-kpp/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /request:
    post:
      summary: Enables a service consumer to request key parameters provisioning to the SEAL KM
Server..
      operationId: Request
      tags:
        - Key Management Parameters Provisioning Request
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/VALKeyPpReq'
      responses:
        '200':
          description: >
            OK. The requested key management parameters are successfully received, processed and
            provisioned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/VALKeyPpResp'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29122_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29122_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29122_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29122_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29122_CommonData.yaml#/components/responses/500'
```

```
        '503':
          $ref: 'TS29122_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    VALKeyPpReq:
      description: Represents the key management parameters to be provisioned.
      type: object
      properties:
        skmcUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        valServiceId:
          type: string
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        payloadId:
          type: string
        payload:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - skmcUri
        - valServiceId
    VALKeyPpResp:
      description: Represents the response to a key management parameters provisioning request.
      type: object
      properties:
        skmcUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        valServiceId:
          type: string
        valTgtUe:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        payloadId:
          type: string
        skmsId:
          type: string
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - skmcUri
        - valServiceId
```

A.15 SS_ADAE_VALPerformanceAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_VALPerformanceAnalytics
  description: |
    API for ADAE VAL performance analytics service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
```

```
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-pa/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /application-performance:
    post:
      description: Creates a new individual VAL performance event subscription.
      operationId: CreateIndValPerfEventSubsc
      tags:
        - VAL performance event subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppPerfSub'
      callbacks:
        paNotification:
          '{$request.body#/notifUri}':
            post:
              requestBody:  # contents of the callback message
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/AppPerfNotif'
              responses:
                '204':
                  description: No Content (successful notification)
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      responses:
        '201':
          description: VAL performance event subscription resource created successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/AppPerfSub'
          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'

/application-performance/{appPerfId}:
  get:
    description: Retrieves an individual VAL performance event subscription.
    operationId: ReadIndValPerfEventSubsc
    tags:
      - Individual VAL performance event subscription (Document)
    parameters:
      - name: appPerfId
        in: path
        description: Identifier of an individual VAL performance event subscription.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: >
          The individual VAL performance subscription matching the appPerfId is retrieved.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AppPerfSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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:
    description: Deletes an individual VAL performance event subscription.
    operationId: DeleteIndValPerfEventSubsc
    tags:
      - Individual VAL performance event subscription (Document)
    parameters:
      - name: appPerfId
        in: path
        description: Identifier of an individual VAL performance event subscription.
        required: true
        schema:
          type: string
    responses:
      '204':
        description: >
          The individual VAL performance subscription matching the appPerfId is deleted.
```

```
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    AppPerfSub:
      description: Represents an individual VAL performance event subscription resource.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        analyticsType:
          $ref: '#/components/schemas/AnalyticsType'
        valServiceId:
          type: string
        valUeIds:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: >
            One or more VAL UE IDs whose analytics or data collection are subject to subcription.
        valServerId:
          type: string
          description: Identity of the VAL server
        dataProdProfile:
          $ref: '#/components/schemas/ProdProfileInfo'
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        timeValidity:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        repReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - notifUri
        - analyticsType
        - valServiceId

    AppPerfNotif:
      description: Represents notification of the VAL performance event.
      type: object
      properties:
        output:
          type: string
          description: Provided output for analytics.
        valServerId:
          type: string
          description: VAL Server identifier.
```

```
        valUeIds:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: List of VAL UE identifiers.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        timeHorizon:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      required:
        - output
        - valServerId

    ProdProfileInfo:
      description: Represents capability of the data producer.
      type: object
      properties:
        prodId:
          type: string
          description: Identity of the data producer.
        prodType:
          $ref: '#/components/schemas/ProducerType'
        dataType:
          $ref: '#/components/schemas/ProducerData'
        prodRole:
          $ref: '#/components/schemas/ProducerRole'
        origProdIds:
          type: array
          items:
            type: string
          minItems: 1
          description: >
            Identifies the identity of the original data producers.
        dataFresh:
          type: integer
          description: Duration of elapsed time in seconds.
        producerCap:
          $ref: '#/components/schemas/ProducerCap'
      required:
        - prodId
        - prodType
        - dataType

    ProducerCap:
      description: Represents capability of the data producer.
      type: object
      properties:
        durationTime:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'

        anonymization:
          type: boolean
          description: >
            Set to true if anonymization is supported.
            Set to false or omitted otherwise.
        dataRate:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
        schedule:
          $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'

    AnalyticsType:
      description: Represents type of requested analytics.
      type: object
      properties:
        category:
          $ref: '#/components/schemas/AnalyticsCategory'
      required:
        - category

# Simple data types and Enumerations

    AnalyticsCategory:
      anyOf:
      - type: string
        enum:
          - PREDICTIVE
          - STATISTICS
```

```
    - 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: |
      Represents the type of the analytics with the values:
      - PREDICTIVE: The event for the analytics is for predictive analytics.
      - STATISTICS: The event for analytics is for statistics analytics.

  ProducerType:
    anyOf:
    - type: string
      enum:
        - ADAE_CLIENT
        - A_DCCF
        - VAL_SERVER
        - SEAL_SERVER
        - SEAL_CLIENT
        - EES
        - EAS
    - 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: |
      Represents the type of the data producer with the values:
      - ADAE_CLIENT: The data producer is ADAE client.
      - A_DCCF: The data producer is A-DCCF.
      - VAL_SERVER: The data producer is VAL server.
      - SEAL_SERVER: The data producer is SEAL server.
      - SEAL_CLIENT: The data producer is SEAL client.
      - EES: The data producer is EES.
      - EAS: The data producer is EAS.

  ProducerData:
    anyOf:
    - type: string
      enum:
        - PERFORMANCE_INDICATOR
        - REPRODUCER_USAGE_DATA
        - SERVER_LOAD_DATA
        - APPLICATION_PERFORMANCE
        - EDGE_LOAD
    - 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: |
      Represents the data type of the data producer with the values:
      - PERFORMANCE_INDICATOR: The data type of the data producer is
        performance indictor.
      - REPRODUCER_USAGE_DATA: The data type of the data producer is
        reproducer usage data.
      - REPRODUCER_USAGE_DATA: The data type of the data producer is
        reproducer usage data.
      - SERVER_LOAD_DATA: The data type of the data producer is
        server load data.
      - APPLICATION_PERFORMANCE: The data type of the data producer is
        application performance.
      - EDGE_LOAD: The data type of the data producer is
        edge load.

  ProducerRole:
    anyOf:
    - type: string
      enum:
        - GENERATING_ENTITY
        - ORIGINAL_PRODUCER
        - RESPOSITORY
    - 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: |
```

```
        Represents the role of the data producer with the values:
        - GENERATING_ENTITY: The role of the data producer is generating entity.
        - ORIGINAL_PRODUCER: The role of the data producer is origina producer.
        - RESPOSITORY: The role of the data producer is repository.
```

A.16 SS_ADAE_SlicePerformanceAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_SlicePerformanceAnalytics
  description: |
    API for ADAE slice-specific application performance analytics service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-sspa/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /slice-specific-application-performance:
    post:
      description: >
        Creates a new individual slice-specific application performance event subscription.
      operationId: SliceAppPerfSubs
      tags:
        - Slice-specific application performance event subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SliceAppPerfSub'
      callbacks:
        sspaNotification:
          '{$request.body#/notifUri}':
            post:
              requestBody:  # contents of the callback message
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SliceAppPerfNotif'
              responses:
                '204':
                  description: No Content (successful notification)
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
```

```
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    responses:
      '201':
        description: Slice-specific performance event subscription resource created successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SliceAppPerfSub'
        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'

  /slice-specific-application-performance/{ssAppPerfId}:
    get:
      description: >
        Retrieves an individual slice-specific application performance event subscription.
      operationId: ReadIndSliceAppPerfEventSubsc
      tags:
        - Individual slice-specific application performance event subscription (Document)
      parameters:
        - name: ssAppPerfId
          in: path
          description: >
            Identifier of an individual slice-specific application performance event subscription.
          required: true
          schema:
            type: string
      responses:
        '200':
          description: >
            The individual slice-specific application performance
            subscription matching the ssAppPerfId is retrieved.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SliceAppPerfSub'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
```

