



**5G;
Service Enabler Architecture Layer for Verticals (SEAL);
Metaverse Enablement Services;
Stage 3
(3GPP TS 29.437 version 19.1.1 Release 19)**



Reference

RTS/TSGC-0329437vj11

Keywords

5G

ETSI

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Foreword

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

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- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol and data model for the SAn and SM Service(s), for enabling the support of Spatial Anchor and Spatial Map management services for vertical applications. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the SAn and SM servers.

The stage 2 architecture and procedures are specified in 3GPP TS 23.437 [13].

The common protocol and interface aspects for API definition are specified in clause 5.2 of 3GPP TS 29.122 [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 29.122: "T8 reference point for Northbound Application Programming Interfaces (APIs)".
- [3] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [4] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.
- [5] 3GPP TR 21.900: "Technical Specification Group working methods".
- [6] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".
- [7] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".
- [8] 3GPP TS 33.122: "Security aspects of Common API Framework (CAPIF) for 3GPP northbound APIs".
- [9] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [10] IETF RFC 9113: "HTTP/2".
- [11] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [12] IETF RFC 9457: "Problem Details for HTTP APIs".
- [13] 3GPP TS 23.437: "Service Enabler Architecture Layer for Verticals (SEAL); Spatial map and Spatial anchors".
- [14] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".
- [15] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [16] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".
- [17] 3GPP TS 29.549: "Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3".
- [18] 3GPP TS 29.558: "Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".
- [19] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".
- [20] 3GPP TS 24.550: "Digital assets, Spatial mapping and Spatial anchors server – Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

None

3.3 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].

SAn	Spatial Anchor
SM	Spatial Map
SMAS	SM service capable Application Server

4 Overview

The Spatial Anchor (SAn) and Spatial Map (SM) Servers form part of the SEAL Enabler Layer defined in 3GPP TS 23.434 [14] and aim to ensure the efficient use and deployment of Spatial Anchor and Spatial Map capabilities to support mobile Metaverse services for vertical applications.

The SAn Server supports for this purpose, among other functionalities defined in 3GPP TS 23.437 [13], the following functionalities:

- Spatial anchor management application layer support functions to VAL Servers over the SAn-S reference point, i.e.:
 - spatial anchors management;
 - discovery of spatial anchors; and
 - spatial anchors usage information management.

Figure 4-1 shows the reference model of the mobile Metaverse Enabler Layer, with a focus on the Spatial Anchor Enabler Layer:

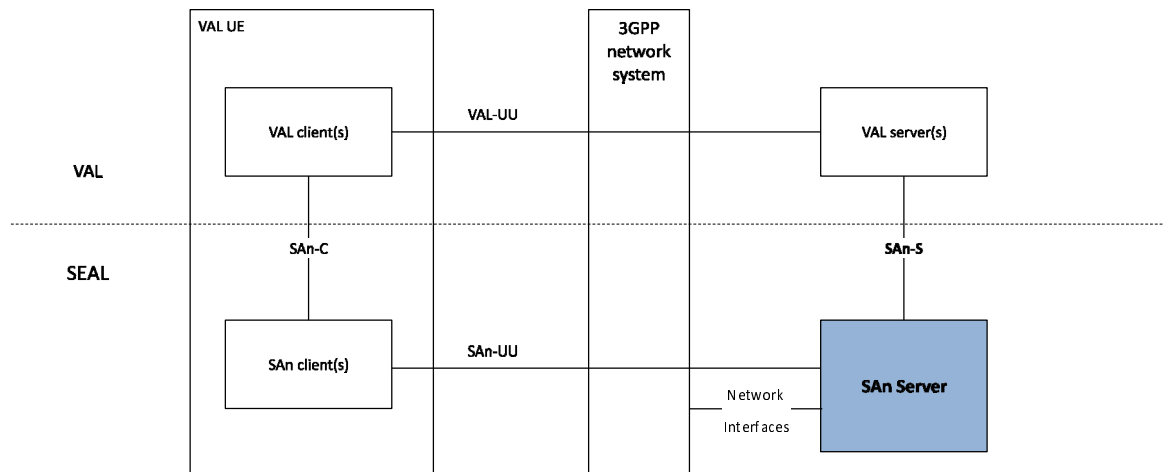


Figure 4-1: Spatial Anchor Enabler Layer functional model

The SM Server supports for this purpose, among other functionalities defined in 3GPP TS 23.437 [13], the following functionalities:

- Spatial map management application layer support functions to VAL Servers over the SM-S reference point, i.e.:
 - spatial maps management;
 - discovery of spatial maps;
 - localization information retrieval;
 - spatial map data source discovery; and
 - spatial map capabilities registration.

Figure 4-2 shows the reference model of the mobile Metaverse Enabler Layer, with a focus on the Spatial Map Enabler Layer:

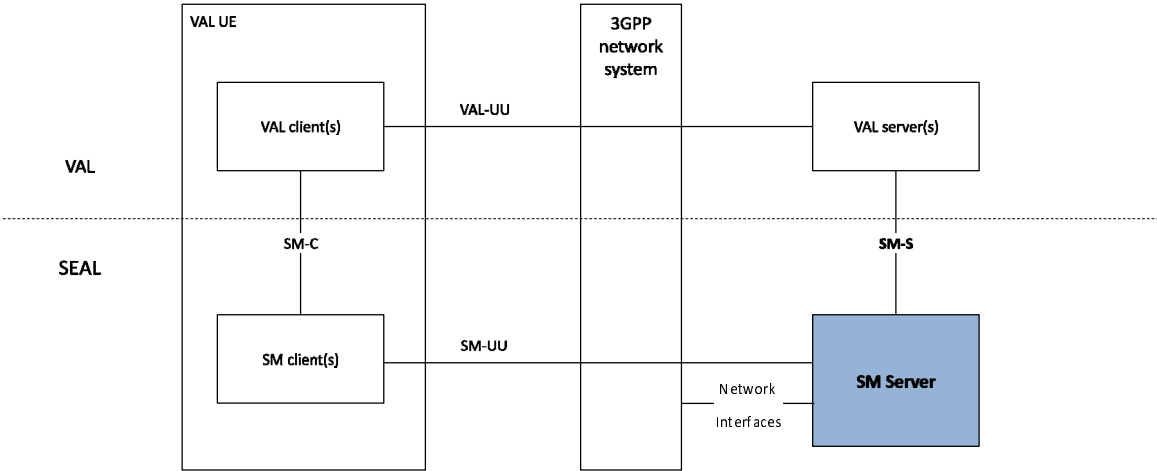


Figure 4-2: Spatial Map Enabler Layer functional model

5 Services offered by the Metaverse Enablement

5.1 Introduction

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	API Name	Annex
SS_SAnManagement	6.1.1	Spatial Anchor Management Service	TS29437_SS_SAnManagement.yaml	ssan-ssanm	A.2
SS_SAnDiscovery	6.1.2	Spatial Anchor Discovery Service	TS29437_SS_SAnDiscovery.yaml	ssan-disc	A.3
SS_SAnUsage	6.1.3	Spatial Anchor Usage Management Service	TS29437_SS_SAnUsage.yaml	ssan-usg	A.4
SS_SmManagement	6.2.1	Spatial Map Management Service	TS29437_SS_SmManagement.yaml	ssm-smm	A.5
SS_SmDiscovery	6.2.2	Spatial Map Discovery Service	TS29437_SS_SmDiscovery.yaml	ssm-disc	A.6
SS_SmLocalization	6.2.3	Spatial Map Localization Management Service	TS29437_SS_SmLocalization.yaml	ssm-loc	A.7
SS_SmDataSourceDiscovery	6.2.4	Spatial Map Data Sources Discovery Service	TS29437_SS_SmDataSourceDiscovery.yaml	ssm-dsdisc	A.8
SS_SmSmasRegistration	6.2.5	SMAS Registration Management	TS29437_SS_SmSmasRegistration.yaml	ssm-smasr	A.9

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 5, the service producer (i.e., SAn Server or SM Server) takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

5.2 Spatial Anchor Server APIs

5.2.1 SS_SAnManagement API

5.2.1.1 Service Description

The SS_SAnManagement service exposed by the SAn Server enables a service consumer to:

- request the creation/update/deletion of a Spatial Anchors List;
- request the creation/update/deletion of a Spatial Anchors Subscription; and
- receive Spatial Anchors related event(s) reporting.

5.2.1.2 Service Operations

5.2.1.2.1 Introduction

The service operation defined for the SS_SAnManagement API are shown in the table 5.2.1.2.1-1.

Table 5.2.1.2.1-1: Operations of the SS_SAnManagement API

Service operation name	Description	Initiated by
SS_SAnManagement_Create	This service operation enables a service consumer to request the creation of a Spatial Anchors List.	e.g., VAL Server
SS_SAnManagement_Update	This service operation enables a service consumer to request the update of an existing Spatial Anchors List.	e.g., VAL Server
SS_SAnManagement_Delete	This service operation enables a service consumer to request the deletion of an existing Spatial Anchors List.	e.g., VAL Server
SS_SAnManagement_Subscribe	This service operation enables a service consumer to request the creation of a Spatial Anchors Subscription.	e.g., VAL Server
SS_SAnManagement_Subscription_Update	This service operation enables a service consumer to request the update of an existing Spatial Anchors Subscription.	e.g., VAL Server
SS_SAnManagement_Unsubscribe	This service operation enables a service consumer to request the deletion of an existing Spatial Anchors Subscription.	e.g., VAL Server
SS_SAnManagement_Notify	This service operation enables a service consumer to receive Spatial Anchors related event(s) reports.	SAn Server
SS_SAnManagement_Retrieve	This service operation enables a service consumer to fetch Spatial Anchors profile.	e.g., VAL Server

5.2.1.2.2 SS_SAnManagement_Create

5.2.1.2.2.1 General

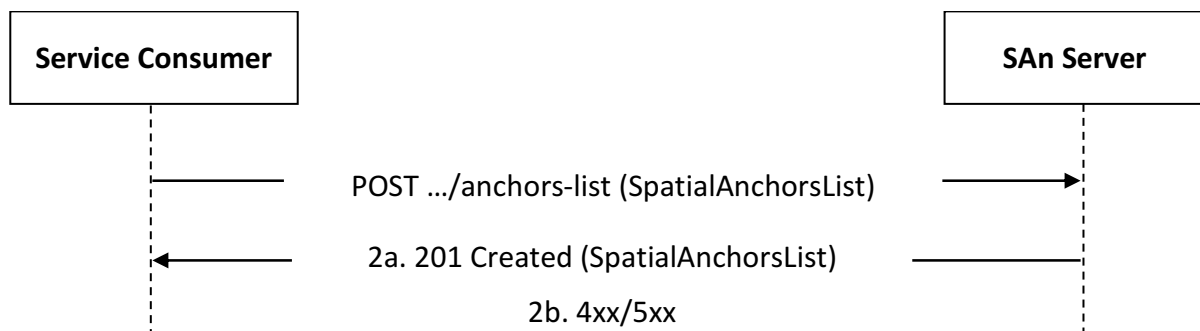
This service operation is used by a service consumer to request the creation of a Spatial Anchors List at the SAn Server.

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

- Spatial Anchors List Creation.

5.2.1.2.2.2 Spatial Anchors List Creation

Figure 5.2.1.2.2.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the creation of a Spatial Anchors List (see also clause 8.3 of 3GPP TS 29.437 [13]).

**Figure 5.2.1.2.2.2-1: Procedure for Spatial Anchors List Creation**

1. In order to create a new Spatial Anchors List, the service consumer shall send an HTTP POST request to the SAn Server targeting the URI of the "Spatial Anchors Lists" collection resource, with the request body including the SpatialAnchorsList data structure.
- 2a. Upon success, the SAn Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual Spatial Anchors List" resource within the SpatialAnchorsList data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. 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 6.1.1.7.

5.2.1.2.3 SS_SAnManagement_Update

5.2.1.2.3.1 General

This service operation is used by a service consumer to request the update of an existing Spatial Anchors List at the SAn Server.

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

- Spatial Anchors List Update.

5.2.1.2.3.2 Spatial Anchors List Update

Figure 5.2.1.2.3.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the update of an existing Spatial Anchors List (see also clause 8.3 of 3GPP TS 29.437 [13]).

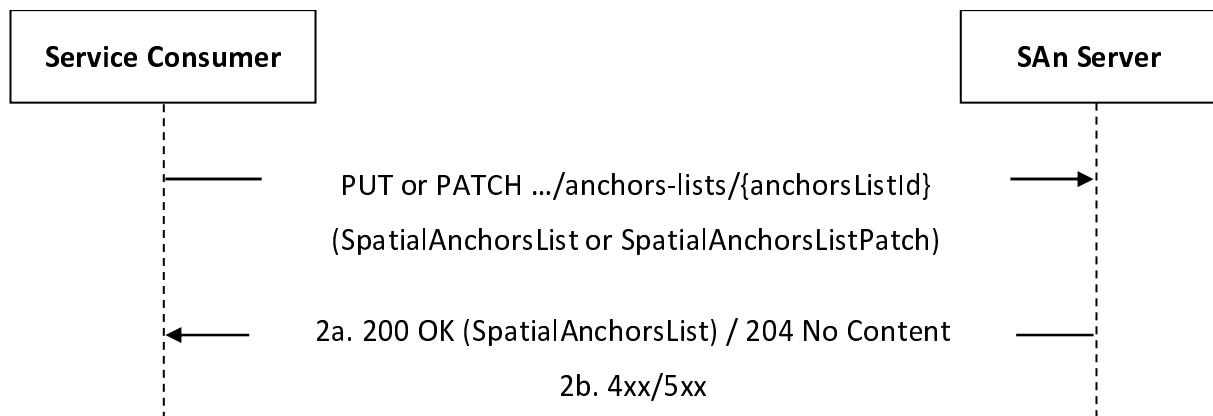


Figure 5.2.1.2.3.2-1: Procedure for Spatial Anchors List Update

1. In order to update an existing Spatial Anchors List, the service consumer shall send an HTTP PUT/PATCH request to the SAn Server, targeting the URI of the corresponding "Individual Spatial Anchors List" resource, with the request body including either:

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

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

- 2a. Upon success, the SAn Server shall update the targeted "Individual Spatial Anchors List" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Spatial Anchors List" resource within the SpatialAnchorsList data structure; or
- an HTTP "204 No Content" status code.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.1.7.

5.2.1.2.4 SS_SAnManagement_Delete

5.2.1.2.4.1 General

This service operation is used by a service consumer to request the deletion of an existing Spatial Anchors List at the SAn Server.

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

- Spatial Anchors List Deletion.

5.2.1.2.4.2 Spatial Anchors List Deletion

Figure 5.2.1.2.4.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the deletion of an existing Spatial Anchors List (see also clause 8.3 of 3GPP TS 23.437 [13]).

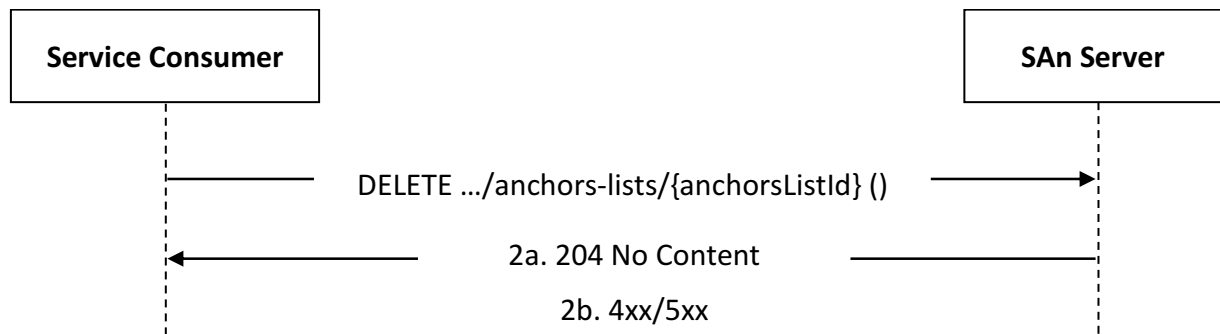


Figure 5.2.1.2.4.2-1: Procedure for Spatial Anchors List Deletion

1. In order to request the deletion of an existing Spatial Anchors List, the service consumer shall send an HTTP DELETE request to the SAn Server targeting the URI of the corresponding "Individual Spatial Anchors List" resource.