```
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
      description: Deletes an individual slice-specific application performance event subscription.
      operationId: DeleteIndSliceAppPerfEventSubsc
      tags:
        - Individual slice-specific application performance event subscription (Document)
      parameters:
        - name: ssAppPerfId
          in: path
          description: >
            Identifier of an individual slice-specific application performance event subscription.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            The individual slice-specific application performance subscription matching
            the ssAppPerfId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    SliceAppPerfSub:
      description: >
        Represents an individual slice-specific application performance event subscription resource.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        analyticsType:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
        sliceId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
```

```
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        valUeIds:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: >
            One or more VAL UE IDs whose analytics are subject to subcription.
        valServerId:
          type: string
          description: >
            Identity of the VAL server if the consumer is different than the VAL server of interest.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        timeValidity:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        timeHorizon:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        repReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - analyticsType
        - notifUri
        - sliceId

    SliceAppPerfNotif:
      description: Represents notification of the slice-specific application performance event.
      type: object
      properties:
        output:
          type: string
          description: Output data.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        timeHorizon:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      required:
        - output
```

A.17 SS_ADAE_Ue2UePerformanceAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_Ue2UePerformanceAnalytics
  description: |
    API for SEAL VAL Service Area Configuration Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.7.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-uupa/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
```

```
  /ue2ue-session-performance:
    post:
      summary: Create an individual UE-to-UE session performance analytics event subscription.
      operationId: SubscribeUe2UePerfAnalytics
      tags:
        - UE-to-UE Performance Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/U2UPerfSub'
      responses:
        '201':
          description: >
            Subscription to the UE-to-UE session performance analytics is created.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/U2UPerfSub'
          headers:
            Location:
              description: Contains the URI of the newly created individual 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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        NotifyU2USessionEvent:
          '{$request.body#/notifUri}':
            post:
              summary: Notify the UE-to-UE session performance analytics.
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/U2UPerfNotif'
              responses:
                '204':
                  description: The notification is successfully received.
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
```

```
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /ue2ue-session-performance/{u2uPerfId}:
    get:
      summary: Read the individual UE-to-UE session performance analytics event subscription.
      operationId: ReadU2UPerfSubscription
      tags:
        - Individual UE-to-UE Performance Subscription (Document)
      parameters:
        - name: u2uPerfId
          in: path
          description: >
            Represents the identifier of an individual UE-to-UE session performance
            analytics subscription.
          required: true
          schema:
            type: string
      responses:
        '200':
          description: >
            The requested individual UE-to-UE session performance event subscription is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/U2UPerfSub'
        '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: Remove the individual UE-to-UE session performance analytics event subscription.
      operationId: RemoveU2UPerfSubscription
      tags:
        - Individual UE-to-UE Performance Subscription (Document)
      parameters:
        - name: u2uPerfId
          in: path
          description: >
            Represents the identifier of an individual UE-to-UE session performance
            analytics subscription.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            The individual UE-to-UE session performance event subscription matching
            the u2uPerfId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
```

```
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    U2UPerfSub:
      description: >
        Represents the UE-to-UE session performance analytics subscription.
      type: object
      properties:
        analyticsType:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
        valUeIds:
          type: array
          description: >
            Represent the list of VAL UEs, whose UE-to-UE session analytics are subscribed to.
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
        valServiceId:
          description: Represents the VAL service for which the subscription applies.
          type: string
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        repReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        reportingInds:
          type: array
          description: Indicates the list of the requested analytics.
          items:
            $ref: '#/components/schemas/U2UAnalytics'
          minItems: 1
        reportingThrs:
          type: array
          description: >
            Identifies reporting threshold corresponding to the application QoS index(es).
          items:
            $ref: '#/components/schemas/U2UThreshold'
          minItems: 1
        reportingGrn:
          $ref: '#/components/schemas/U2UReportingGranularity'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        timeInterval:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - analyticsType
        - valUeIds
        - notifUri

    U2UPerfNotif:
      description: >
        Represents the threshold for UE-to-UE session performance analytics.
      type: object
```

```
      properties:
        analyticsOutput:
          type: array
          description: >
            Represents the exposure level requirements for the analytics to be exposed.
          items:
            $ref: '#/components/schemas/U2UAnalyticsData'
          minItems: 1
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - analyticsOutput

    U2UThreshold:
      description: >
        Represents the threshold for UE-to-UE session performance analytics.
      type: object
      properties:
        value:
          $ref: '#/components/schemas/U2UAnalyticsData'
        thrDirect:
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MatchingDirection'
      required:
        - value
        - thrDirect

    U2UAnalyticsData:
      description: >
        Represents the UE-to-UE analytics data.
      type: object
      properties:
        valUes:
          $ref: '#/components/schemas/U2UPair'
        avgLatency:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        avgPer:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/PacketErrRate'
        avgDataRate:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/BitRate'
        jitter:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'

    U2UPair:
      description: >
        Represents the UE-to-UE pair.
      type: object
      properties:
        valUeA:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        valUeB:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
      required:
        - valUeA
        - valUeB

# Simple data types and Enumerations
    U2UAnalytics:
      anyOf:
      - type: string
        enum:
           - AVG_LATENCY
           - AVG_PER
           - AVG_DATA_RATE
           - JITTER
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the UE-to-UE analytics types.
        Possible values are:
        - AVG_LATENCY: The indication for requesting the average latency analytics.
        - AVG_PER: The indication for requesting the average packet error rate analytics.
        - AVG_DATA_RATE: The indication for requesting the average data rate analytics.
        - JITTER: The indication for requesting the jitter analytics.

    U2UReportingGranularity:
```

```
      anyOf:
      - type: string
        enum:
           - GROUP
           - INDIVIDUAL
      - type: string
        description: >
          This string provides forward-compatibility with future
          extensions to the enumeration and is not used to encode
          content defined in the present version of this API.
      description: |
        Represents the UE-to-UE reporting granularity.
        Possible values are:
        - GROUP: The indication for requesting the analytics for all
            VAL UE-to-UE application sessions.
        - INDIVIDUAL: The indication for requesting the analytics for individual
            VAL UE-to-UE application sessions.
```

A.18 SS_ADAE_LocationAccuracyAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_LocationAccuracyAnalytics
  description: |
    API for ADAE location accuracy performance analytics service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-laa/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /location-accuracy:
    post:
      description: >
        Creates a new individual location accuracy performance event subscription.
      operationId: LocAccurSubs
      tags:
        - Location accuracy performance event subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocAccurSub'
      callbacks:
        laaNotification:
          '{$request.body#/notifUri}':
            post:
              requestBody:  # contents of the callback message
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/LocAccurNotif'
              responses:
                '204':
                  description: No Content (successful notification)
                '307':
```

```
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    responses:
      '201':
        description: Location accuracy subscription resource created successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocAccurSub'
        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'

  /location-accuracy/{locAccId}:
    get:
      description: Retrieves an individual location accuracy performance event subscription.
      operationId: ReadIndLocAccurPerfEventSubsc
      tags:
        - Individual location accuracy performance event subscription (Document)
      parameters:
        - name: locAccId
          in: path
          description: >
            Identifier of an individual location accuracy performance event subscription.
          required: true
          schema:
            type: string
      responses:
        '200':
          description: >
```

```
            The individual location accuracy subscription matching the locAccId is retrieved.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/LocAccurSub'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
      description: Deletes an individual location accuracy performance event subscription.
      operationId: DeleteIndLocAccurPerfEventSubsc
      tags:
        - Individual location accuracy performance event subscription (Document)
      parameters:
        - name: locAccId
          in: path
          description: >
            Identifier of an individual location accuracy performance event subscription.
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            The individual location accuracy performance subscription matching the locAccId
            is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    LocAccurSub:
      description: >
```