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

2a. Upon success, the SAn Server shall respond with an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.1.7.

5.2.1.2.5 SS_SAnManagement_Subscribe

5.2.1.2.5.1 General

This service operation is used by a service consumer to request the creation of a Spatial Anchors Subscription at the SAn Server.

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

- Spatial Anchors Subscription Creation.

5.2.1.2.5.2 Spatial Anchors Subscription Creation

Figure 5.2.1.2.5.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the creation of a Spatial Anchors Subscription (see also clause 8.3 of 3GPP TS 23.437 [13]).

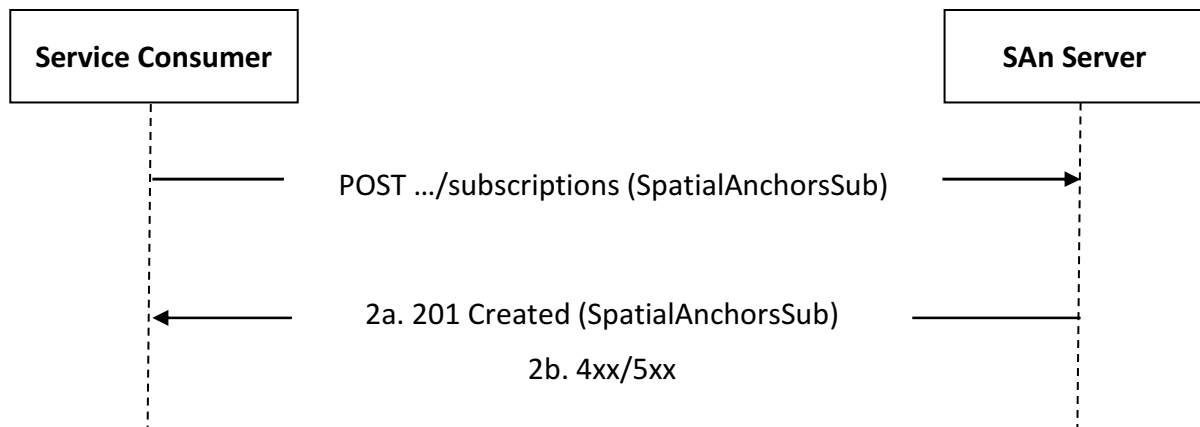


Figure 5.2.1.2.5.2-1: Procedure for Spatial Anchors Subscription Creation

1. In order to create a new Spatial Anchors Subscription, the service consumer shall send an HTTP POST request to the SAn Server targeting the URI of the "Spatial Anchors Subscriptions" collection resource, with the request body including the SpatialAnchorsSub data structure.
- 2a. Upon success, the SAn Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual Spatial Anchors Subscription" resource within the SpatialAnchorsSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. 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 6.1.1.7.

5.2.1.2.6 SS_SAnManagement_Subscription_Update

5.2.1.2.6.1 General

This service operation is used by a service consumer to request the update of an existing Spatial Anchors Subscription at the SAn Server.

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

- Spatial Anchors Subscription Update.

5.2.1.2.6.2 Spatial Anchors Subscription Update

Figure 5.2.1.2.6.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the update of an existing Spatial Anchors Subscription (see also clause 8.3 of 3GPP TS 23.437 [13]).

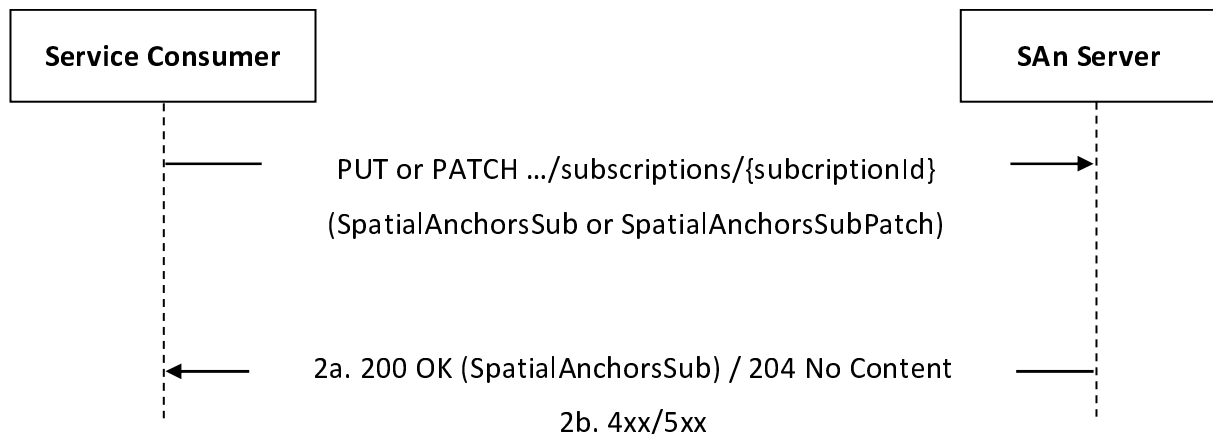


Figure 5.2.1.2.6.2-1: Procedure for Spatial Anchors Subscription Update

1. In order to update an existing Spatial Anchors List, the service consumer shall send an HTTP PUT/PATCH request to the SAn Server, targeting the URI of the corresponding "Individual Spatial Anchors Subscription" resource, with the request body including either:
 - the updated representation of the resource within the SpatialAnchorSub data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the SpatialAnchorsSubPatch data structure, in case the HTTP PATCH method is used.

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

- 2a. Upon success, the SAn Server shall update the targeted "Individual Spatial Anchors Subscription" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Spatial Anchors Subscription" resource within the SpatialAnchorsSub data structure; or
 - an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.1.7.

5.2.1.2.7 SS_SAnManagement_Unsubscribe

5.2.1.2.7.1 General

This service operation is used by a service consumer to request the deletion of an existing Spatial Anchors Subscription at the SAn Server.

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

- Spatial Anchors Subscription Deletion.

5.2.1.2.7.2 Spatial Anchors Subscription Deletion

Figure 5.2.1.2.7.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the deletion of an existing Spatial Anchors Subscription (see also clause 8.3 of 3GPP TS 23.437 [13]).

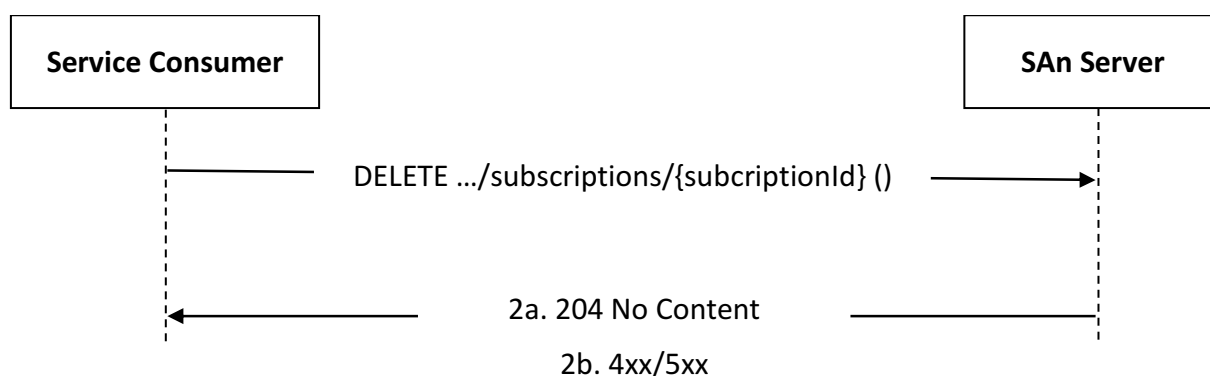


Figure 5.2.1.2.7.2-1: Procedure for Spatial Anchors Subscription Deletion

1. In order to request the deletion of an existing Spatial Anchors Subscription, the service consumer shall send an HTTP DELETE request to the SAn Server targeting the URI of the corresponding "Individual Spatial Anchors Subscription" resource.

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

- 2a. Upon success, the SAn Server shall respond with an HTTP "204 No Content" status code.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.1.7.

5.2.1.2.8 SS_SAnManagement_Notify

5.2.1.2.8.1 General

This service operation is used by a SAn Server to notify a previously subscribed consumer on:

- Spatial Anchors related Event(s) Reports.

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

- Spatial Anchors Notification.

5.2.1.2.8.2 Spatial Anchors Notification

Figure 5.2.1.2.8.2-1 depicts a scenario where the SAn Server sends a request to notify a previously subscribed service consumer on Spatial Anchors related events report(s) (see also clause 8.3 of 3GPP TS 29.437 [13]).

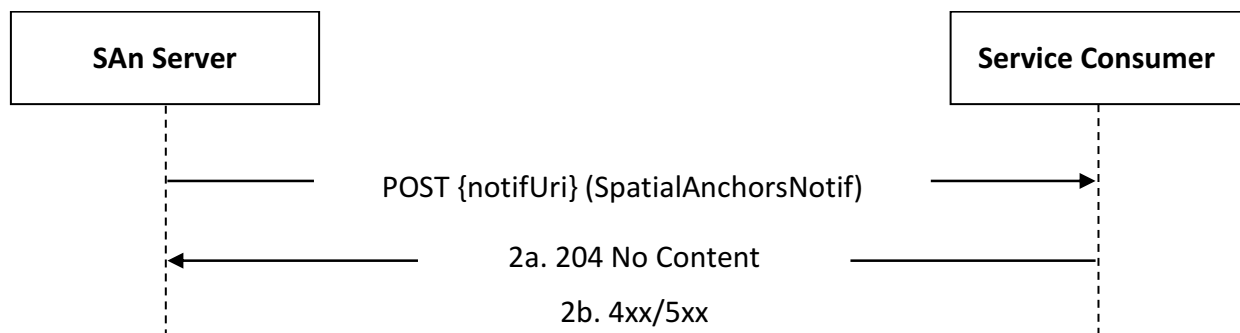


Figure 5.2.1.2.8.2-1: Procedure for Spatial Anchors Notification

1. In order to notify a previously subscribed service consumer on Spatial Anchors related Event(s) report(s), the SAn Server shall send an HTTP POST request 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 and/or update of the corresponding Spatial Anchors Subscription using the procedures defined in clauses 5.2.1.2.5 and 5.2.1.2.6, the request body including the SpatialAnchorsNotif data structure.
- 2a. Upon success, the service consumer shall respond to the SAn Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. 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 6.1.1.7.

5.2.1.2.9 SS_SAnManagement_Retrieve

5.2.1.2.9.1 General

This service operation is used by a service consumer to request the spatial anchors profile information from the SAn Server.

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

- Spatial Anchor Profile Retrieve.

5.2.1.2.9.2 Spatial Anchor Profile Retrieve

This service operation is realized by the SS_SAnDiscovery_Request service operation of the SS_SAnDiscovery API, as specified in clause 5.2.2.2.2.

5.2.2 SS_SAnDiscovery API

5.2.2.1 Service Description

The SS_SAnDiscovery service exposed by the SAn Server enables a service consumer to:

- discover the spatial anchor(s) at the SAn Server.

5.2.2.2 Service Operations

5.2.2.2.1 Introduction

The service operation defined for the SS_SAnDiscovery API are shown in the table 5.2.2.2.1-1.

Table 5.2.2.2.1-1: Operations of the SS_SAnDiscovery API

Service operation name	Description	Initiated by
SS_SAnDiscovery_Request	This service operation enables a service consumer to discover the spatial anchors at the SAn Server.	e.g., VAL Server

5.2.2.2.2 SS_SAnDiscovery_Request

5.2.2.2.2.1 General

This service operation is used by a service consumer to request the discovery of the spatial anchors at the SAn Server.

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

- Spatial Anchors Discovery.

5.2.2.2.2.2 Spatial Anchors Discovery

Figure 5.2.2.2.2.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the discovery of the spatial anchors (see also clause 8.3 of 3GPP TS 23.437 [13]).

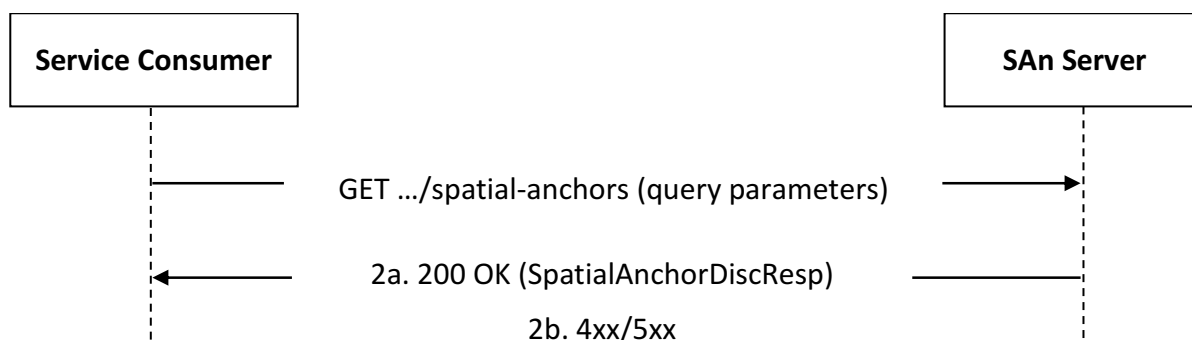


Figure 5.2.2.2.2-1: Procedure for Spatial Anchors Discovery

1. In order to discover the spatial anchors profiles, the service consumer shall send an HTTP GET request to the SAn Server targeting the URI of the "Spatial Anchors" collection resource, with the request URI query parameters including the filter criteria to discover the matching spatial anchor profiles.
- 2a. Upon success, the SAn Server shall respond with an HTTP "200 OK" status code with the response body containing a list of spatial anchor profiles within the SpatialAnchorsDiscResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.1.2.7.

5.2.3 SS_SAnUsage API

5.2.3.1 Service Description

The SS_SAnUsage API service enables a service consumer to:

- create/update/delete a spatial anchor usage subscription at the SAn Server;
- receive spatial anchor usage information report(s) from the SAn Server;
- request spatial anchor usage information from the SAn Server; and
- report spatial anchor usage information report(s) to the SAn Server.

5.2.3.2 Service Operations

5.2.3.2.1 Introduction

The service operation defined for the SS_SAnUsage API are shown in the table 5.2.3.2.1-1.

Table 5.2.3.2.1-1: Operations of the SS_SAnUsage API

Service operation name	Description	Initiated by
SS_SAnUsage_Create	This service operation enables a service consumer to request either the creation of a new spatial anchor usage subscription at the SAn Server or the spatial anchor usage information to the SAn Server. (NOTE)	e.g., VAL Server
SS_SAnUsage_Update	This service operation enables a service consumer to request the updation of an existing spatial anchor usage information subscription at the SAn server.	e.g., VAL Server
SS_SAnUsage_Delete	This service operation enables a service consumer to request the deletion of an existing spatial anchor usage information subscription from the SAn Server.	e.g., VAL Server
SS_SAnUsage_Notify	This service operation enables a SEAL SAn server to notify a previously subscriber service consumer about the Spatial Anchors Usage Information.	e.g., SAn Server
SS_SAnUsage_Report	This service operation enables a service consumer to report the spatial anchor usage information to the SAn Server	e.g., VAL Server
NOTE: The Stage 2 SS_SAnUsageInfo_Request service operation defined in clause 8.4.3 of 3GPP TS 23.437 [13] is specified by reusing the SS_SAnUsage_Create service operation with one-time immediate reporting requested.		

5.2.3.2.2 SS_SAnUsage_Create

5.2.3.2.2.1 General

This service operation is used by a service consumer to either:

- request the creation of Spatial Anchors Usage Information Subscription at the SAn Server; or
- request Spatial Anchors Usage Information to the SAn Server.

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

- Spatial Anchor Usage Information Subscription Creation.
- Spatial Anchor Usage Information Request.

5.2.3.2.2.2 Spatial Anchor Usage Information Subscription Creation

Figure 5.2.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the creation of Spatial Anchors Usage Information Subscription (see also clause 8.4.2 of 3GPP TS 23.437 [13]).

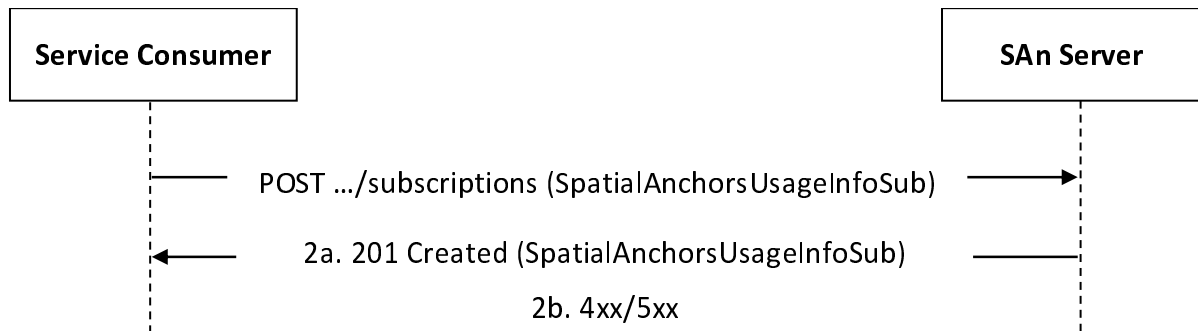


Figure 5.2.3.2.2.2-1: Procedure for Spatial Anchor Usage Information Subscription Creation

1. In order to create a new Spatial Anchors Usage Information Subscription, the service consumer shall send an HTTP POST request to the SAn Server targeting the URI of the "Spatial Anchors Usage Information Subscriptions" collection resource, with the request body including the SpatialAnchorsUsageInfoSub data structure.
- 2a. Upon success, the SAn Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Spatial Anchors Usage Information Subscriptions" resource within the SpatialAnchorsUsageInfoSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. 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 6.1.3.7.

5.2.3.2.2.3 Spatial Anchor Usage Information Request

Figure 5.2.3.2.2.3-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the Spatial Anchors Usage Information (see also clause 8.4.3 of 3GPP TS 23.437 [13]).

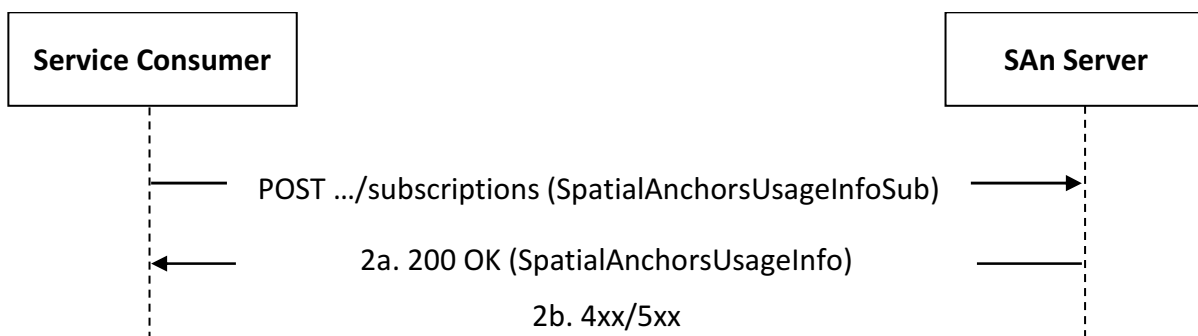


Figure 5.2.3.2.2.3-1: Procedure for Spatial Anchor Usage Information Request

1. In order to request Spatial Anchors Usage Information, the service consumer shall send an HTTP POST request to the SAn Server targeting the URI of the "Spatial Anchors Usage Information Subscriptions" collection resource, with the request body including the SpatialAnchorsUsageInfoSub data structure within which one-time immediate reporting shall be requested by setting the "immRep" attribute to "true" and the "maxReportNbr" attribute to 1 within the "reportReq" attribute of the SpatialAnchorsUsageInfoSub data structure.
- 2a. Upon success, the SAn Server shall respond with an HTTP "200 OK" status code with the response body containing the requested Spatial Anchors Usage Information report(s) within the SpatialAnchorsUsageInfo data structure.
- 2b. 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 6.1.3.7.

5.2.3.2.3 SS_SAnUsage_Update

5.2.3.2.3.1 General

This service operation is used by a service consumer to update the existing "Individual Spatial Anchors Usage Information Subscription" from the SAn Server.

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

- Spatial Anchor Usage Information Subscription Update.

5.2.3.2.3.2 Spatial Anchor Usage Subscription Update

Figure 5.2.3.2.3.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to update the existing spatial anchors usage information subscription (see also clause 8.4 of 3GPP TS 23.437 [13]).

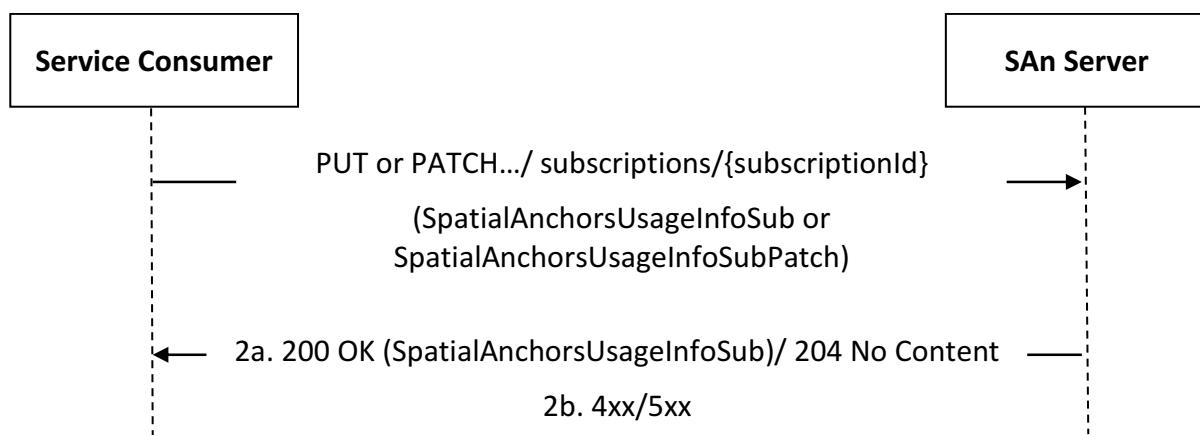


Figure 5.2.3.2.3.2-1: Procedure for Spatial Anchor Usage Information Subscription Update

1. In order to update an existing spatial anchor usage information subscription, the service consumer shall send an HTTP PUT/PATCH request to the SAn Server, targeting the URI of the corresponding "Individual Spatial Anchors Usage Information Subscription" resource, with the request body including either:
 - the updated representation of the resource within the `SpatialAnchorsUsageInfoSub` data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the `SpatialAnchorsUsageInfoSubPatch` data structure, in case the HTTP PATCH method is used.

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

- 2a. Upon success, the SAn Server shall update the targeted "Individual Spatial Anchors Usage Information Subscription" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Spatial Anchors Usage Information Subscription" resource within the `SpatialAnchorsUsageInfoSub` data structure; or
 - an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.3.7.

5.2.3.2.4 SS_SAnUsage_Delete

5.2.3.2.4.1 General

This service operation is used by a service consumer to request the deletion of an existing "Individual Spatial Anchors Usage Information Subscription" resource at the SAn Server.

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

- Spatial Anchor Usage Information Subscription Deletion.

5.2.3.2.4.2 Spatial Anchor Usage Information Subscription Deletion

Figure 5.2.3.2.4.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to request the deletion of an existing Spatial Anchors Usage Information Subscription (see also clause 8.4 of 3GPP TS 23.437 [13]).

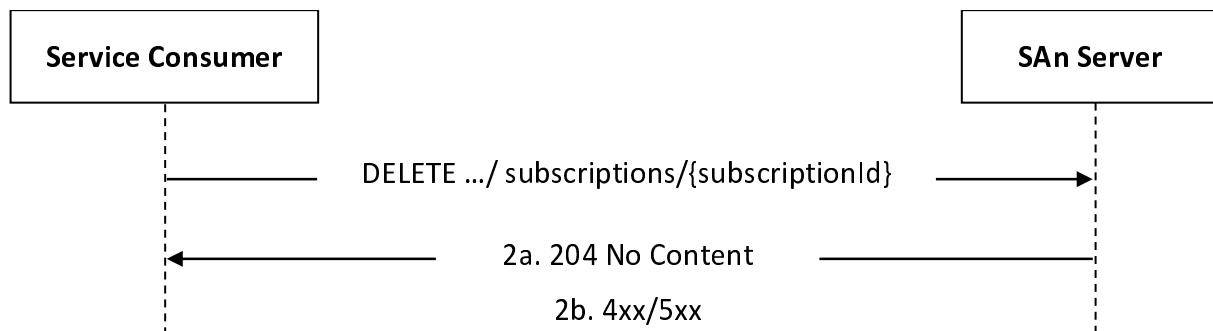


Figure 5.2.3.2.4.2-1: Procedure for Spatial Anchor Usage Information Subscription Deletion

1. In order to request the deletion of an existing Spatial Anchors Usage Information Subscription, the service consumer shall send an HTTP DELETE request to the SAn Server targeting the URI of the corresponding "Individual Spatial Anchors Usage Information Subscription" resource.

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

2a. Upon success, the SAn Server shall respond with an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.3.7.

5.2.3.2.5 SS_SAnUsage_Notify

5.2.3.2.5.1 General

This service operation is used by a SEAL SAn Server to notify a previously subscribed consumer on:

- Spatial anchors usage information.

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

- Spatial Anchors Usage Information Notification.

5.2.3.2.5.2 Spatial Anchors Usage Information Notification

Figure 5.2.3.2.5.2-1 depicts a scenario where the SEAL SAn Server sends a request to notify a previously subscribed service consumer on Spatial Anchors Usage Information related report(s) (see also clause 8.4 of 3GPP TS 23.437 [13]).

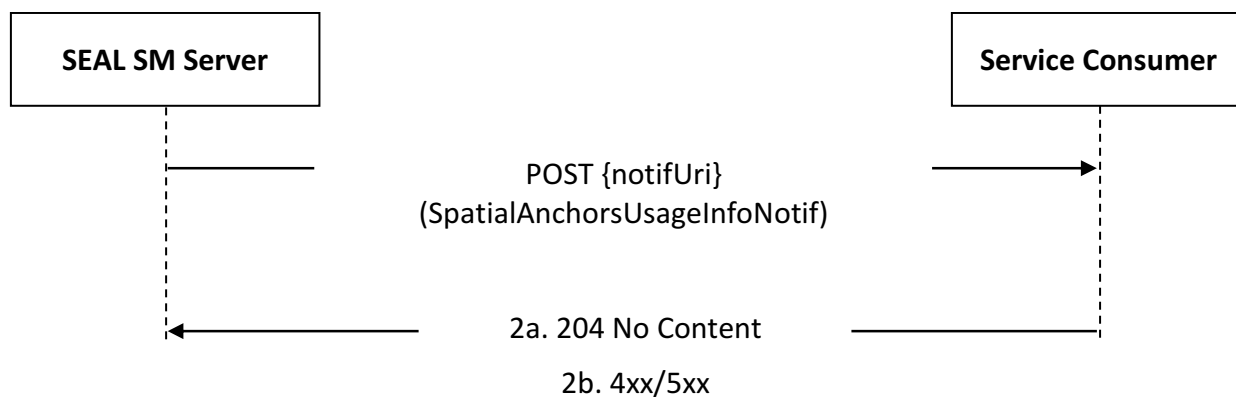


Figure 5.2.3.2.5.2-1: Procedure for Spatial Maps Notification

1. In order to notify a previously subscribed service consumer on Spatial Anchors Usage Information related report(s), the SEAL SAn Server shall send an HTTP POST request 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 and/or update of the corresponding Spatial Anchors Usage Information Subscription using the procedures defined in clauses 5.2.3.2.2 and 5.2.3.2.3, the request body including the SpatialAnchorsUsageInfoNotif data structure.
- 2a. Upon success, the service consumer shall respond to the SEAL SAn Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. 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 6.1.3.7.

5.2.3.2.6 Void

5.2.3.2.7 SS_SAnUsage_Report

5.2.3.2.7.1 General

This service operation is used by a service consumer to report the Spatial Anchors Usage Information at the SAn Server.

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

- Spatial Anchor Usage Information Report.

5.2.3.2.7.2 Spatial Anchor Usage Information Report

Figure 5.2.3.2.7.2-1 depicts a scenario where a service consumer sends a request to the SAn Server to report spatial anchors usage information (see also SS_SAnUsageReport_Request service operation, clause 8.4.4 of 3GPP TS 23.437 [13]).

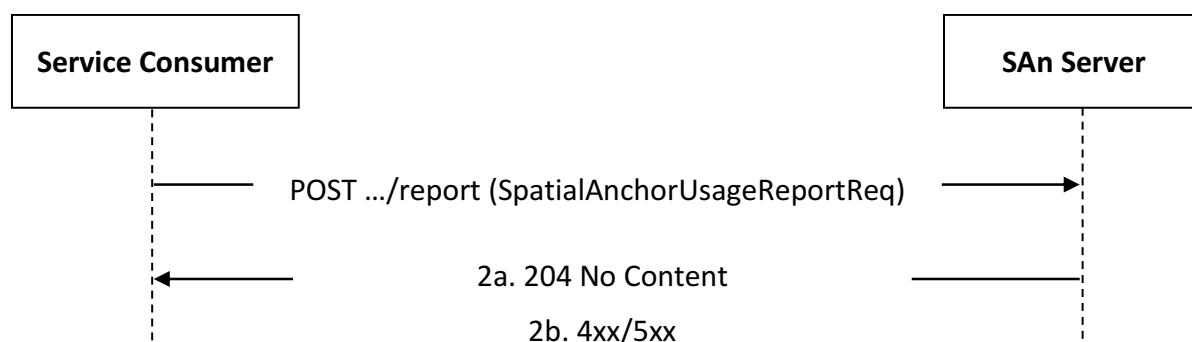


Figure 5.2.3.2.7.2-1: Procedure for Spatial Anchor Usage Information Report

1. In order to report the spatial anchor usage information, the service consumer shall send an HTTP POST request to the SAn Server targeting the URI of the corresponding custom operation (i.e., "Report"), with the request body including the SpatialAnchorUsageReportReq data structure.
- 2a. Upon success, the SAn Server shall respond with an HTTP "204 No Content" status code to confirm the successful reception of the reported spatial anchor usage information.
- 2b. 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 6.1.3.7.

5.3 Spatial Map Server APIs

5.3.1 SS_SmManagement API

5.3.1.1 Service Description

The SS_SmManagement API service enables a service consumer to:

- manage spatial maps on SEAL SM server.
- get spatial maps information from SEAL SM server.
- subscribe and receive spatial maps related events from SEAL SM server.