```
      Represents an individual location accuracy performance event subscription resource.
    type: object
    properties:
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      analyticsType:
        $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
      valUeIds:
        type: array
        items:
          $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
        minItems: 1
        description: >
          One or more VAL UE IDs whose analytics are subject to subcription.
      accuracy:
        $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/Accuracy'
      valServiceId:
        type: string
        description: >
          Identifier of the VAL service for which location accuracy analytics is requested.
      confLevel:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      area:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
      timeValidity:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
      ueMobs:
        type: array
        items:
          $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/UeMobility'
        minItems: 1
        description: Mobility and route information of the target VAL UEs.
      repReq:
        $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - analyticsType
      - valUeIds
      - accuracy
      - notifUri

  LocAccurNotif:
    description: Represents notification of the location accuracy performance event.
    type: object
    properties:
      output:
        type: string
        description: Event output data.
      confLevel:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    required:
      - output
```

A.19 SS_ADAE_ServiceApiAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_ServiceApiAnalytics
  description: |
    API for ADAE service API analytics service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.7.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
```

```
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-sa/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /service-api:
    post:
      description: >
        Creates a new individual service API event subscription.
      operationId: SrvApiSubs
      tags:
        - Service API event subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SrvApiSub'
      callbacks:
        saaNotification:
          '{$request.body#/notifUri}':
            post:
              requestBody:  # contents of the callback message
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SrvApiNotif'
              responses:
                '204':
                  description: No Content (successful notification)
                '307':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
                '400':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
                '401':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
                '403':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
                '404':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
                '411':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
                '413':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
                '415':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
                '429':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
                '500':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
                default:
                  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      responses:
        '201':
          description: Service API event subscription resource created successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SrvApiSub'
          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'

/service-api/{srvApiId}:
  get:
    description: Retrieves an individual service API event subscription.
    operationId: ReadIndSrvApiEventSubsc
    tags:
      - Individual service API event subscription (Document)
    parameters:
      - name: srvApiId
        in: path
        description: >
          Identifier of an individual service API event subscription.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: >
          The individual service API event subscription matching the srvApiId is retrieved.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SrvApiSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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:
    description: Deletes an individual service API event subscription.
    operationId: DeleteIndSrvApiEventSubsc
    tags:
      - Individual service API event subscription (Document)
    parameters:
      - name: srvApiId
        in: path
        description: >
          Identifier of an individual service API event subscription.
        required: true
        schema:
          type: string
    responses:
```

```
        '204':
          description: >
            The individual service API subscription matching the srvApiId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    SrvApiSub:
      description: Represents an individual service API event subscription.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        analyticsType:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
        eventCriteria:
          type: string
          description: Criteria matching service API analytics event.
        serviceApiName:
          type: string
          description: Service API name.
        serviceApiType:
          type: string
          description: Service API type.
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        timeValidity:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        timeHorizon:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        repReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - analyticsType
        - notifUri
        - eventCriteria
      oneOf:
        - required: [serviceApiName]
        - required: [serviceApiType]

    SrvApiNotif:
      description: Represents notification of the service API event.
      type: object
      properties:
        requestorId:
          type: string
          description: Identifier of the requestor of the analytics.
        output:
          type: string
```

```
        description: Output for analytics.
      area:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
      confLevel:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
    required:
      - requestorId
      - output
```

A.20 SS_ADAE_SliceUsagePatternAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_SliceUsagePatternAnalytics
  description: |
    API for ADAE Slice Usage Pattern Analytics.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-sup/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /slice-usage-pattern:
    post:
      description: Creates a new Individual slice usage pattern subscription.
      operationId: CreateSliceUsageSub
      tags:
        - Slice Usage Pattern Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SUPSub'
      responses:
        '201':
          description: Slice Usage Pattern subscription resource created successfully.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SUPSub'
          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:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    callbacks:
      SUPNotification:
        '{$request.body#/notifUri}':
          post:
            requestBody:  # contents of the callback message
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/SUPNotif'
            responses:
              '204':
                description: No Content (successful notification)
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /slice-usage-pattern/{subscriptionId}:
    get:
      description: Retrieves an individual Slice Usage Pattern Subscription.
      operationId: ReadSUPSub
      tags:
        - Individual slice usage pattern subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: Identifier of an individual Events Subscription
          required: true
          schema:
            type: string
      responses:
        '200':
          description: The individual slice usage pattern subscription.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SUPSub'
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
```

```
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
      description: Deletes an individual Slice Usage Pattern Subscription.
      operationId: DeleteSUPSub
      tags:
        - Individual slice usage pattern subscription (Document)
      parameters:
        - name: subscriptionId
          in: path
          description: Identifier of an individual Events Subscription
          required: true
          schema:
            type: string
      responses:
        '204':
          description: >
            The individual Slice Usage Pattern Subscription matching the subscriptionId is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    SUPSub:
      description: Represents an individual Slice Usage Pattern Subscription.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        analyticsType:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
        sliceId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        valUeIds:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
```

```
          minItems: 1
          description: List of identities of one or more VAL UEs.
        valServerId:
          type: string
          description: VAL server identifier.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        timeValidity:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        historicTimeInt:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        repReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        immNotif:
          $ref: '#/components/schemas/SUPNotif'
        dataId:
          type: string
          description: Identity of the slice usage statistics data which is to be collected.
        valServiceId:
          type: string
          description: VAL service identifier.
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - notifUri
        - analyticsType
        - sliceId

    SUPNotif:
      description: Represents notification information of a Slice Usage Pattern Event.
      type: object
      properties:
        output:
          type: string
          description: Implementation-specific string representing the slice usage analytics.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - output
```

A.21 SS_ADAE_EdgeLoadAnalytics API

```
openapi: 3.0.0

info:
  title: SS_ADAE_EdgeLoadAnalytics
  description: |
    API for ADAE Edge Load Analytics.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.0"

externalDocs:
  description: >
    3GPP TS 29.549 V18.6.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-adae-el/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /edge-load:
    post:
```

```
    description: Creates a new individual Edge Load Event Subscription.
    operationId: EdgeSub
    tags:
      - Edge Load Events Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EdgeSub'
    callbacks:
      notifUri:
        '{$request.body#/notifUri}':
          post:
            requestBody:  # contents of the callback message
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/EdgeNotif'
            responses:
              '204':
                description: No Content (successful notification)
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'
    responses:
      '201':
        description: Edge Load Events subscription resource created successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EdgeSub'
        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'

/edge-load/{edgeLdId}:
  get:
    description: Retrieves an individual Edge Load Event Subscription.
    operationId: RetrieveIndEdgeLdEventSubsc
    tags:
      - Individual Edge Load Events Subscription (Document)
    parameters:
      - name: edgeLdId
        in: path
        description: Identifier of an individual Events Subscription.
        required: true
        schema:
          type: string
    responses:
      '200':
        description: The individual edge load subscription.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EdgeSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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:
    description: Deletes an individual Edge Load Event Subscription.
    operationId: DeleteIndEdgeLdEventSubsc
    tags:
      - Individual Edge Load Events Subscription (Document)
    parameters:
      - name: edgeLdId
        in: path
        description: Identifier of an individual Events Subscription
        required: true
        schema:
          type: string
    responses:
      '204':
        description: >
          The individual Edge Load Events Subscription matching the edgeLdId is deleted.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '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:
    EdgeSub:
      description: Represents an individual Edge Load Subscription resource.
      type: object
      properties:
        analyticsType:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/AnalyticsType'
        destinationEasInfo:
          type: string
          description: String representing the information for the destination EAS.
        destinationEesId:
          type: string
          description: String identifying the the destination EES.
        dnai:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
        dnn:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
        dataProdProfile:
          $ref: 'TS29549_SS_ADAE_VALPerformanceAnalytics.yaml#/components/schemas/ProdProfileInfo'
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        area:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
        report:
          $ref: '#/components/schemas/EdgeNotif'
        reportReq:
          $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        timeInterval:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - analyticsType
        - notifUri
      anyOf:
        - required: [destinationEasInfo]
        - required: [destinationEesId]
        - oneOf:
           - required: [dnai]
           - required: [dnn]

    EdgeNotif:
      description: Represents notification information of an Edge Load Event.
      type: object
      properties:
        analyticsOutput:
          type: string
          description: String representing the edge load analytics.
        confLevel:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
      required:
        - analyticsOutput
```

A.22 SS_AADRF_DataManagement API