5.3.1.2 Service Operations

5.3.1.2.1 Introduction

The service operation defined for the SS_SmManagement API are shown in the table 5.3.1.2.1-1.

Table 5.3.1.2.1-1: Operations of the SS_SmManagement API

Service operation name	Description	Initiated by
SS_SAnUsage_Create	This service operation enables a service consumer to request the creation of a new spatial map at the SEAL SM server.	e.g., VAL Server
SS_SAnUsage_Request	This service operation enables a service consumer to retrieve the spatial map information from the SEAL SM server.	e.g., VAL Server
SS_SmManagement_Update	This service operation enables a service consumer to update the existing spatial maps information at the SEAL SM server.	e.g., VAL Server
SS_SmManagement_Delete	This service operation enables a service consumer to delete the existing spatial maps information from the SEAL SM server.	e.g., VAL Server
SS_SmManagement_Subscribe	This service operation enables a service consumer to request the creation of spatial maps subscription at the SEAL SM Server.	e.g., VAL Server
SS_SmManagement_Notify	This service operation enables a service consumer to receive the spatial maps related event(s) reports.	SM Server
SS_SmManagement_Subscribe_Update	This service operation enables a service consumer to request the update of an existing spatial maps subscription at the SEAL SM Server.	e.g., VAL Server
SS_SmManagement_Unsubscribe	This service operation enables a service consumer to request the deletion of an existing spatial maps subscription from the SEAL SM Server.	e.g., VAL Server

5.3.1.2.2 SS_SmManagement_Create

5.3.1.2.2.1 General

This service operation is used by a service consumer to request the creation of a new Spatial Map at the SEAL SM Server.

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

- Spatial Map Creation.

5.3.1.2.2.2 Spatial Map Creation

Figure 5.3.1.2.2.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the creation of Spatial Maps (see also clause 9.3 of 3GPP TS 23.437 [13]).

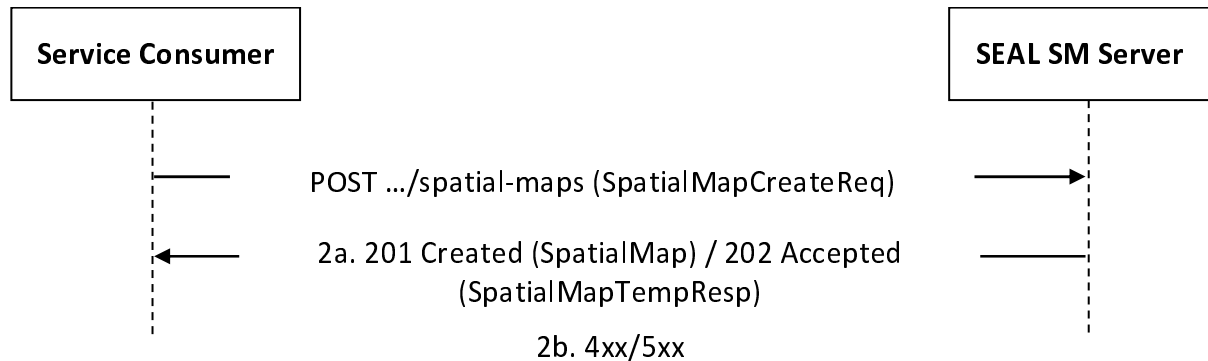


Figure 5.3.1.2.2.2-1: Procedure for Spatial Maps Creation

1. In order to create a new Spatial Map, the service consumer shall send an HTTP POST request to the SEAL SM Server targeting the URI of the "Spatial Maps" collection resource, with the request body including the SpatialMapCreateReq data structure.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Spatial Maps" resource within the SpatialMap data structure, and an HTTP "Location" header field containing the URI of the created resource or with an HTTP "202 Accepted" status code with the response body containing SpatialMapTempResp data structure.
- 2b. 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 6.2.1.7.

5.3.1.2.3 SS_SmManagement_Request

5.3.1.2.3.1 General

This service operation is used by a service consumer to retrieve an existing "Spatial Maps" resource from the SEAL SM Server.

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

- Spatial Map Request.

5.3.1.2.3.2 Spatial Map Request

Figure 5.3.1.2.3.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to retrieve the existing spatial maps information (see also clause 9.3 of 3GPP TS 23.437 [13]).

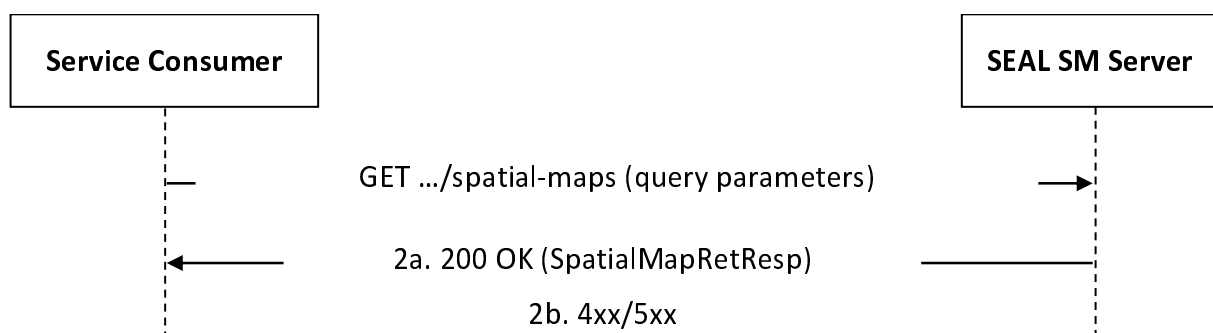


Figure 5.3.1.2.3.2-1: Procedure for Spatial Map Request

1. In order to retrieve the existing Spatial Maps Information, the service consumer shall send an HTTP GET request to the SEAL SM Server targeting the URI of the corresponding "Spatial Maps" resource with the request URI query parameters including the filter criteria to discover the matching spatial map usage information.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "200 OK" status code with the response body containing a list of spatial map information within the SpatialMapRetResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.1.7.

5.3.1.2.4 SS_SmManagement_Update

5.3.1.2.4.1 General

This service operation is used by a service consumer to update the existing "Individual Spatial Map" resource at the SEAL SM Server.

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

- Spatial Map Update.

5.3.1.2.4.2 Spatial Map Update

Figure 5.3.1.2.4.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to update the existing spatial map information (see also clause 9.3 of 3GPP TS 23.437 [13]).

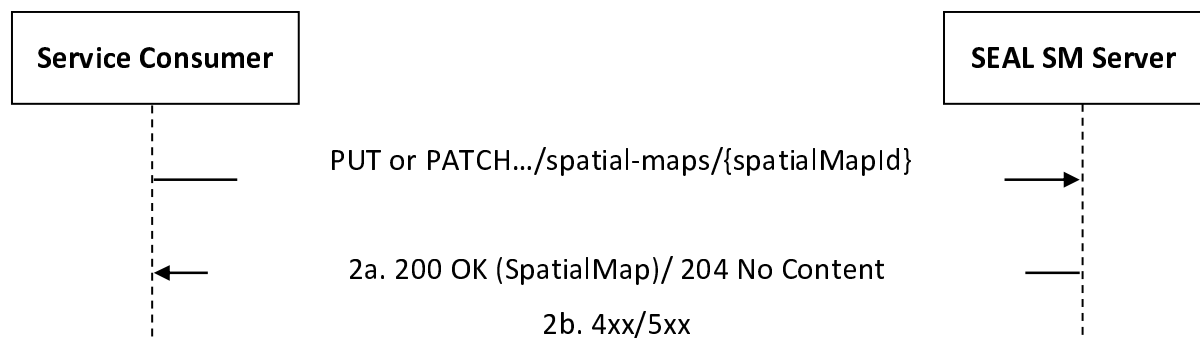


Figure 5.3.1.2.2-1: Procedure for Spatial Maps Information Update

1. In order to update an existing spatial map, the service consumer shall send an HTTP PUT/PATCH request to the SEAL SM Server, targeting the URI of the corresponding "Individual Spatial Map" resource, with the request body including either:
 - the updated representation of the resource within the SpatialMap data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the SpatialMapPatch data structure, in case the HTTP PATCH method is used.

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

- 2a. Upon success, the SEAL SM Server shall update the targeted "Individual Spatial Map" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Spatial Maps" resource within the SpatialMap data structure; or
 - an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.2.1.7.

5.3.1.2.5 SS_SmManagement_Delete

5.3.1.2.5.1 General

This service operation is used by a service consumer to request the deletion of an existing "Individual Spatial Map" resource at the SEAL SM Server.

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

- Spatial Map Deletion.

5.3.1.2.5.2 Spatial Map Deletion

Figure 5.3.1.2.5.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the deletion of an existing spatial map (see also clause 9.3 of 3GPP TS 23.437 [13]).

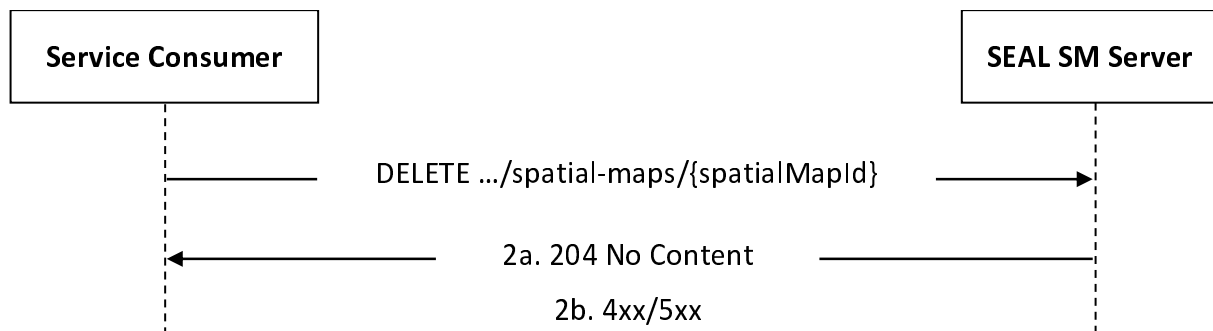


Figure 5.3.1.2.5.2-1: Procedure for Spatial Maps Deletion

1. In order to request the deletion of an existing spatial map, the service consumer shall send an HTTP DELETE request to the SEAL SM Server targeting the URI of the corresponding "Individual Spatial Map" resource.

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

2a. Upon success, the SEAL SM Server shall respond with an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.2.1.7.

5.3.1.2.6 SS_SmManagement_Subscribe

5.3.1.2.6.1 General

This service operation is used by a service consumer to request the creation of spatial maps subscription at the SEAL SM Server.

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

- Spatial Maps Subscription Creation.

5.3.1.2.6.2 Spatial Maps Subscription Creation

Figure 5.3.1.2.6.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the creation of a Spatial Maps Subscription (see also clause 9.3 of 3GPP TS 23.437 [13]).

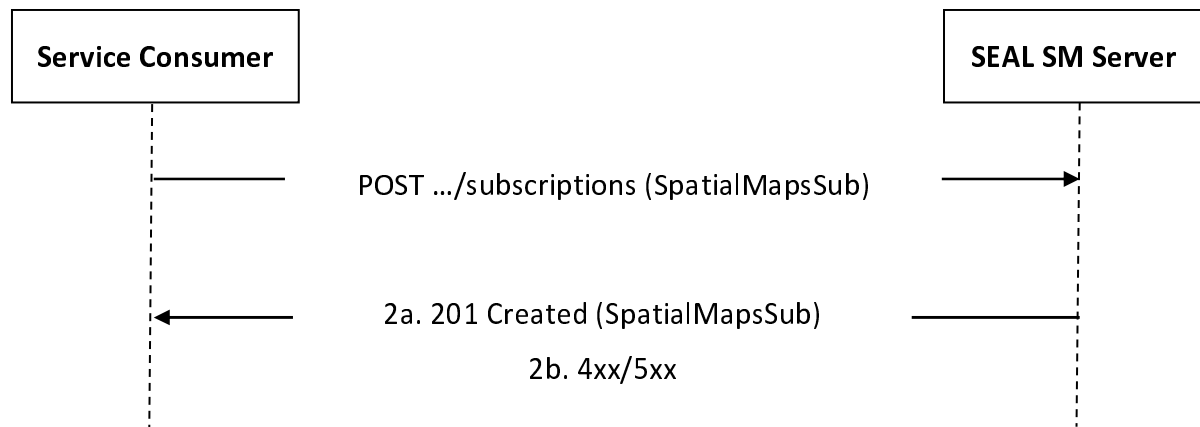


Figure 5.3.1.2.6.2-1: Procedure for Spatial Maps Subscription Creation

1. In order to create a new Spatial Maps Subscription, the service consumer shall send an HTTP POST request to the SEAL SM Server targeting the URI of the "Spatial Maps Subscriptions" collection resource, with the request body including the SpatialMapsSub data structure.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual Spatial Maps Subscription" resource within the SpatialMapsSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. 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 6.2.1.7.

5.3.1.2.7 SS_SmManagement_Notify

5.3.1.2.7.1 General

This service operation is used by a SEAL SM Server to notify a previously subscribed consumer on:

- Spatial Maps related Event(s) Reports.

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

- Spatial Maps Notification.

5.3.1.2.7.2 Spatial Maps Notification

Figure 5.3.1.2.7.2-1 depicts a scenario where the SEAL SM Server sends a request to notify a previously subscribed service consumer on Spatial Maps related events report(s) (see also clause 9.3 of 3GPP TS 23.437 [13]).

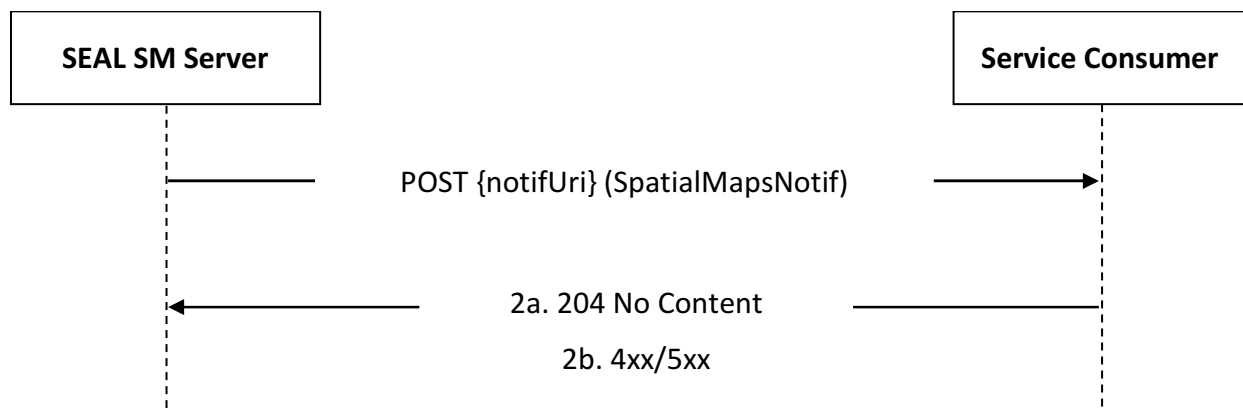


Figure 5.3.1.2.7.2-1: Procedure for Spatial Maps Notification

1. In order to notify a previously subscribed service consumer on Spatial Maps related Event(s) report(s), the SEAL SM Server shall send an HTTP POST request 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 either:

- the creation and/or update of the corresponding Spatial Maps Subscription using the procedures defined in clauses 5.3.1.2.6 and 5.3.1.2.8, if the notification is related to an explicit Spatial Maps Subscription; or
- the creation of the Spatial Map using the procedures defined in clause 5.3.1.2.2, if the notification is related to an implicit subscription as part of the Spatial Map Creation;

with the request body including the SpatialMapsNotif data structure.

2a. Upon success, the service consumer shall respond to the SEAL SM Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.

2b. 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 6.2.1.7.

5.3.1.2.8 SS_SmManagement_Subscription_Update

5.3.1.2.8.1 General

This service operation is used by a service consumer to request the update of an existing Spatial Maps Subscription at the SEAL SM Server.

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

- Spatial Maps Subscription Update.

5.3.1.2.8.2 Spatial Maps Subscription Update

Figure 5.3.1.2.8.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the update of an existing Spatial Maps Subscription (see also clause 9.3 of 3GPP TS 23.437 [13]).

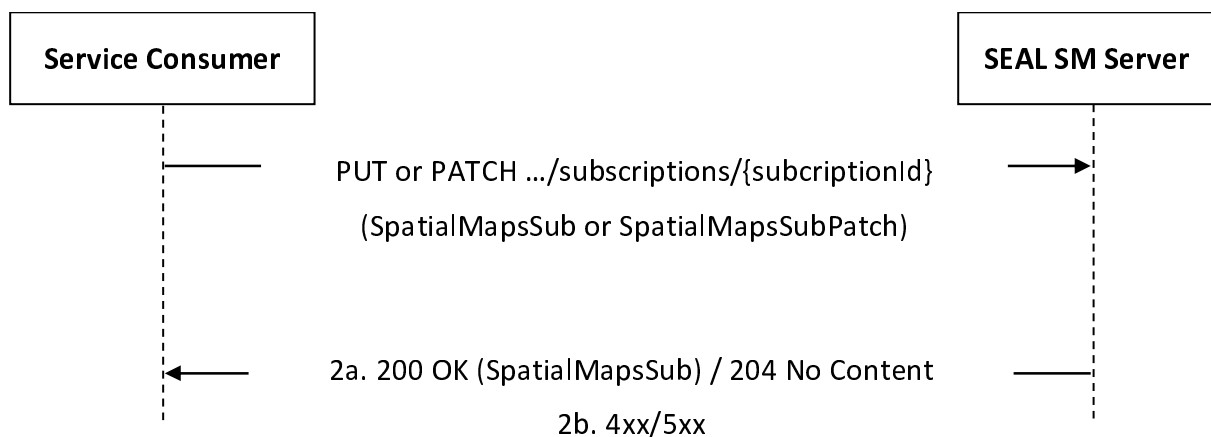


Figure 5.3.1.2.8.2-1: Procedure for Spatial Maps Subscription Update

1. In order to update an existing Spatial Maps Subscription, the service consumer shall send an HTTP PUT/PATCH request to the SEAL SM Server, targeting the URI of the corresponding "Individual Spatial Maps Subscription" resource, with the request body including either:

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

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

2a. Upon success, the SEAL SM Server shall update the targeted "Individual Spatial Maps Subscription" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Spatial Maps Subscription" resource within the SpatialMapsSub data structure; or
- an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.2.1.7.

5.3.1.2.9 SS_SmManagement_Unsubscribe

5.3.1.2.9.1 General

This service operation is used by a service consumer to request the deletion of an existing Spatial Maps Subscription at the SEAL SM Server.

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

- Spatial Maps Subscription Deletion.

5.3.1.2.9.2 Spatial Maps Subscription Deletion

Figure 5.3.1.2.9.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the deletion of an existing Spatial Maps Subscription (see also clause 9.3 of 3GPP TS 23.437 [13]).

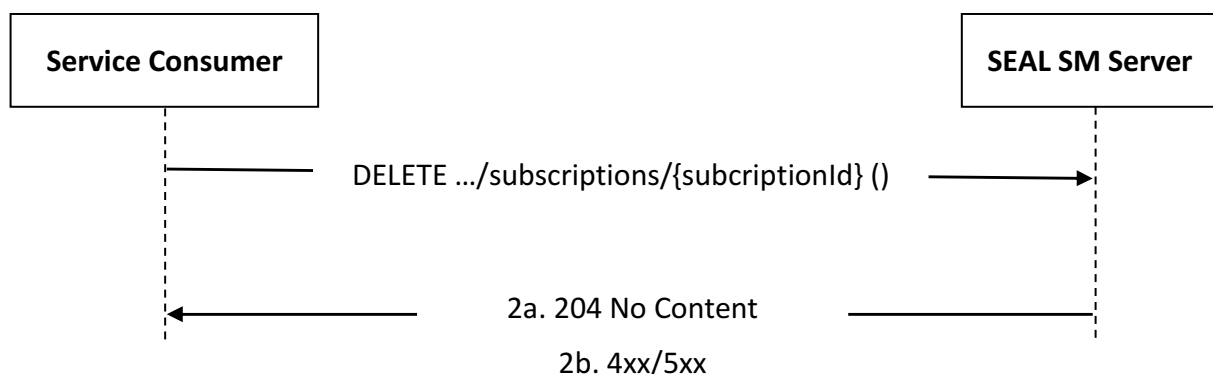


Figure 5.2.1.2.9.2-1: Procedure for Spatial Anchors Subscription Deletion

1. In order to request the deletion of an existing Spatial Maps Subscription, the service consumer shall send an HTTP DELETE request to the SEAL SM Server targeting the URI of the corresponding "Individual Spatial Maps Subscription" resource.

NOTE: An alternative service consumer (i.e. other than the one that requested the creation of the targeted resource) can initiate this request.

2a. Upon success, the SEAL SM Server shall respond with an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.2.1.7.

5.3.2 SS_SmDiscovery API

5.3.2.1 Service Description

The SS_SmDiscovery service exposed by the SEAL SM Server enables a service consumer to:

- discover spatial maps

- discover SMAS.

5.3.2.2 Service Operations

5.3.2.2.1 Introduction

The service operation defined for the SS_SmDiscovery API are shown in the table 5.3.2.2.1-1.

Table 5.3.2.2.1-1: Operations of the SS_SmDiscovery API

Service operation name	Description	Initiated by
SS_SmDiscovery_Request	This service operation enables a service consumer to discover spatial maps or SMAS from the SEAL SM Server.	e.g., VAL Server

5.3.2.2.2 SS_SmDiscovery_Request

5.3.2.2.2.1 General

This service operation is used by a service consumer to request the discovery of the spatial maps or SMAS from the SEAL SM Server.

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

- Spatial Maps or SMAS Discovery.

5.3.2.2.2.2 Spatial Maps or SMAS Discovery

Figure 5.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the discovery of the spatial maps or SMAS from the SEAL SM Server (see also clauses 9.3.2 and 9.6.5 of 3GPP TS 29.437 [13]).

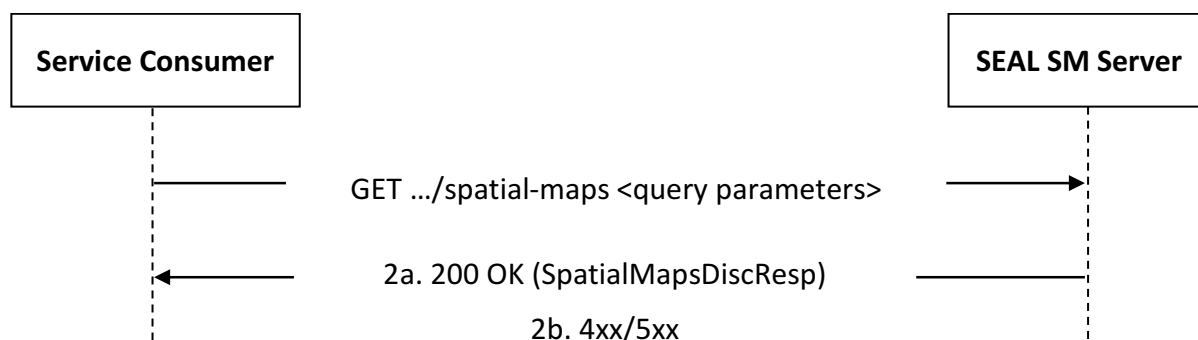


Figure 5.3.2.2.2-1: Procedure for Spatial Maps Discovery

1. In order to discover the spatial maps information, the service consumer shall send an HTTP GET request to the SEAL SM Server targeting the URI of the "Spatial Maps" collection resource, with the request URI query parameters including the filter criteria to discover the matching spatial map or SMAS information.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "200 OK" status code with the response body containing spatial map or SMAS information within the SpatialMapsDiscResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.2.7.

5.3.3 SS_SmLocalization API

5.3.3.1 Service Description

The SS_SmLocalization service exposed by the SEAL SM Server enables a service consumer to:

- get localization information from the spatial maps.

5.3.3.2 Service Operations

5.3.3.2.1 Introduction

The service operation defined for the SS_SmLocalization API are shown in the table 5.3.3.2.1-1.

Table 5.3.3.2.1-1: Operations of the SS_SmLocalization API

Service operation name	Description	Initiated by
SS_SmLocalization_Request	This service operation enables a service consumer to get localization information from the spatial maps.	e.g., VAL Server

5.3.3.2.2 SS_SmLocalization_Request

5.3.3.2.2.1 General

This service operation is used by a service consumer to request for localization of a target identity (VAL user or VAL UE).

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

- Spatial Map Localization Request.

5.3.3.2.2.2 Spatial Map Localization Request

Figure 5.3.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the localization of the spatial maps from the SEAL SM Server (see also clause 9.4 of 3GPP TS 23.437 [13]).

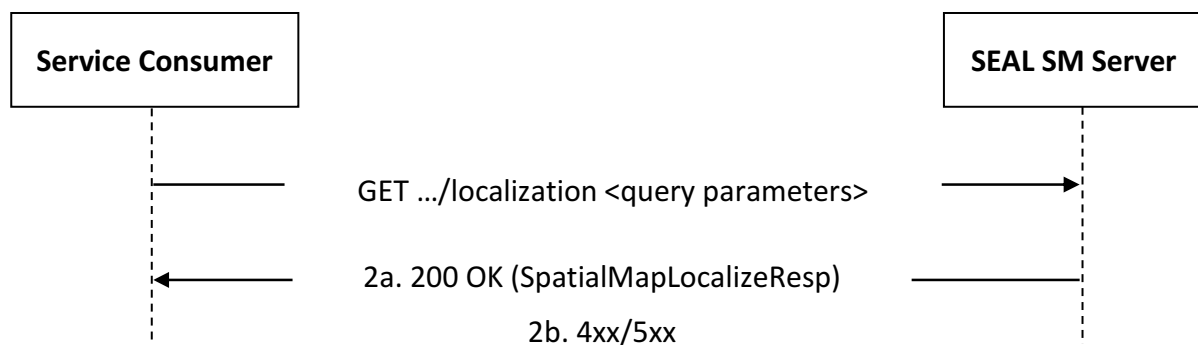


Figure 5.3.3.2.2.2-1: Procedure for Spatial Map Localization Request

1. In order to discover the spatial maps information, the service consumer shall send an HTTP GET request to the SEAL SM Server targeting the URI of the "Spatial Localization" collection resource, with the request URI query parameters including the filter criteria to localize the spatial map information.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "200 OK" status code with the response body containing localization information within the SpatialMapLocalizeResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.3.7.

5.3.4 SS_SmDataSourceDiscovery API

5.3.4.1 Service Description

The SS_SmDataSourceDiscovery service exposed by the SEAL SM Server enables a service consumer to:

- discover SM data sources from the SEAL SM Server.

5.3.4.2 Service Operations

5.3.4.2.1 Introduction

The service operation defined for the SS_SmDataSourceDiscovery API are shown in the table 5.3.4.2.1-1.

Table 5.3.4.2.1-1: Operations of the SS_SmDataSourceDiscovery API

Service operation name	Description	Initiated by
SS_SmDataSourceDiscovery_Request	This service operation enables a service consumer to discover the SM data sources from the SEAL SM Server.	e.g., VAL Server

5.3.4.2.2 SS_SmDataSourceDiscovery_Request

5.3.4.2.2.1 General

This service operation is used by a service consumer to request the discovery of the SM data sources from the SEAL SM Server.

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

- Spatial Maps Data Source Discovery Request.

5.3.4.2.2.2 Spatial Maps Data Source Discovery Request

Figure 5.3.4.2.2.2-1 depicts a scenario where a service consumer sends a request to the SEAL SM Server to request the discovery of SM data sources (see also clause 9.5 of 3GPP TS 29.437 [13]).

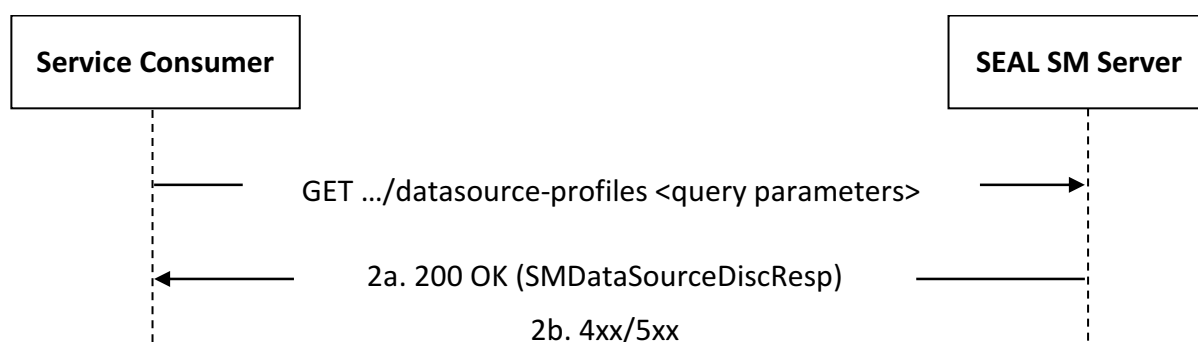


Figure 5.3.4.2.2.2-1: Procedure for Spatial Maps Data Source Discovery Request

1. In order to discover the SM data source profiles, the service consumer shall send an HTTP GET request to the SEAL SM Server targeting the URI of the "Spatial Maps Data Source Profiles" collection resource, with the request URI query parameters including the filter criteria to discover the matching SM data source profiles.
- 2a. Upon success, the SEAL SM Server shall respond with an HTTP "200 OK" status code with the response body containing a list of SM data source profiles within the SMDDataSourceDiscResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.4.7.

5.3.5 SS_SmSmasRegistration

5.3.5.1 Service Description

The SS_SmSmasRegistration service exposed by the SM Server enables a service consumer to:

- create/update/delete an SMAS Registration.

5.3.5.2 Service Operations

5.3.5.2.1 Introduction

The service operations defined for the SS_SmSmasRegistration service are shown in table 5.3.5.2.1-1.

Table 5.3.5.2.1-1: SS_SmSmasRegistration Service Operations

Service Operation Name	Description	Initiated by
SS_SmSmasRegistration_Create	This service operation enables a service consumer to request the creation of an SMAS Registration.	e.g., VAL Server
SS_SmSmasRegistration_Update	This service operation enables a service consumer to request the update of an existing SMAS Registration.	e.g., VAL Server
SS_SmSmasRegistration_Delete	This service operation enables a service consumer to deregister an SMAS by requesting the deletion of the corresponding existing SMAS Registration.	e.g., VAL Server

5.3.5.2.2 SS_SmSmasRegistration_Create

5.3.5.2.2.1 General

This service operation is used by a service consumer to request the creation of an SMAS Registration at the SM Server.

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

- SMAS Registration Creation.

5.3.5.2.2.2 SMAS Registration Creation

Figure 5.3.5.2.2.2-1 depicts a scenario where a service consumer sends a request to the SM Server to request the creation of an SMAS Registration (see also clause 9.6 of 3GPP TS 29.437 [13]).