```
openapi: 3.0.0
```

```yaml
info:
  title: SS_AADRF_DataManagement
  description: |
    API for A-ADRF Data Management Service.
    © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
  version: "1.0.1"

externalDocs:
  description: >
    3GPP TS 29.549 V18.7.0 Service Enabler Architecture Layer for Verticals (SEAL);
    Application Programming Interface (API) specification; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.549/

security:
  - {}
  - oAuth2ClientCredentials: []

servers:
  - url: '{apiRoot}/ss-aadrf-datamanagement/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

paths:
  /subscriptions:
    post:
      summary: Create Individual A-ADRF Data Management Subscription.
      operationId: CreateAADRFEventSubscription
      tags:
        - A-ADRF Data Management Subscriptions (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DataManageSub'
      responses:
        '201':
          description: >
            The requested Individual A-ADRF Data Management Subscription is successfully created and
            a representation of the created resource is returned in the response body.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/DataManageSub'
          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'
      callbacks:
        myNotification:
```

```
        '{$request.body#/notifUri}':
          post:
            summary: Notify on the requested data.
            requestBody:
              required: true
              content:
                application/json:
                  schema:
                    $ref: '#/components/schemas/DataManageNotification'
            responses:
              '204':
                description: The notification is successfully received.
              '307':
                $ref: 'TS29122_CommonData.yaml#/components/responses/307'
              '308':
                $ref: 'TS29122_CommonData.yaml#/components/responses/308'
              '400':
                $ref: 'TS29122_CommonData.yaml#/components/responses/400'
              '401':
                $ref: 'TS29122_CommonData.yaml#/components/responses/401'
              '403':
                $ref: 'TS29122_CommonData.yaml#/components/responses/403'
              '404':
                $ref: 'TS29122_CommonData.yaml#/components/responses/404'
              '411':
                $ref: 'TS29122_CommonData.yaml#/components/responses/411'
              '413':
                $ref: 'TS29122_CommonData.yaml#/components/responses/413'
              '415':
                $ref: 'TS29122_CommonData.yaml#/components/responses/415'
              '429':
                $ref: 'TS29122_CommonData.yaml#/components/responses/429'
              '500':
                $ref: 'TS29122_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29122_CommonData.yaml#/components/responses/503'
              default:
                $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  /subscriptions/{subscriptionId}:
    parameters:
      - name: subscriptionId
        in: path
        description: >
          Represents the Individual A-ADRF Data Management Subscription resource.
        required: true
        schema:
          type: string

    delete:
      summary: Remove the Individual A-ADRF Data Management Subscription.
      operationId: UnsubscribeAADRFEventSubscription
      tags:
        - Individual A-ADRF Data Management Subscription (Document).
      responses:
        '204':
          description: >
            The individual A-ADRF Data Management Subscription resource matching the subscriptionId
            is deleted.
        '307':
          $ref: 'TS29122_CommonData.yaml#/components/responses/307'
        '308':
          $ref: 'TS29122_CommonData.yaml#/components/responses/308'
        '400':
          $ref: 'TS29122_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29122_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29122_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29122_CommonData.yaml#/components/responses/404'
        '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:
    DataManageSub:
      description: Represents the event subscriptions.
      type: object
      properties:
        eventSubscriptions:
          type: array
          items:
            $ref: '#/components/schemas/EventSubscription'
          minItems: 1
          description: Subscribed events.
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        notifCorrId:
          type: string
          description: Notification correlation identifier.
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - eventSubscriptions
        - notifUri

    EventSubscription:
      description: Represents the event subscription.
      type: object
      properties:
        event:
          $ref: '#/components/schemas/AadrfEvent'
        dataCollectReq:
          type: string
        dataProducerIds:
          type: array
          items:
            type: string
          minItems: 1
          description: The list of Data Producer IDs.
        valUes:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
          description: The target VAL UE(s) identifiers.
        valServerId:
          type: string
          description: The target VAL server ID.
        valServiceId:
          type: string
          description: The VAL service ID.
        profileCriteria:
          type: string
        validConds:
          $ref: 'TS29549_SS_Events.yaml#/components/schemas/ValidityConditions'
        snssais:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 1
          description: Identification(s) of network slice(s) to which the subscription applies.
        edgeReq:
          $ref: '#/components/schemas/EdgeReq'
        apiLogReq:
          $ref: '#/components/schemas/ApiLogReq'
      required:
        - event

    EdgeReq:
      description: Represents the EDGE data request requirement.
```

```
      type: object
      properties:
        dnais:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
          minItems: 1
          description: Identifiers the DN Access Identifier.
        dnns:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
          minItems: 1
          description: Identifiers the DN Access Identifier.
        destEasId:
          type: string
          description: Identifier for the destination EAS.
        destEesId:
          type: string
          description: Identifier for the destination EES.
      anyOf:
        - required: [dnais]
        - required: [dnns]
        - required: [destEasId]
        - required: [destEesId]

    ApiLogReq:
      description: Represents the API log request requirement.
      type: object
      properties:
        apiRequestorInfo:
          type: string
        apiId:
          type: string
          description: String identifying the API invoked.
        apiName:
          type: string
          description: Name of the API which was invoked.
        apiVersion:
          type: string
          description: Version of the API which was invoked.
        inputParameters:
          type: string

          description: List of input parameters.
        result:
          type: string
          description: For HTTP protocol, it contains HTTP status code of the invocation.
        apiInvokerId:
          type: string
          description: Identity of the API invoker which invoked the service API.
        exposureLvl:
          $ref: '#/components/schemas/ExposureLevel'
        apiAggreInfo:
          type: string
      required:
        - apiRequestorInfo

    DataManageNotification:
      description: Represents the notification to the consumer.
      type: object
      properties:
        event:
          $ref: '#/components/schemas/AadrfEvent'
        notifCorrId:
          type: string
          description: Notification correlation identifier.
        valServerId:
          type: string
          description: The target VAL server ID.
        valServiceId:
          type: string
          description: The VAL service ID.
        valUeIds:
          type: array
          items:
            $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
          minItems: 1
```

```
          description: The target VAL UE(s) identifiers.
        locAccuracy:
          type: string
        validConds:
          $ref: 'TS29549_SS_Events.yaml#/components/schemas/ValidityConditions'
        apiLogs:
          type: array
          items:
            $ref: '#/components/schemas/ApiLogInfo'
          minItems: 1
          description: The API logs information.
        rttDeviation:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
        snssais:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
          minItems: 1
          description: Identification(s) of network slice(s) to which the subscription applies.
        edgeInfo:
          $ref: '#/components/schemas/EdgeInfo'
      required:
        - event

    ApiLogInfo:
      description: Represents the API log data.
      type: object
      properties:
        apiId:
          type: string
          description: String identifying the API invoked.
        apiName:
          type: string
          description: Name of the API which was invoked.
        failNum:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        apiAvailableInd:
          type: boolean
          description: Indicates the API availability.
        apiVerChgNum:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        apiLocChg:
          type: boolean
          description: Indicates the API location changes for the target API.
        apiThrottlingEvents:
          type: string
        invokeNum:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
        apiVersion:
          type: string
          description: Version of the API which was invoked.
      required:
        - apiId

    EdgeInfo:
      description: Represents the EDGE related data.
      type: object
      properties:
        edgeReq:
          $ref: '#/components/schemas/EdgeReq'
        output:
          type: string


# Simple data types and Enumerations
    AadrfEvent:
      anyOf:
      - type: string
        enum:
           - HISTORICAL_SERVICEAPI
           - NETWORK_SLICE
           - EDGE_DATA
           - LOCATION_ACCURACY
      - type: string
        description: >
          This string provides forward-compatibility with future extensions to the enumeration and
          is not used to encode content defined in the present version of this API.
      description: |
```

```
      Indicates the subscribed events.
      Possible values are:
      - HISTORICAL_SERVICEAPI: The event for historical service API logs.
      - NETWORK_SLICE: The event for the network slice data.
      - EDGE_DATA: The event for the EDGE related data.
      - LOCATION_ACCURACY: The event for the location accuracy data.

  ExposureLevel:
    anyOf:
    - type: string
      enum:
         - READ
         - WRITE
         - DELETE
    - type: string
      description: >
        This string provides forward-compatibility with future extensions to the enumeration and
        is not used to encode content defined in the present version of this API.
    description: |
      Indicates the exposure level.
      Possible values are:
      - READ: The exposure level for the logs to be exposed is read.
      - WRITE: The exposure level for the logs to be exposed is write.
      - DELETE: The exposure level for the logs to be exposed is delete.
```

Annex B (normative): SEAL NRM server support integration with TSN

When the SEAL Network Resource Management (NRM) server act as a TSN AF, the NRM server shall support integration with TSN including 5GS Bridge information reporting as defined in clause 14.3.8.2 of 3GPP TS 23.434 [2] and 5GS Bridge configuration as defined in clause 14.3.8.3 of 3GPP TS 23.434 [2].

The 5GS integration with TSN only support fully-centralized model as defined in IEEE Std 802.1Qcc-2018 [29], the NRM server acts as a TSN AF as defined in clause 14.2.2.2 of 3GPP TS 23.434 [2], shall support the TSN bridge information report as defined in clause 14.3.2.29 of 3GPP TS 23.434 [2], TSN bridge information confirmation as defined in clause 14.3.2.30 of 3GPP TS 23.434 [2], TSN bridge configuration request as defined in clause 14.3.2.31 of 3GPP TS 23.434 [2] and TSN bridge configuration response as defined in clause 14.3.2.32 of 3GPP TS 23.434 [2]. TSN CNC (as defined in IEEE 802.1Qcc [29]) via the NRM-S reference point configures the TSN flows in the 5GS. As a TSN AF, the SEAL NRM server shall interact with the 5GS PCF over the N5 reference point to configure the 5G QoS and TSCAI parameters in 5GS as defined in clause 14.2.2.24 of 3GPP TS 29.514 [30].

Annex C (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
2021-03	CT#91e	CP-210221	0015	1	F	Adding some missing description fields to data type definitions in OpenAPI specification files	17.0.0
2021-03	CT#91e	CP-210221	0016	1	F	Corrections to HTTP custom headers handling for Northbound APIs	17.0.0
2021-03	CT#91e	CP-210220	0017		F	OpenAPI reference	17.0.0
2021-03	CT#91e	CP-210240	0018		F	Update of OpenAPI version and TS version in externalDocs field	17.0.0
2021-06	CT#92e	CP-211238	0019	1	F	Correction of invalid characters in OpenAPI specification files	17.1.0
2021-06	CT#92e	CP-211241	0022	1	F	204 No Content during modification procedure on SS_GroupManagement API	17.1.0
2021-06	CT#92e	CP-211241	0023	1	F	Support redirection for SEAL APIs	17.1.0
2021-06	CT#92e	CP-211235	0025		A	Notifcation URI	17.1.0
2021-06	CT#92e	CP-211240	0026		F	204 No Conent for resource modification in SS_LocationReporting API	17.1.0
2021-06	CT#92e	CP-211265	0027		F	Update of OpenAPI version and TS version in externalDocs field	17.1.0
2021-09	CT#93e	CP-212214	0028		F	Resource URI correction on SEAL APIs	17.2.0
2021-09	CT#93e	CP-212207	0029	1	B	Support 5G CN external group information for SEAL groups	17.2.0
2021-09	CT#93e	CP-212207	0030	1	B	Message filters for SEAL groups	17.2.0
2021-09	CT#93e	CP-212223	0031		F	Update of OpenAPI version and TS version in externalDocs field	17.2.0
2021-12	CT#94e	CP-213232	0032	1	B	Support local MBMS	17.3.0
2021-12	CT#94e	CP-213232	0033	1	B	Support Tracking UE and obtaining dynamic UE information	17.3.0
2021-12	CT#94e	CP-213231	0034	1	B	Group Management enhancement for 5G-VN groups	17.3.0
2021-12	CT#94e	CP-213250	0035	4	B	eSEAL Events Monitoring service	17.3.0
2021-12	CT#94e	CP-213220	0036		B	Alignment with SA3 supported TLS profiles	17.3.0
2021-12	CT#94e	CP-213254	0037	2	B	Network slice capability management API for SEAL	17.3.0
2021-12	CT#94e	CP-213231	0038	1	B	eSEAL location deviation service	17.3.0
2021-12	CT#94e	CP-213231	0039	1	B	Introduce TSC related service operations	17.3.0
2021-12	CT#94e	CP-213231	0041	1	B	Support Create_TSC_Stream service operation	17.3.0
2021-12	CT#94e	CP-213231	0042	1	B	Support Delete_TSC_Stream service operation	17.3.0
2021-12	CT#94e	CP-213231	0045	2	B	Create_TSC_Stream data model and OpenAPI	17.3.0
2021-12	CT#94e	CP-213231	0046		B	Delete_TSC_Stream OpenAPI definition	17.3.0
2021-12	CT#94e	CP-213236	0052	1	D	Editorial corrections for tables, figures, clauses, headers and refernces	17.3.0
2021-12	CT#94e	CP-213246	0054		F	Update of OpenAPI version and TS version in externalDocs field	17.3.0
2022-03	CT#95e	CP-220205	0040	4	B	Support Discover_TSC_Stream_Availability service operation	17.4.0

2022-03	CT#95e	CP-220205	0043	4	B	Resource structure to support TSC related service operations	17.4.0
2022-03	CT#95e	CP-220205	0044	4	B	Discover_TSC_Stream_Availability data model and OpenAPI	17.4.0
2022-03	CT#95e	CP-220205	0055	2	B	Obtain service operation in SS_NetworkResourceMonitoring	17.4.0
2022-03	CT#95e	CP-220205	0056	2	B	SS_NetworkResourceMonitoring API support	17.4.0
2022-03	CT#95e	CP-220205	0057	2	B	SS_NetworkResourceMonitoring OpenAPI implementation	17.4.0
2022-03	CT#95e	CP-220205	0058	1	B	Support integration with TSN	17.4.0
2022-03	CT#95e	CP-220205	0059		F	Terminology replacement of NSCM with NSCE	17.4.0
2022-03	CT#95e	CP-220205	0060	1	B	Location deviation service and Open API	17.4.0
2022-03	CT#95e	CP-220205	0061	2	B	SS_LocationAreaMonitoring API	17.4.0
2022-03	CT#95e	CP-220205	0062		B	Location report timestamp support	17.4.0
2022-03	CT#95e	CP-220205	0063		B	Add VAL service specific information	17.4.0
2022-03	CT#95e	CP-220205	0065	1	B	SS_NetworkResourceMonitoring API definition and Subscribe/Unsubscribe/Notify service operations	17.4.0
2022-03	CT#95e	CP-220205	0066		B	Supporting temporary group formation within a VAL system	17.4.0
2022-03	CT#95e	CP-220205	0067	1	B	Subscription update for SS_Events API	17.4.0
2022-03	CT#95e	CP-220205	0068	1	B	Clarification on location based group for SS_GroupManagement API	17.4.0
2022-03	CT#95e	CP-220204	0070	1	B	Support PATCH for update of Individual SEAL Location Reporting Configuration resource	17.4.0
2022-03	CT#95e	CP-220204	0071		B	Support PATCH for update of Individual VAL group document resource	17.4.0
2022-03	CT#95e	CP-220194	0072		F	Update of info and externalDocs fields	17.4.0
2022-06	CT#96	CP-221140	0073	1	F	Tags and OperationId support in the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0074	1	F	Dimension of QoS parameters in the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0075	2	F	Clarifications of reporting, reporting termination, and subscription termination in SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0076	1	F	The "Requestor identity" attributes removal in Release 17 APIs	17.5.0