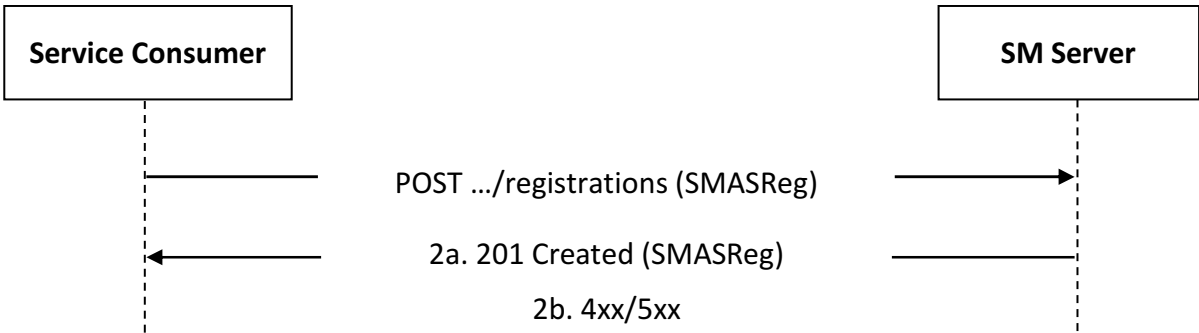


Figure 5.3.5.2.2.2-1: Procedure for SMAS Registration Creation

1. In order to create a new SMAS Registration, the service consumer shall send an HTTP POST request to the SM Server targeting the URI of the "SMAS Registrations" collection resource, with the request body including the SMASReg data structure.

- 2a. Upon success, the SM Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual SMAS Registration" resource within the SMASReg data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. 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 6.2.5.7.

5.3.5.2.3 SS_SmSmasRegistration_Update

5.3.5.2.3.1 General

This service operation is used by a service consumer to request the update of an existing SMAS Registration at the SM Server.

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

- SMAS Registration Update.

5.3.5.2.3.2 SMAS Registration Update

Figure 5.3.5.2.3.2-1 depicts a scenario where a service consumer sends a request to the SM Server to request the update of an existing SMAS Registration (see also clause 9.6 of 3GPP TS 23.437 [13]).

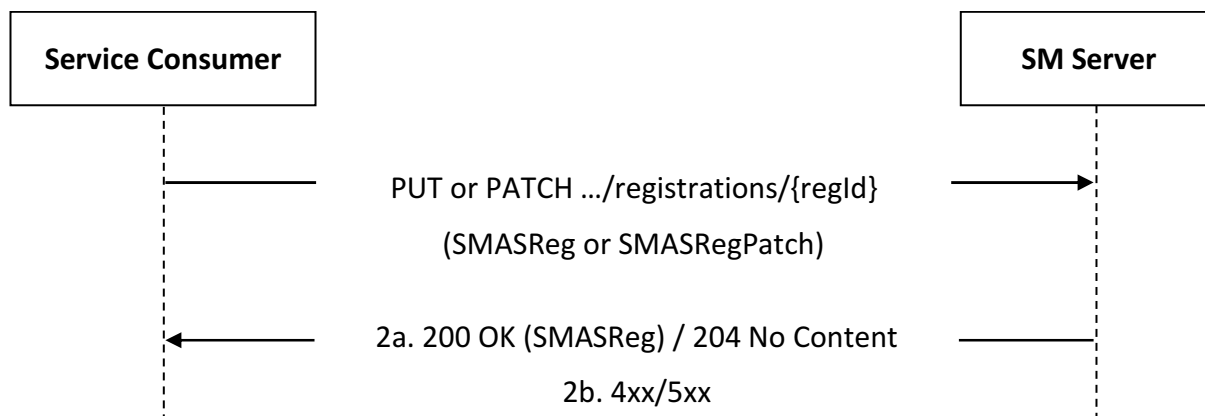


Figure 5.3.5.2.3.2-1: Procedure for SMAS Registration Update

1. In order to update an existing SMAS Registration, the service consumer shall send an HTTP PUT/PATCH request to the SM Server, targeting the URI of the corresponding "Individual SMAS Registration" resource, with the request body including either:

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

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

- 2a. Upon success, the SM Server shall update the targeted "Individual SMAS Registration" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual SMAS Registration" resource within the SMASReg data structure; or
- an HTTP "204 No Content" status code.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.2.5.7.

5.3.5.2.4 SS_SmSmasRegistration_Delete

5.3.5.2.4.1 General

This service operation is used by a service consumer to request the deletion of an existing SMAS Registration at the SM Server.

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

- SMAS Registration Deletion.

5.3.5.2.4.2 SMAS Registration Deletion

Figure 5.3.5.2.4.2-1 depicts a scenario where a service consumer sends a request to the SM Server to request the deletion of an existing SMAS Registration (see also clause 9.6 of 3GPP TS 29.437 [13]).

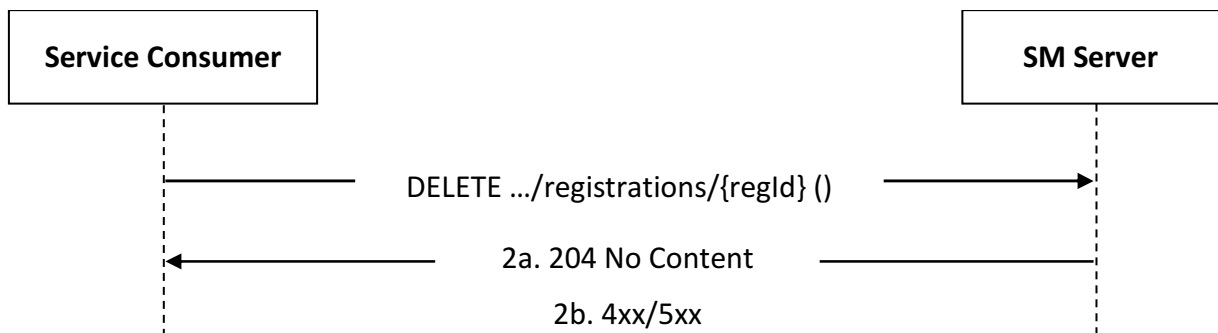


Figure 5.3.5.2.4.2-1: Procedure for SMAS Registration Deletion

1. In order to deregister an SMAS, the service consumer shall send an HTTP DELETE request to the SM Server targeting the URI of the corresponding "Individual SMAS Registration" resource.

NOTE: An alternative service consumer (i.e., other than the one that requested the creation/update of the targeted resource) can initiate this request.

- 2a. Upon success, the SM Server shall respond with an HTTP "204 No Content" status code.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.2.5.7.

6 API Definitions

6.1 Spatial Anchor Server APIs

6.1.1 SS_SAnManagement API

6.1.1.1 Introduction

The SS_SAnManagement shall use the SS_SAnManagement API.

The API URI of the SS_SAnManagement API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssan-sanm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.1.3 and 6.1.1.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.1, the SAn server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.1.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SAnManagement API.

6.1.1.3 Resources

6.1.1.3.1 Overview

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

Figure 6.1.1.3.1-1 depicts the resource URIs structure for the SS_SAnManagement API.

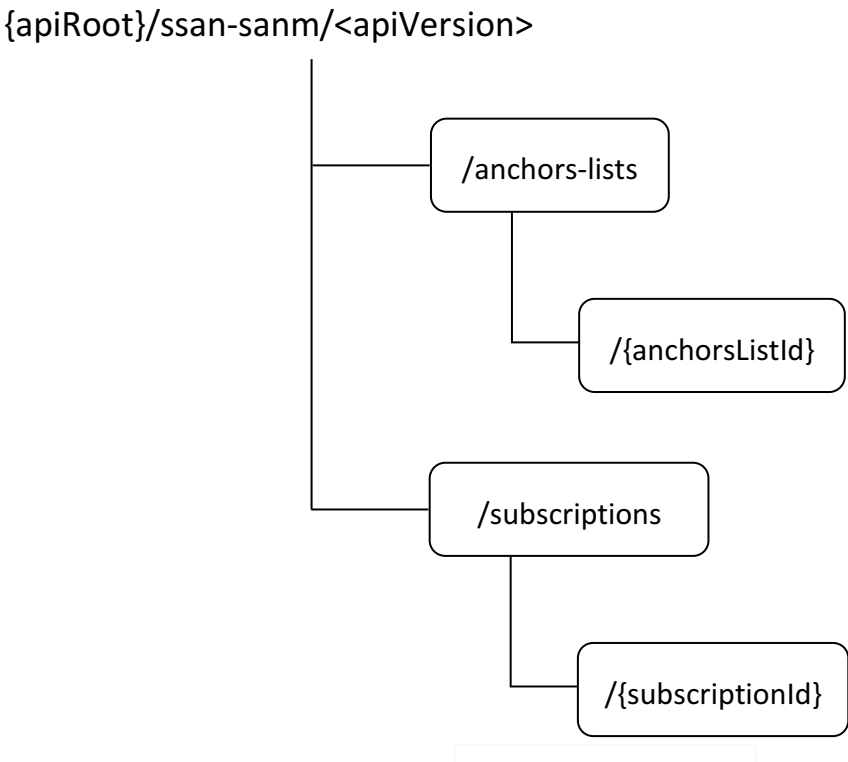


Figure 6.1.1.3.1-1: Resource URI structure of the SS_SAnManagement API

Table 6.1.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.1.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Anchors Lists	/anchors-lists	POST	Create a new Spatial Anchors List.
Individual Spatial Anchors List	/anchors-lists/{anchorsListId}	GET	Retrieve an existing "Individual Spatial Anchors List" resource.
		PUT	Update an existing "Individual Spatial Anchors List" resource.
		PATCH	Modify an existing "Individual Spatial Anchors List" resource.
		DELETE	Delete an existing "Individual Spatial Anchors List" resource.
Spatial Anchors Subscriptions	/subscriptions	POST	Create a new Spatial Anchors Subscription.
Individual Spatial Anchors Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual Spatial Anchors Subscription" resource.
		PUT	Update an existing "Individual Spatial Anchors Subscription" resource.
		PATCH	Modify an existing "Individual Spatial Anchors Subscription" resource.
		DELETE	Delete an existing "Individual Spatial Anchors Subscription" resource.

6.1.1.3.2 Resource: Spatial Anchors Lists

6.1.1.3.2.1 Description

This resource represents the collection of Spatial Anchors Lists managed by the SAn Server.

6.1.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/ssan-sanm/<apiVersion>/anchors-lists**

This resource shall support the resource URI variables defined in table 6.1.1.3.2.2-1.

Table 6.1.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.1.

6.1.1.3.2.3 Resource Standard Methods

6.1.1.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Spatial Anchors List at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.1.3.2.3.1-1.

Table 6.1.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.1.3.2.3.1-3.

Table 6.1.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsList	M	1	Represents the parameters to request the creation of a new Spatial Anchors List.

Table 6.1.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsList	M	1	201 Created	Successful case. The Spatial Anchors List is successfully created and a representation of the created "Individual Spatial Anchors List" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.2.3.1-4: 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}/ssan-sanm/<apiVersion>/anchors-lists/{anchorsListId}

6.1.1.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.1.1.3.3 Resource: Individual Spatial Anchors List

6.1.1.3.3.1 Description

This resource represents a Spatial Anchors List managed by the SAn Server.

6.1.1.3.3.2 Resource Definition

Resource URI: {apiRoot}/ssan-sanm/<apiVersion>/anchors-lists/{anchorsListId}

This resource shall support the resource URI variables defined in table 6.1.1.3.3.2-1.

Table 6.1.1.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.1.
anchorsListId	string	Represents the identifier of the "Individual Spatial Anchors List" resource.

6.1.1.3.3.3 Resource Standard Methods

6.1.1.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Spatial Anchors List" resource at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.1.3.3.3.1-1.

Table 6.1.1.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.1.3.3.3.1-3.

Table 6.1.1.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.1.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsList	M	1	200 OK	Successful case. The requested "Individual Spatial Anchors List" 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 SAn 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 URI of the resource located in an alternative SAn Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.3.1-4: 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 SAn Server.

Table 6.1.1.3.3.1-5: 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 SAn Server.

6.1.1.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Spatial Anchors List" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.3.2-1.

Table 6.1.1.3.3.2-1: 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 6.1.1.3.3.2-2 and the response data structures and response codes specified in table 6.1.1.3.3.2-3.

Table 6.1.1.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsList	M	1	Represents the updated representation of the "Individual Spatial Anchors List" resource.

Table 6.1.1.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsList	M	1	200 OK	Successful case. The "Individual Spatial Anchors List" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors List" 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.3.2-4: 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 SAn Server.

Table 6.1.1.3.3.2-5: 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 SAn Server.

6.1.1.3.3.3.4 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Spatial Anchors List" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.3.4-1.

Table 6.1.1.3.3.4-1: 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 6.1.1.3.3.4-2 and the response data structures and response codes specified in table 6.1.1.3.3.4-3.

Table 6.1.1.3.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsListPatch	M	1	Represents the parameters to request the modification of the "Individual Spatial Anchors List" resource.

Table 6.1.1.3.3.4-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsList	M	1	200 OK	Successful case. The "Individual Spatial Anchors List" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors List" 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.3.4-4: 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 SAn Server.

Table 6.1.1.3.3.4-5: 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 SAn Server.

6.1.1.3.3.3.3 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Spatial Anchors List" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.3.3.3-1.

Table 6.1.1.3.3.3.3-1: 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 6.1.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.1.3.3.3.3-3.

Table 6.1.1.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.1.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The "Individual Spatial Anchors List" 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.3.3.3-4: 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 SEAL SAn server.

Table 6.1.1.3.3.3.3-5: 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 SEAL SAn server.

6.1.1.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.1.1.3.4 Resource: Spatial Anchors Subscriptions

6.1.1.3.4.1 Description

This resource represents the collection of Spatial Anchors Subscriptions managed by the SAn Server.

6.1.1.3.4.2 Resource Definition

Resource URI: **{apiRoot}/ssan-sanm/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.1.1.3.4.2-1.

Table 6.1.1.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.1.

6.1.1.3.4.3 Resource Standard Methods

6.1.1.3.4.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Spatial Anchors Subscription at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.1.3.4.3.1-1.

Table 6.1.1.3.4.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.1.3.4.3.1-2 and the response data structures and response codes specified in table 6.1.1.3.4.3.1-3.

Table 6.1.1.3.4.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsSubscription	M	1	Represents the parameters to request the creation of a new Spatial Anchors Subscription.

Table 6.1.1.3.4.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsSubscription	M	1	201 Created	Successful case. The Spatial Anchors Subscription is successfully created and a representation of the created "Individual Spatial Anchors Subscription" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.4.3.1-4: 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}/ssan-sanm/<apiVersion>/anchors-subscriptions/{subscriptionId}

6.1.1.3.4.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.1.1.3.5 Resource: Individual Spatial Anchors Subscription

6.1.1.3.5.1 Description

This resource represents an Individual Spatial Anchors Subscription managed by the SAn Server.

6.1.1.3.5.2 Resource Definition

Resource URI: {apiRoot}/ssan-sanm/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.1.3.5.2-1.

Table 6.1.1.3.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.1.
subscriptionId	string	Represents the identifier of the "Individual Spatial Anchors Subscription" resource.

6.1.1.3.5.3 Resource Standard Methods

6.1.1.3.5.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Spatial Anchors Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.1.3.5.3.1-1.

Table 6.1.1.3.5.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.1.3.5.3.1-2 and the response data structures and response codes specified in table 6.1.1.3.5.3.1-3.

Table 6.1.1.3.5.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.1.3.5.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsSub	M	1	200 OK	Successful case. The requested "Individual Spatial Anchors Subscription" 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 SAn 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 URI of the resource located in an alternative SAn Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.5.3.1-4: 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 SAn Server.

Table 6.1.1.3.5.3.1-5: 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 SAn Server.

6.1.1.3.5.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Spatial Anchors Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.5.3.2-1.

Table 6.1.1.3.5.3.2-1: 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 6.1.1.3.5.3.2-2 and the response data structures and response codes specified in table 6.1.1.3.5.3.2-3.

Table 6.1.1.3.5.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsSub	M	1	Represents the updated representation of the "Individual Spatial Anchors Subscription" resource.

Table 6.1.1.3.5.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsSub	M	1	200 OK	Successful case. The "Individual Spatial Anchors Subscription" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.5.3.2-4: 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 SAn Server.

Table 6.1.1.3.5.3.2-5: 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 SAn Server.

6.1.1.3.5.3.4 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Spatial Anchors Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.5.3.4-1.

Table 6.1.1.3.5.3.4-1: 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 6.1.1.3.5.3.4-2 and the response data structures and response codes specified in table 6.1.1.3.5.3.4-3.

Table 6.1.1.3.5.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsSubscriptionPatch	M	1	Represents the parameters to request the modification of the "Individual Spatial Anchors Subscription" resource.

Table 6.1.1.3.5.3.4-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsSubscription	M	1	200 OK	Successful case. The "Individual Spatial Anchors Subscription" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors Subscription" 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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.5.3.4-4: 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 SAN Server.

Table 6.1.1.3.5.3.4-5: 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 SAN Server.

6.1.1.3.5.3.3 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Spatial Anchors Subscription" resource at the SAN Server.

This method shall support the URI query parameters specified in the table 6.1.1.3.5.3.3-1.

Table 6.1.1.3.5.3.3-1: 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 6.1.1.3.5.3.3-2 and the response data structures and response codes specified in table 6.1.1.3.5.3.3-3.

Table 6.1.1.3.5.3.3-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.1.3.5.3.3-3: 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 Spatial Anchors 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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.3.5.3.3-4: 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 SEAL SAN server.

Table 6.1.1.3.5.3.3-5: 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 SEAL SAN server.

6.1.1.3.5.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification

6.1.1.4 Custom Operations without associated resources

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

6.1.1.5 Notifications

6.1.1.5.1 General

Notifications shall comply to clause 5.2.1.5 of 3GPP TS 29.122 [2].

Table 6.1.1.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Spatial Anchors Notification	{notifUri}	POST	Enables the SAn Server to notify a previously subscribed service consumer on Spatial Anchors related event(s).

6.1.1.5.2 Spatial Anchors Notification

6.1.1.5.2.1 Description

The Spatial Anchors Notification is used by the SAn Server to notify a previously subscribed service consumer on Spatial Anchors related event(s).

6.1.1.5.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 6.1.1.5.2.2-1.

Table 6.1.1.5.2.2-1: Callback URI variables

Name	Definition
notifUri	Represents the callback URI encoded as a string formatted as a URI.

6.1.1.5.2.3 Standard Methods

6.1.1.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.1.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.1.5.2.3.1-1.

Table 6.1.1.5.2.3.1-2: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
SpatialAnchorsNotif	M	1	Contains the Spatial Anchors Notification.

Table 6.1.1.5.2.3.1-3: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Spatial Anchors 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 service consumer where the notification should be sent. 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 URI representing the end point of an alternative service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.1.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.1.1.6 Data Model

6.1.1.6.1 General

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

Table 6.1.1.6.1-1 specifies the data types defined for the SS_SAnManagement API.

Table 6.1.1.6.1-1: SS_SAnManagement API specific Data Types

Data type	Clause defined	Description	Applicability
AllowedEntity	6.1.1.6.2.9	Represents the allowed application entity.	
AllowedRules	6.1.1.6.2.8	Represents the allowed entities rules.	
AnchorEvent	6.1.1.6.3.4	Represents the spatial anchor event type.	
AnchorsEventsSub	6.1.1.6.2.16	Represents the spatial anchor event subscription.	
AnchorFilter	6.1.1.6.2.21	Represents the spatial anchors specific filters.	
AnchorManagementEvent	6.1.1.6.3.5	Represents the spatial anchor management events.	
AnchorsNotification	6.1.1.6.2.14	Represents the Spatial Anchors notification.	
Angle	6.1.1.6.3.2	Represents the angle value	
DetectedEvent	6.1.1.6.3.6	Represents the triggered spatial anchor event for the notification.	
DiscoveryFilter	6.1.1.6.2.18	Represents the discovery event filter.	
EntityType	6.1.1.6.3.3	Represents the type of entity.	
EventFilter	6.1.1.6.2.17	Represents the spatial anchors event subscription filters.	
Fov	6.1.1.6.2.27	Represents the field of view	
LocationInfo	6.1.1.6.2.23	Represents the Localization information for the Spatial Anchor.	
Orientation	6.1.1.6.2.26	Represents the Orientation	
Pose	6.1.1.6.2.25	Represents the current pose.	
PositionInfo	6.1.1.6.2.10	Represents the positioning information of the Spatial Anchor and the related Spatial Map.	
RangeFilter	6.1.1.6.2.20	Represents the range event filter.	
ServConnectInfo	6.1.1.6.2.5	Represents the connectivity information related to the application service.	
SpatialAnchor	6.1.1.6.2.6	Represents the Spatial Anchor profile information.	
SpatialAnchorRm	6.1.1.6.2.7	Represents the same as the SpatialAnchor data structure but with the OpenAPI "nullable" property set to "true".	
SpatialAnchorId	6.1.1.6.3.2	Represents the identifier of a Spatial Anchors List.	
SpatialAnchorsList	6.1.1.6.2.2	Represents the Spatial Anchors List.	
SpatialAnchorsListPatch	6.1.1.6.2.3	Represents the requested modifications to a Spatial Anchors List.	
SpatialAnchorMapPosition	6.1.1.6.2.22	Represents the position information of a spatial anchor in a given spatial map.	
SpatialAnchorsNotif	6.1.1.6.2.13	Represents the spatial anchor event notification message.	
SpatialAnchorProfile	6.1.1.6.2.24	Represents the spatial anchor profile information.	
SpatialAnchorsSub	6.1.1.6.2.11	Represents a Spatial Anchor subscription.	
SpatialAnchorsSubPatch	6.1.1.6.2.12	Represents the requested modifications to a Spatial Anchor Subscription.	
UEAnchorInterest	6.1.1.6.2.15	Represents the UE information with spatial anchor interest.	
UeFilter	6.1.1.6.2.19	Represent the event filter for UE with spatial anchor interest. event	
VALServiceInfo	6.1.1.6.2.4	Represents the VAL service information.	

Table 6.1.1.6.1-2 specifies data types re-used by the SS_SAnManagement API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SAnManagement API.

Table 6.1.1.6.1-2: SS_SAnManagement API re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.122 [2]	Represents a string formatted as a sequence of bytes.	
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
Dnai	3GPP TS 29.571 [15]	Represents a DNAI.	
Dnn	3GPP TS 29.571 [15]	Represents a DNN.	
EndPoint	3GPP TS 29.558 [18]	Represents the end point information.	
Float	3GPP TS 29.571 [15]	Represents a float.	
Local3dPointUncertaintyEllipsoid	3GPP TS 29.572 [16]	Represents a 3D point.	
LocationInfo	3GPP TS 29.122 [2]	Represents the location information and direction.	
ReportingInformation	3GPP TS 29.523 [19]	Represents the reporting requirements information.	
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
UInt32	3GPP TS 29.571 [15]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [2]	Represent a URI.	

6.1.1.6.2 Structured data types

6.1.1.6.2.1 Introduction

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

6.1.1.6.2.2 Type: SpatialAnchorsList

Table 6.1.1.6.2.2-1: Definition of type SpatialAnchorsList

Attribute name	Data type	P	Cardinality	Description	Applicability
valServInfo	VALServiceInfo	M	1	Contains the application service information associated with the Spatial Anchors List.	
anchors	map(SpatialAnchor)	M	1..N	Contains the list of spatial anchor(s) constituting the Spatial Anchor List. The key of the map shall be set to the value of the "anchorId" attribute of the corresponding map value encoded using the SpatialAnchor data structure.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.1.1.8. This attribute shall be present only when feature negotiation is required.	

6.1.1.6.2.3 Type: SpatialAnchorsListPatch

Table 6.1.1.6.2.3-1: Definition of type SpatialAnchorsListPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
valServInfo	VALServiceInfo	O	0..1	Contains the updated application service information associated with the Spatial Anchors List.	
anchors	map(SpatialAnchorRm)	O	1..N	Contains the updated list of spatial anchor(s) constituting the Spatial Anchor List. The key of the map shall be set to the value of the "anchorId" attribute of the corresponding map value encoded using the SpatialAnchorRm data structure.	

6.1.1.6.2.4 Type: VALServiceInfo

Table 6.1.1.6.2.4-1: Definition of type VALServiceInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceId	string	M	1	Contains the identifier of the application service.	
endPt	EndPoint	M	1	Contains the endpoint information to be used to communicate with the application service.	
servConInfo	ServConnectInfo	O	0..1	Contains the connection information to be used to establish connectivity to the application service.	

6.1.1.6.2.5 Type: ServConnectInfo

Table 6.1.1.6.2.5-1: Definition of type ServConnectInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
dnais	array(Dnai)	C	1..N	Contains the target DNAI(s). (NOTE)	
dnn	Dnn	C	0..1	Contains the target DNN. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.1.6.2.6 Type: SpatialAnchor

Table 6.1.1.6.2.6-1: Definition of type SpatialAnchor

Attribute name	Data type	P	Cardinality	Description	Applicability
anchorId	SpatialAnchorId	C	0..1	Contains the identifier of the spatial anchor. This attribute shall always be present except in a Spatial Anchors List creation request.	
posInfo	PositionInfo	M	1	Contains the position related information of the spatial anchor.	
specInfo	Bytes	O	0..1	Contains a container for application specific information of the spatial anchor.	
svcArea	ServiceArea	O	0..1	Contains the service area where the spatial anchor is accessible.	
rules	AllowedRules	O	0..1	Contains the information of the entities allowed to discover the spatial anchor.	

6.1.1.6.2.7 Type: SpatialAnchorRm

This data structure is defined in the same way as the SpatialAnchor data structure defined in clause 6.1.1.6.2.6 but with the OpenAPI "nullable" property set to "true".

6.1.1.6.2.8 Type: AllowedRules

Table 6.1.1.6.2.8-1: Definition of type AllowedRules

Attribute name	Data type	P	Cardinality	Description	Applicability
allowedEntities	array(AllowedEntity)	C	1..N	Contains the list of the entities that are allowed to discover the spatial anchor. (NOTE)	
valServiceList	array(string)	C	1..N	Contains list of the VAL service ID(s) and/or the application service ID(s) of the entity(ies) that are allowed to discover the spatial anchor. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.1.6.2.9 Type: AllowedEntity

Table 6.1.1.6.2.9-1: Definition of type AllowedEntity

Attribute name	Data type	P	Cardinality	Description	Applicability
type	EntityType	C	0..1	Contains the entity's type. (NOTE)	
identifier	string	C	0..1	Contains the identifier of the entity. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.1.6.2.10 Type: PositionInfo

Table 6.1.1.6.2.10-1: Definition of type PositionInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
pos	Local3dPointUncertaintyEllipsoid	C	0..1	The 3D position of the spatial anchor in space (e.g., x, y and z coordinates). (NOTE)	
spaMapPos	SpatialAnchorMapPosition	C	0..1	Contains position information of the spatial anchor within the spatial map. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.1.6.2.11 Type: SpatialAnchorsSub

Table 6.1.1.6.2.11-1: Definition of type SpatialAnchorsSub

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(AnchorEventsSub)	M	1..N	Contains the spatial anchors events subscription details.	
notifUri	Uri	M	1	Contains the URI via which notifications shall be delivered.	
report	SpatialAnchorsNotif	C	0..1	Contains the Spatial Anchors related event(s) report(s). This attribute shall be present only if immediate reporting was requested and the outputs are available.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the absolute time at which the subscription is to expire.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.1.1.6.2.12 Type: SpatialAnchorsSubPatch

Table 6.1.1.6.2.12-1: Definition of type SpatialAnchorsSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(AnchorEventsSub)	O	1..N	Contains the spatial anchors events subscription details to be modified.	
notifUri	Uri	O	0..1	Contains the updated URI via which notifications shall be delivered.	
reportReq	ReportingInformation	O	0..1	Contains the updated reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the expiration time at which the subscription is to expire.	

6.1.1.6.2.13 Type: SpatialAnchorsNotif

Table 6.1.1.6.2.13-1: Definition of type SpatialAnchorsNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subId	string	M	1	Contains the identifier of the spatial anchor event subscription.	
reports	array(AnchorsReport)	M	1..N	Contains the Spatial Anchors related event(s) report(s).	

6.1.1.6.2.14 Type: AnchorsReport

Table 6.1.1.6.2.14-1: Definition of type AnchorsReport

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AnchorEvent	M	1	Contains the spatial anchor event.	
detEvent	DetectedEvent	O	0..1	Contains the identifier of the event that triggered the server to send a notification.	
achrList	array(SpatialAnchorProfile)	C	1..N	Contains the list of discovered spatial anchor(s). This attribute shall be present only when the reported event within the "event" attribute is "ANCHOR_DISCOVERY" or "SPATIAL_ANCHOR_IN_RANGE" .	
ueAnchrInt	array(UEAnchorInterest)	C	1..N	Contains the list of UE(s) with spatial anchor interest. This attribute shall be present only when the reported event within the "event" attribute is "UE_SPATIAL_ANCHOR_INTEREST" or "SPATIAL_ANCHOR_IN_RANGE" .	

6.1.1.6.2.15 Type: UEAnchorInterest

Table 6.1.1.6.2.15-1: Definition of type UEAnchorInterest

Attribute name	Data type	P	Cardinality	Description	Applicability
ueld	string	C	0..1	Contains the identifier of the UE with spatial anchor interest. (NOTE)	
anchrId	SpatialAnchorId	C	0..1	Contains the identifier of the spatial anchor of interest. (NOTE)	
anchrRng	Float	C	0..1	Contains the spatial anchor range. Minimum: 0 (NOTE)	

NOTE: At least one of these attributes shall be present.

6.1.1.6.2.16 Type: AnchorsEventsSub

Table 6.1.1.6.2.16-1: Definition of type AnchorsEventsSub

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AnchorEvent	M	1	Contains the Spatial Anchor event.	
evntFiltr	EventFilter	M	1	Contains the detection filters for the Spatial Anchor event.	

6.1.1.6.2.17 Type: EventFilter

Table 6.1.1.6.2.17-1: Definition of type EventFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
discFiltr	DiscoveryFilter	C	0..1	Contains the discovery event filters. This attribute shall be present only for the "ANCHOR_DISCOVERY" event.	
ueFiltr	UeFilter	C	0..1	Contains the UE with spatial anchor interest event filters. This attribute shall be present for the "UE_SPATIAL_ANCHOR_INTEREST" event.	
rngFiltr	RangeFilter	C	0..1	Contains the spatial anchor in range event filters. This attribute shall be present for the "SPATIAL_ANCHOR_IN_RANGE" event.	
anchrFiltr	AnchorFilter	C	0..1	Contains the applicable spatial anchors characteristics. This attribute shall be present for the "ANCHOR_DISCOVERY" and "UE_SPATIAL_ANCHOR_INTEREST" events.	

6.1.1.6.2.18 Type: DiscoveryFilter

Table 6.1.1.6.2.18-1: Definition of type DiscoveryFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
mgntEvts	array(AnchorManagementEvent)	M	1..N	Contains the spatial anchor management events.	

6.1.1.6.2.19

Type: UeFilter

Table 6.1.1.6.2.19-1: Definition of type UeFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
rngVal	Float	M	1	Contains the range value to detect UEs that are within or out of range of spatial anchors, expressed in meters. Minimum = 0	
disc	boolean	O	0..1	Indicates whether the UEs that have discovered spatial anchors are to be included in the event report. - "true" indicates to include UEs that discovered the spatial anchors. - "false" indicates to not include UEs that discovered the spatial anchors. - The default value is "false" if omitted.	