2022-06	CT#96	CP-221140	0077	1	F	Resolving EN for the Subscribe service operation in the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0078		F	The corrections of naming in the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0079	1	F	NO-REF_SIBLINGS error correction	17.5.0
2022-06	CT#96	CP-221140	0080	2	F	SEAL-S security update for Release-17	17.5.0
2022-06	CT#96	CP-221140	0082	3	F	Partial success support in the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221140	0083	1	B	Supplementary location information to verticals	17.5.0
2022-06	CT#96	CP-221140	0084		F	Resolution of the Editor’s note for Network slice capability Enablement API.	17.5.0
2022-06	CT#96	CP-221140	0085	1	F	Correction of arrays cardinality in the SS_NetworkResourceMonitoring OpenAPI file	17.5.0
2022-06	CT#96	CP-221156	0087		A	SEAL-S security update	17.5.0
2022-06	CT#96	CP-221148	0088	1	F	Resource URI overview and apiVersion placeholder	17.5.0
2022-06	CT#96	CP-221148	0089	1	F	OpenAPI long descriptions	17.5.0
2022-06	CT#96	CP-221156	0091		A	Correcting the ValTargetUe data type name in two occurrences	17.5.0
2022-06	CT#96	CP-221260	0092	2	F	Organizing and correcting the data model of the SS_NetworkResourceMonitoring API	17.5.0
2022-06	CT#96	CP-221151	0093		F	Update of info and externalDocs fields	17.5.0
2022-09	CT#97e	CP-222108	0094	2	F	Modification of data type for Network slice capability Enablement API	17.6.0
2022-09	CT#97e	CP-222181	0095	1	F	Termination of reporting related updates	17.6.0
2022-09	CT#97e	CP-222118	0096	1	F	Tags and OperationId support in the SS_Events API	17.6.0
2022-09	CT#97e	CP-222118	0097	1	F	Tags and OperationId support in the SS_GroupManagement API	17.6.0
2022-09	CT#97e	CP-222118	0098	1	F	Tags and OperationId support in the SS_KeyInfoRetrieval API	17.6.0
2022-09	CT#97e	CP-222118	0099	1	F	Tags and OperationId support in the SS_LocationAreaInfoRetrieval API	17.6.0
2022-09	CT#97e	CP-222117	0100		F	Tags and OperationId support in the SS_NetworkSliceAdaptation API	17.6.0
2022-09	CT#97e	CP-222117	0101		F	Tags and OperationId support in the SS_UserProfileRetrieval API	17.6.0
2022-09	CT#97e	CP-222118	0102	1	F	Tags and OperationId support in the SS_LocationReporting API	17.6.0
2022-09	CT#97e	CP-222108	0103	1	F	Path correction in the SS_LocationAreaInfoRetrieval OpenAPI file	17.6.0
2022-09	CT#97e	CP-222182	0104	1	F	"Error handling" clause: alignment with other NBI and 5GS APIs	17.6.0
2022-09	CT#97e	CP-222108	0105		F	Correction of the SS_NetworkResourceAdaptation API naming	17.6.0
2022-09	CT#97e	CP-222108	0106	1	F	Correction in error cases in the SS_NetworkResourceMonitoring API	17.6.0
2022-09	CT#97e	CP-222117	0107		F	Correction of the LocationInfo data type spelling in the SS_LocationAreaInfoRetrieval API	17.6.0
2022-09	CT#97e	CP-222117	0108		F	Correction of the "SubscriptionId" resource URI variable name	17.6.0
2022-09	CT#97e	CP-222108	0109		F	Correction of the note for LocationInfoCriteria data type in SS_Events API	17.6.0
2022-09	CT#97e	CP-222108	0110	1	F	Correction of the "proxRange" attribute within the ReferenceUEDetail structure in SS_Events API	17.6.0

2022-09	CT#97e	CP-222108	0111	1	F	Correction in the validation criteria for the Update_Trigger_Location_Reporting service operation in the SS_LocationReporting API	17.6.0
2022-09	CT#97e	CP-222117	0112		F	Definitions of HTTP "406 Not Acceptable" response	17.6.0
2022-09	CT#97e	CP-222125	0113		F	SS_GroupManagement API: delete operation	17.6.0
2022-09	CT#97e	CP-222121	0114		F	Update of info and externalDocs fields	17.6.0
2022-12	CT#98e	CP-223193	0119	1	A	Correction of the presence and cardinality of the “suppFeat” attribute within the MulticastSubscription data structure in the SS_NetworkResourceAdaptation API	17.7.0
2022-12	CT#98e	CP-223185	0116	1	F	Correction of the tables for the re-used and API-specific data structures in the SEAL APIs	18.0.0
2022-12	CT#98e	CP-223185	0117	1	F	Correction the enumerations in the SS_NetworkResourceMonitoring API	18.0.0
2022-12	CT#98e	CP-223185	0118		F	Correction of the descriptions in the OpenAPI files of the SEAL APIs	18.0.0
2022-12	CT#98e	CP-223194	0120	1	B	Update_Unicast_QoS_Monitoring service operation for the SS_NetworkResourceMonitoring API	18.0.0
2022-12	CT#98e	CP-223194	0121	1	B	PATCH and PUT methods for the SS_NetworkResourceMonitoring AP	18.0.0
2022-12	CT#98e	CP-223194	0122	1	B	OpenAPI implementation for the Update_Unicast_QoS_Monitoring_Subscription service operation in the SS_NetworkResourceMonitoring API	18.0.0
2022-12	CT#98e	CP-223194	0123	1	B	Interaction with CM server in the Create_Group service operation of the SS_GroupManagement API	18.0.0
2022-12	CT#98e	CP-223185	0124		F	Cardinality for data types of SS_Events API	18.0.0
2022-12	CT#98e	CP-223189	0127		F	Update of info and externalDocs fields	18.0.0
2023-03	CT#99	CP-230157	0128	1	B	Updates on location reporting	18.1.0
2023-03	CT#99	CP-230156	0129	1	F	Correction of the description fields in enumerations	18.1.0
2023-03	CT#99	CP-230157	0132	1	F	Essential correction of the Create_Group service operation in the SS_GroupManagement API	18.1.0
2023-03	CT#99	CP-230157	0134	1	B	Partial failure support in the SS_Events API	18.1.0
2023-03	CT#99	CP-230157	0137	1	F	Correction of the websocket procedures in the SS_Events API	18.1.0
2023-03	CT#99	CP-230156	0138		D	Correction of the references for the WebsockNotifConfig and reqTestNotif	18.1.0
2023-03	CT#99	CP-230168	0139	1	B	VAL Service area – Location Area Monitoring	18.1.0
2023-03	CT#99	CP-230168	0140	1	B	VAL Service area – Location based group	18.1.0
2023-03	CT#99	CP-230168	0142	1	B	SS_IdmParameterProvisioning API description	18.1.0
2023-03	CT#99	CP-230161	0143		F	Update of info and externalDocs fields	18.1.0
2023-06	CT#100	CP-231146	0141	2	B	SS_VALServiceAreaConfiguration service API	18.2.0
2023-06	CT#100	CP-231175	0144	2	B	Introduce a new attribute to support location QoS	18.2.0
2023-06	CT#100	CP-231185	0145		B	Definition of SEALDD related functionalities	18.2.0
2023-06	CT#100	CP-231146	0146	1	B	Definition of the service description part of the MBS resource management service operations	18.2.0
2023-06	CT#100	CP-231146	0147	1	B	Definition of the API resources part of the MBS resource management service operations	18.2.0
2023-06	CT#100	CP-231146	0148		B	Definition of the API notifications part of the MBS resource management service operations	18.2.0
2023-06	CT#100	CP-231329	0149	4	B	Definition of the API data model part of the MBS resource management service operations	18.2.0
2023-06	CT#100	CP-231330	0150	4	B	Definition of the OpenAPI description part of the MBS resource management service operations	18.2.0
2023-06	CT#100	CP-231139	0151	1	F	Correction of the error handling in the SS_GroupManagement API	18.2.0
2023-06	CT#100	CP-231146	0152	1	B	Definition of the SS_VALServiceData API	18.2.0
2023-06	CT#100	CP-231146	0153	1	B	Implementation of the SS_VALServiceData API	18.2.0
2023-06	CT#100	CP-231146	0154	1	B	OpenAPI file for the SS_VALServiceData API	18.2.0
2023-06	CT#100	CP-231139	0156	1	F	Support of Network slice capability management	18.2.0
2023-06	CT#100	CP-231203	0157	2	B	VAL service area support in the SS_LocationReporting API	18.2.0
2023-06	CT#100	CP-231188	0158	1	B	Support of ADAES	18.2.0
2023-06	CT#100	CP-231146	0159	1	B	SS_VALServiceAreaConfiguration service API implementation	18.2.0
2023-06	CT#100	CP-231204	0160	2	B	SS_VALServiceAreaConfiguration service API implementation of the OpenAPI file	18.2.0
2023-06	CT#100	CP-231175	0161	1	B	Improvement of the Subscribe_Location_Monitoring service operation in the SS_LocationMonitoring API	18.2.0
2023-06	CT#100	CP-231146	0162	1	B	SS_IdmParameterProvisioning API service description and data model	18.2.0
2023-06	CT#100	CP-231175	0163	1	B	Support of obtaining location information from a 3rd party LMS	18.2.0
2023-06	CT#100	CP-231141	0164		F	Update of info and externalDocs fields	18.2.0
2023-09	CT#101	CP-232100	0165	1	B	Defining the Activate_MBS_Resource service operation	18.3.0
2023-09	CT#101	CP-232100	0166	1	B	Defining the Deactivate_MBS_Resource service operation	18.3.0
2023-09	CT#101	CP-232125	0167		F	Complete the list of SEAL service APIs	18.3.0
2023-09	CT#101	CP-232116	0169	1	A	Corrections of the attribute name and missed clause	18.3.0
2023-09	CT#101	CP-232100	0171	1	B	Improvement of the Create_TSC_Stream service operation for the time synchronization capabilities	18.3.0

2023-09	CT#101	CP-232100	0172	1	F	IDM Parameter provisioning correction	18.3.0
2023-09	CT#101	CP-232100	0173	1	B	LocationAreaInfoRetreival - VAL service area identifer	18.3.0
2023-09	CT#101	CP-232100	0174	1	B	SS_LocationMonitoring - VAL service area identifer	18.3.0
2023-09	CT#101	CP-232085	0175		F	Update of info and externalDocs fields	18.3.0
2023-12	CT#102	CP-233231	0176		F	Further progressing the definition of MBS resources management	18.4.0
2023-12	CT#102	CP-233205	0177	3	B	Subscribe/Notify service operation implementation in the SS_VALServiceAreaConfiguration API	18.4.0
2023-12	CT#102	CP-233243	0178	1	B	Subscribe/Notify service operation OpenAPI implementation in the SS_VALServiceAreaConfiguration API	18.4.0
2023-12	CT#102	CP-233243	0179	1	B	Subscribe/Notify service operation procedures in the SS_VALServiceAreaConfiguration API	18.4.0
2023-12	CT#102	CP-233243	0180	1	B	Triggering criteria in the SS_LocationReporting API	18.4.0
2023-12	CT#102	CP-233243	0181	1	B	Improvement of the Delete_TSC_Stream service operation for the time synchronization capabilities	18.4.0
2023-12	CT#102	CP-233243	0182	1	B	VAL service area feature name update	18.4.0
2023-12	CT#102	CP-233243	0184	1	B	VAL application performance API	18.4.0
2023-12	CT#102	CP-233259	0186	1	B	Slice-specific application performance API	18.4.0
2023-12	CT#102	CP-233259	0187	1	B	UE-to-UE session performance API	18.4.0
2023-12	CT#102	CP-233259	0188	1	B	Location accuracy API	18.4.0
2023-12	CT#102	CP-233259	0189	1	B	Service API API	18.4.0
2023-12	CT#102	CP-233259	0190	1	B	Slice Usage Pattern API	18.4.0
2023-12	CT#102	CP-233259	0191	1	B	Edge Load API	18.4.0
2023-12	CT#102	CP-233259	0192	1	B	Updates to the MBS resources related service descriptions	18.4.0
2023-12	CT#102	CP-233243	0194		B	BDT_Configuration_request API support with description update	18.4.0
2023-12	CT#102	CP-233243	0196	1	B	BDT_Configuration_request API support with resources and data model update	18.4.0
2023-12	CT#102	CP-233243	0197	1	B	BDT_Negotiation_notification support with description update	18.4.0
2023-12	CT#102	CP-233243	0198	1	B	BDT_Negotiation_Notification support with Notification message and data model update	18.4.0
2023-12	CT#102	CP-233243	0199	1	B	BDT_Configuration_request API support with open API update	18.4.0
2023-12	CT#102	CP-233243	0200	1	B	Rename the feature name for 5GFLS and remove ENs	18.4.0
2023-12	CT#102	CP-233285	0201	1	F	EN resolution for the VAL service area location representation	18.4.0
2023-12	CT#102	CP-233243	0202	1	F	EN resolution for the VAL service area ID representation	18.4.0
2023-12	CT#102	CP-233243	0203	1	B	Update subscription service operation implementation in the SS_VALServiceAreaConfiguration API	18.4.0
2023-12	CT#102	CP-233243	0205	1	B	Update subscription service operation implementation in the SS_VALServiceAreaConfiguration OpenAPI file	18.4.0
2023-12	CT#102	CP-233243	0206	1	B	Update subscription service operation in the SS_VALServiceAreaConfiguration API	18.4.0
2023-12	CT#102	CP-233243	0207	1	B	Notification service operation in the SS_LocationReporting API	18.4.0
2023-12	CT#102	CP-233138	0208	2	B	SS_IdmParameterProvisioning API Other CRUD operations	18.4.0
2023-12	CT#102	CP-233243	0209	1	B	Further progressing the definition of MBS resources management	18.4.0
2023-12	CT#102	CP-233237	0210		F	Update of info and externalDocs fields	18.4.0
2024-03	CT#103	CP-240169	0183	3	B	SEAL Key management parameter provisioning	18.5.0
2024-03	CT#103	CP-240164	0212	2	B	VAL performance analytics	18.5.0
2024-03	CT#103	CP-240164	0213	1	B	SS_ADAE_VALPerformanceAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0214	3	B	Slice-specific application performance analytics	18.5.0
2024-03	CT#103	CP-240164	0215	1	B	SS_ADAE_SlicePerformanceAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0216	2	B	Location accuracy performance analytics	18.5.0
2024-03	CT#103	CP-240164	0217	2	B	SS_ADAE_LocationAccuracyAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0218	3	B	Service API analytics	18.5.0
2024-03	CT#103	CP-240164	0219	1	B	SS_ADAE_ServiceApiAnalytics API	18.5.0
2024-03	CT#103	CP-240193	0220	1	B	Transferring the NSCE_NetworkSliceAdaptation API to TS 29.435	18.5.0
2024-03	CT#103	CP-240165	0221	3	B	Updates to API Definition for SS_ADAE_EdgeLoadAnalytics API and Solve ENs	18.5.0
2024-03	CT#103	CP-240164	0222	1	B	Service Operation Description for SS_ADAE_EdgeLoadAnalytics API	18.5.0
2024-03	CT#103	CP-240165	0223	3	B	OpenAPI for SS_ADAE_EdgeLoadAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0224	1	B	Define API of SS_AADRF_DataManagement API	18.5.0
2024-03	CT#103	CP-240164	0225	1	B	Define OpenAPI of SS_AADRF_DataManagement API	18.5.0
2024-03	CT#103	CP-240164	0226	1	B	Define service descriptions of SS_AADRF_DataManagement API	18.5.0
2024-03	CT#103	CP-240165	0227	2	B	Implementation of the OpenAPI file for the SS_ADAE_Ue2UePerformanceAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0228	1	B	The procedures of the SS_ADAE_Ue2UePerformanceAnalytics API	18.5.0
2024-03	CT#103	CP-240165	0229	3	B	Implementation of the SS_ADAE_Ue2UePerformanceAnalytics API	18.5.0
2024-03	CT#103	CP-240164	0230	1	B	Slice usage pattern analytics operations	18.5.0
2024-03	CT#103	CP-240164	0231	1	B	Slice usage pattern analytics data model completion	18.5.0
2024-03	CT#103	CP-240164	0232	1	B	Slice usage pattern analytics OpenAPI	18.5.0
2024-03	CT#103	CP-240164	0233	1	B	VAL performance analytics data model updates	18.5.0
2024-03	CT#103	CP-240164	0234	1	B	Slice-specific performance analytics data model updates	18.5.0

2024-03	CT#103	CP-240164	0235	1	B	Location accuracy analytics data model updates	18.5.0
2024-03	CT#103	CP-240164	0236	1	B	Service API analytics data model updates	18.5.0
2024-03	CT#103	CP-240169	0237	1	B	Support BDT_Configuration Get, Update and Delete service operations	18.5.0
2024-03	CT#103	CP-240169	0238	1	B	Update open API for BDT_Configuration	18.5.0
2024-03	CT#103	CP-240169	0239	1	B	Update resources and data model clauses fro BDT_Configuration	18.5.0
2024-03	CT#103	CP-240169	0240	1	F	Supported features presence condition correction	18.5.0
2024-03	CT#103	CP-240169	0241		F	SS_IdmParameterProvisioning correction	18.5.0
2024-03	CT#103	CP-240171	0242		F	HTTP RFCs obsoleted by IETF RFC 9112, 9110, 9111 and 9113	18.5.0
2024-03	CT#103	CP-240169	0243	1	B	Update service operations for location management services	18.5.0
2024-03	CT#103	CP-240169	0244	1	B	Alignment of VAL service area identifier alignment with new data type	18.5.0
2024-03	CT#103	CP-240169	0245	1	B	Unified traffic pattern and monitoring management	18.5.0
2024-03	CT#103	CP-240169	0246	1	F	Corrections to partial failure report	18.5.0
2024-03	CT#103	CP-240171	0247	1	B	Define the missing Group Deletion Notification	18.5.0
2024-03	CT#103	CP-240169	0248	1	B	Define the NRM reliable transmission service operation	18.5.0
2024-03	CT#103	CP-240169	0249		B	Support 5MBS related error handling	18.5.0
2024-03	CT#103	CP-240169	0250	1	F	Various corrections and updates	18.5.0
2024-03	CT#103	CP-240169	0253	1	B	EN resolution for the VAL service area ID in the SS_GroupManagement API	18.5.0
2024-03	CT#103	CP-240169	0254	1	B	EN resolution for the LocationReport data type in the SS_LocationReporting API	18.5.0
2024-03	CT#103	CP-240169	0255		F	OpenAPI file correction of the the SS_VALServiceAreaConfiguration API	18.5.0
2024-03	CT#103	CP-240166	0259		F	Update of info and externalDocs fields	18.5.0
2024-06	CT#104	CP-241116	0258	2	F	EN resolution for VAL UE(s) and User(s) identifiers in the SS_VALServiceData API	18.6.0
2024-06	CT#104	CP-241099	0260	1	F	Clarification for Exposure level requirements	18.6.0
2024-06	CT#104	CP-241099	0262	2	F	Add reporting requirements to SliceAppPerfSub	18.6.0
2024-06	CT#104	CP-241099	0264	1	F	Add reporting requirements to LocAccurSub	18.6.0
2024-06	CT#104	CP-241099	0266	1	F	Add new attributes to SrvApiSub	18.6.0
2024-06	CT#104	CP-241099	0267	1	F	Add reporting requirements to SUPSub	18.6.0
2024-06	CT#104	CP-241099	0268		F	Edge Load Analytics corrections	18.6.0
2024-06	CT#104	CP-241099	0269		F	A-ADRF Data Management API corrections	18.6.0
2024-06	CT#104	CP-241096	0270	1	F	Various SEAL API corrections	18.6.0
2024-06	CT#104	CP-241099	0271	1	F	Removal of the Editor's Note for the analytics type in the notification	18.6.0
2024-06	CT#104	CP-241099	0272	1	F	Resolve the Editor's Notes for the analytics and data output	18.6.0
2024-06	CT#104	CP-241099	0273	1	F	Update the analytics type in the subscription	18.6.0
2024-06	CT#104	CP-241099	0274		F	307 and 308 responses support in ADAES APIs	18.6.0
2024-06	CT#104	CP-241099	0276	1	F	Alignment of the SS_ADAE_Ue2UePerformanceAnalytics API	18.6.0
2024-06	CT#104	CP-241116	0277	2	B	EN resolution for application error in SEAL APIs	18.6.0
2024-06	CT#104	CP-241116	0278		F	Correction of OpenAPI syntax errors	18.6.0
2024-06	CT#104	CP-241083	0279	1	F	Various updates and corrections about APIs	18.6.0
2024-06	CT#104	CP-241099	0280	1	B	Updates to the API Definition for SS_ADAE_EdgeLoadAnalytics API	18.6.0
2024-06	CT#104	CP-241099	0281	1	B	Updates to the OpenAPI for SS_ADAE_EdgeLoadAnalytics API	18.6.0
2024-06	CT#104	CP-241116	0282		F	Various corrections to the MBS resources definition	18.6.0
2024-06	CT#104	CP-241084	0287	1	F	Correct the reference to HTTP error status codes and NBI usages	18.6.0
2024-06	CT#104	CP-241099	0289	1	F	UE to UE Performance Analytics API corrections	18.6.0
2024-06	CT#104	CP-241116	0292	1	F	Essential corrections to the SS_IdmParameterProvisioning API	18.6.0
2024-06	CT#104	CP-241099	0294		F	Corrections on SS_ADAE_EdgeLoadAnalytics service	18.6.0
2024-06	CT#104	CP-241099	0295	1	F	Corrections on SS_ADAE_LocationAccuracyAnalytics service	18.6.0
2024-06	CT#104	CP-241099	0296		F	Corrections on SS_ADAE_ServiceApiAnalytics service	18.6.0
2024-06	CT#104	CP-241099	0297	1	F	Corrections on SS_ADAE_SlicePerformanceAnalytics service	18.6.0
2024-06	CT#104	CP-241100	0298	1	F	Corrections on SS_ADAE_SliceUsagePatternAnalytics service	18.6.0
2024-06	CT#104	CP-241099	0299		F	Corrections on SS_ADAE_VALPerformanceAnalytics service	18.6.0
2024-06	CT#104	CP-241086	0300		F	Update of info and externalDocs fields	18.6.0
2024-09	CT#105	CP-242123	0302	1	F	Corrections to SS_ADAE_EdgeLoadAnalytics API	18.7.0
2024-09	CT#105	CP-242123	0306	1	F	Correction on data types of SS_AADRF_DataManagement API	18.7.0
2024-09	CT#105	CP-242162	0307		F	EN resolution in the SS_VALServiceAreaConfiguration API	18.7.0
2024-09	CT#105	CP-242123	0308	1	F	Service names clarifications	18.7.0
2024-09	CT#105	CP-242123	0309	1	F	A-ADRF reporting requirements	18.7.0
2024-09	CT#105	CP-242123	0310	1	F	A-ADRF data type contents	18.7.0
2024-09	CT#105	CP-242123	0311		F	Corrections on event Criteria	18.7.0
2024-09	CT#105	CP-242123	0312		F	Corrections on SS_ADAE_Ue2UePerformanceAnalytics API Uri	18.7.0
2024-09	CT#105	CP-242123	0313	1	F	Corrections on the pair of VAL UEs	18.7.0
2024-09	CT#105	CP-242123	0314		F	Corrections on the SS_ADAE_ServiceApiAnalytics API	18.7.0
2024-09	CT#105	CP-242123	0315		F	Essential corrections on analytics output	18.7.0
2024-09	CT#105	CP-242123	0319	1	F	Resolve the Editor's Note and corrections on the ADAES API	18.7.0
2024-09	CT#105	CP-242120	0320		F	Update of info and externalDocs fields	18.7.0

2025-03	CT#107	CP-250114	0373	2	F	Updates to complete the support of MBS Service Area related handling	18.8.0
2025-03	CT#107	CP-250128	0377		F	Update of info and externalDocs fields	18.8.0

History

Document history		
V18.5.0	May 2024	Publication
V18.6.0	July 2024	Publication
V18.7.0	September 2024	Publication
V18.8.0	March 2025	Publication