6.1.1.6.2.20

Type: RangeFilter

Table 6.1.1.6.2.20-1: Definition of type RangeFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
perSrch	boolean	O	0..1	Contains the persistent search preference. - "true" indicates to enable persistent search. - "false" indicates not to enable persistent search. - The default value is "false" if omitted.	
usrLoc	LocationInfo	O	0..1	Contains the current location and direction of the user.	
pose	Pose	O	0..1	Contains the current pose of the user.	
appRng	Float	M	1	Contains the range within which the spatial anchors are monitored to be in range or out of range of the subscriber's field of view, expressed in centimetres. Minimum = 0	

6.1.1.6.2.21

Type: AnchorFilter

Table 6.1.1.6.2.21-1: Definition of type AnchorFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
anchIds	array(SpatialAnchorId)	C	1..N	Contains the identifier(s) of the spatial anchors of interest. (NOTE)	
svcIds	array(string)	C	1..N	Contains the identifier(s) of the associated application service(s) of interest. (NOTE)	
areaInt	ServiceArea	C	0..1	Contains the area of interest. (NOTE)	

NOTE: At least one of these attributes shall be present.

6.1.1.6.2.22 Type: SpatialAnchorMapPosition

Table 6.1.1.6.2.22-1: Definition of type SpatialAnchorMapPosition

Attribute name	Data type	P	Cardinality	Description	Applicability
spaMapId	string	M	1	Contains the Spatial Map identifier.	
spaMapLayerIds	array(string)	O	1..N	Contains the identifier(s) of Spatial Map layer(s).	
localInfo	LocalizationInfo	O	0..1	Contains the localization information specific to the spatial map.	

6.1.1.6.2.23 Type: LocalizationInfo

Table 6.1.1.6.2.23-1: Definition of type LocalizationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
info	string	M	1	Contains the localization information specific to the spatial map.	

6.1.1.6.2.24 Type: SpatialAnchorProfile

Table 6.1.1.6.2.24-1: Definition of type SpatialAnchorProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
anchInfo	SpatialAnchor	M	1	Represents the spatial anchor information.	
valSvcInf	ValServiceInfo	M	1	Represents the VAL service information.	

6.1.1.6.2.25 Type: Pose

Table 6.1.1.6.2.25-1: Definition of type Pose

Attribute name	Data type	P	Cardinality	Description	Applicability
orientation	Orientation	M	1	Representation the orientation of the Pose.	
position	Local3dPointUncertaintyEllipsoid	O	0..1	Represents the position of the pose relative to the spatial Map.	
fov	Fov	O	0..1	Represents the four sides of the field of view used for the projection of the corresponding Spatial map.	

6.1.1.6.2.26 Type: Orientation

Table 6.1.1.6.2.26-1: Definition of type Orientation

Attribute name	Data type	P	Cardinality	Description	Applicability
x	Float	M	1	Represents the X coordinate of the quaternion, expressed in centimetres. Minimum = 0.	
y	Float	M	1	Represents the Y coordinate of the quaternion, expressed in centimetres. Minimum = 0.	
z	Float	M	1	Represents the Z coordinate of the quaternion, expressed in centimetres. Minimum = 0.	
w	Angle	M	1	Represents the W coordinate of the quaternion.	

6.1.1.6.2.27 Type: Fov

Table 6.1.1.6.2.27-1: Definition of type Fov

Attribute name	Data type	P	Cardinality	Description	Applicability
angleLeft	Angle	M	1	Represents the angle of the left side of the field of view.	
angleRight	Angle	M	1	Represents the angle of the right side of the field of view.	
angleUp	Angle	M	1	Represents the angle of the top part of the field of view.	
angleDown	Angle	M	1	Represents the angle of the bottom part of the field of view.	

6.1.1.6.3 Simple data types and enumerations

6.1.1.6.3.1 Introduction

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

6.1.1.6.3.2 Simple data types

The simple data types defined in table 6.1.1.6.3.2-1 shall be supported.

Table 6.1.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
SpatialAnchorId	Uint32	Represents the unique identifier of a Spatial Anchor.	
Angle	integer	Represents the value of the angles. Minimum = 0 Maximum = 360	

6.1.1.6.3.3 Enumeration: EntityType

The enumeration EntityType represents the type of entity. It shall comply with the provisions defined in table 6.1.1.6.3.3-1.

Table 6.1.1.6.3.3-1: Enumeration EntityType

Enumeration value	Description	Applicability
VAL_SERVER	Indicates that the entity type is a VAL Server.	
VAL_CLIENT	Indicates that the entity type is a VAL Client.	

6.1.1.6.3.4 Enumeration: AnchorEvent

The enumeration AnchorEvent represents the Spatial Anchors event. It shall comply with the provisions defined in table 6.1.1.6.3.4-1.

Table 6.1.1.6.3.4-1: Enumeration AnchorEvent

Enumeration value	Description	Applicability
ANCHOR_DISCOVERY	Indicates that the Spatial Anchors event is spatial anchor discovery.	
UE_SPATIAL_ANCHOR_INTEREST	Indicates that the Spatial Anchors event is the UE with spatial anchors interest.	
SPATIAL_ANCHOR_IN_RANGE	Indicates that the Spatial Anchors event is the spatial anchor in range.	

6.1.1.6.3.5 Enumeration: AnchorManagementEvent

The enumeration AnchorManagementEvent represents the spatial anchor management event. It shall comply with the provisions defined in table 6.1.1.6.3.5-1.

Table 6.1.1.6.3.5-1: Enumeration AnchorManagementEvent

Enumeration value	Description	Applicability
ANCHOR_CREATION	Indicates that the spatial anchor management event is spatial anchor creation.	
ANCHOR_UPDATE	Indicates that the spatial anchor management event is spatial anchor updation.	
ANCHOR_DELETION	Indicates that the spatial anchor management event is spatial anchor deletion.	

6.1.1.6.3.6 Enumeration: DetectedEvent

The enumeration DetectedEvent represents the detected event that triggers the notification. It shall comply with the provisions defined in table 6.1.1.6.3.6-1.

Table 6.1.1.6.3.6-1: Enumeration DetectedEvent

Enumeration value	Description	Applicability
ANCHOR_IN_RANGE_OF_UE	Indicates that the triggered event is spatial anchor in range of the UE.	
ANCHOR_OUT_RANGE_OF_UE	Indicates that the triggered event is spatial anchor out of range of the UE.	
UE_IN_RANGE_OF_ANCHOR	Indicates that the triggered event is UE entering in the range of spatial anchor.	
UE_OUT_RANGE_OF_ANCHOR	Indicates that the triggered event is UE leaving the range of spatial anchor.	

6.1.1.6.4 Data types describing alternative data types or combinations of data types

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

6.1.1.6.5 Binary data

6.1.1.6.5.1 Binary Data Types

Table 6.1.1.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.1.1.7 Error Handling

6.1.1.7.1 General

For the SS_SAnManagement API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.1.1.7.2 Protocol Errors

No specific procedures for the SS_SAnManagement API are specified.

6.1.1.7.3 Application Errors

The application errors defined for the SS_SAnManagement API are listed in Table 6.1.1.7.3-1.

Table 6.1.1.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.1.8 Feature negotiation

The optional features in table 6.1.1.8-1 are defined for the SS_SAnManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.1.1.8-1: Supported Features

Feature number	Feature Name	Description
n/a		

6.1.1.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SAnManagement API.

6.1.2 SS_SAnDiscovery API

6.1.2.1 Introduction

The SS_SAnDiscovery shall use the SS_SAnDiscovery API.

The API URI of the SS_SAnDiscovery API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssan-disc".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.2.3 and 6.1.2.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.2, the SAn Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.2.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SAnDiscovery API.

6.1.2.3 Resources

6.1.2.3.1 Overview

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

Figure 6.1.2.3.1-1 depicts the resource URIs structure for the SS_SAnDiscovery API.

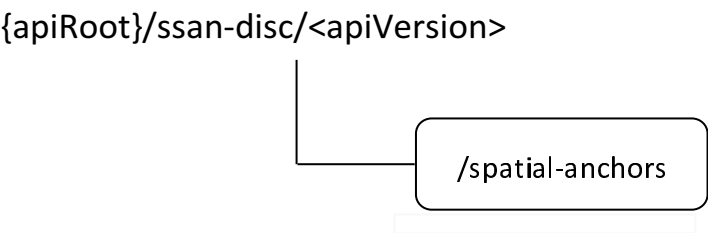


Figure 6.1.2.3.1-1: Resource URI structure of the SS_SAnDiscovery API

Table 6.1.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.2.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Anchors	/spatial-anchors	GET	Discover spatial anchor profiles.

6.1.2.3.2 Resource: Spatial Anchors

6.1.2.3.2.1 Description

This resource represents the collection of Spatial Anchors managed by the SAn Server.

6.1.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/ssan-disc/<apiVersion>/spatial-anchors**

This resource shall support the resource URI variables defined in table 6.1.2.3.2.2-1.

Table 6.1.2.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.2.1.

6.1.2.3.2.3 Resource Standard Methods

6.1.2.3.2.3.1 GET

The HTTP GET method allows a service consumer to discover Spatial Anchor(s) at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.2.3.2.3.1-1.

Table 6.1.2.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
anchor-ids	array(SpatialAnchorId)	C	1..N	Contains the identifier(s) of the targeted spatial anchor(s). (NOTE)	
area-int	ServiceArea	C	0..1	Contains the area of interest within which the targeted spatial anchor(s) are located. (NOTE)	
svc-id	string	C	0..1	Contains the identifier of the target VAL service. (NOTE)	
anch-inf	Bytes	C	0..1	Contains the application specific information of the targeted spatial anchor(s). (NOTE)	
supp-feats	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.1.2.8. This query parameter shall be present only when feature negotiation is required.	
NOTE: At least one of these query parameters shall be present.					

This method shall support the request data structures specified in table 6.1.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.2.3.2.3.1-3.

Table 6.1.2.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.2.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsDiscoveryResponse	M	1	200 OK	Successful case. The Spatial Anchor Profile(s) matching the query filter criteria 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 SAn 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 URI of the resource located in an alternative SAn Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.3.2.3.1-4: 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 SAn Server.

Table 6.1.2.3.2.3.1-5: 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 SAn Server.

6.1.2.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.1.2.4 Custom Operations without associated resources

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

6.1.2.5 Notifications

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

6.1.2.6 Data Model

6.1.2.6.1 General

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

Table 6.1.2.6.1-1 specifies the data types defined for the SS_SAnDiscovery API.

Table 6.1.2.6.1-1: SS_SAnDiscovery API specific Data Types

Data type	Clause defined	Description	Applicability
SpatialAnchorsDiscResp	6.1.2.6.2.2	Represents the spatial anchors discovery response.	

Table 6.1.2.6.1-2 specifies data types re-used by the SS_SAnDiscovery API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SAnDiscovery API.

Table 6.1.2.6.1-2: SS_SAnDiscovery API re-used Data Types

Data type	Reference	Comments	Applicability
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SpatialAnchorId	6.1.1.6.3.2	Represents the identifier of a Spatial Anchor.	
SpatialAnchorProfile	6.1.1.6.2.24	Represents the Spatial Anchor profile information.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

6.1.2.6.2 Structured data types

6.1.2.6.2.1 Introduction

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

6.1.2.6.2.2 Type: SpatialAnchorsDiscResp

Table 6.1.2.6.2.2-1: Definition of type SpatialAnchorsDiscResp

Attribute name	Data type	P	Cardinality	Description	Applicability
results	array(SpatialAnchorProfile)	M	0..N	Contains the profile(s) of the spatial anchor(s) matching the provided discovery filter criteria. If there are no spatial anchor(s) matching the provided discovery filter criteria, an empty array shall be returned within this attribute.	
supFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.1.2.8. This attribute shall be present only when feature negotiation is required.	

6.1.2.6.3 Simple data types and enumerations

6.1.2.6.3.1 Introduction

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

6.1.2.6.3.2 Simple data types

The simple data types defined in table 6.1.2.6.3.2-1 shall be supported.

Table 6.1.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.2.6.4 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.

6.1.2.6.5 Binary data

6.1.2.6.5.1 Binary Data Types

Table 6.1.2.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.1.2.7 Error Handling

6.1.2.7.1 General

For the SS_SAnDiscovery API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.1.2.7.2 Protocol Errors

No specific procedures for the SS_SAnDiscovery API are specified.

6.1.2.7.3 Application Errors

The application errors defined for the SS_SAnDiscovery API are listed in Table 6.1.2.7.3-1.

Table 6.1.2.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.2.8 Feature negotiation

The optional features in table 6.1.2.8-1 are defined for the SS_SAnDiscovery API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.1.2.8-1: Supported Features

Feature number	Feature Name	Description
n/a		

6.1.2.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SAnDiscovery API.

6.1.3 SS_SAnUsage API

6.1.3.1 Introduction

The SS_SAnUsageInfo and SS_SAnUsageReport services shall use the SS_SAnUsage API.

The API URI of the SS_SAnUsage API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssan-usg".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.3.3 and 6.1.3.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.3, the SAn Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.3.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SAnUsage API.

6.1.3.3 Resources

6.1.3.3.1 Overview

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

Figure 6.1.3.3.1-1 depicts the resource URIs structure for the SS_SAnUsage API.

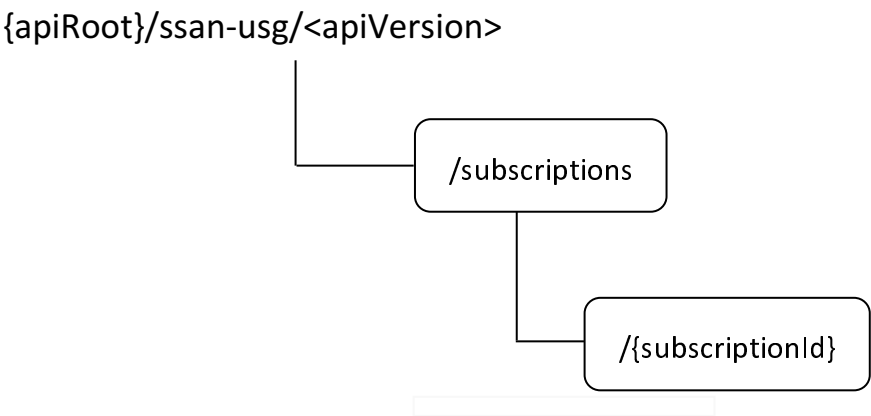


Figure 6.1.3.3.1-1: Resource URI structure of the SS_SAnUsage API

Table 6.1.3.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Anchors Usage Information Subscriptions	/subscriptions	POST	Create a new Spatial Anchors Usage Information Subscription.
Individual Spatial Anchors Usage Information Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual Spatial Anchors Usage Information Subscription" resource.
		PUT	Update an existing "Individual Spatial Anchors Usage Information Subscription" resource.
		PATCH	Modify an existing "Individual Spatial Anchors Usage Information Subscription" resource.
		DELETE	Delete an existing "Individual Spatial Anchors Usage Information Subscription" resource.

6.1.3.3.2 Resource: Spatial Anchors Usage Information Subscriptions

6.1.3.3.2.1 Description

This resource represents the collection of Spatial Anchors Usage Information Subscriptions managed by the SAn Server.

6.1.3.3.2.2 Resource Definition

Resource URI: **{apiRoot}/ssan-usg/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.1.3.3.2.2-1.

Table 6.1.3.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.3.1

6.1.3.3.2.3 Resource Standard Methods

6.1.3.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Spatial Anchors Usage Information Subscription at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.3.3.2.3.1-1.

Table 6.1.3.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.3.2.3.1-3.

Table 6.1.3.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsUsageInfoSub	M	1	Represents the parameters to request the creation of a new Spatial Anchors Usage Information Subscription.

Table 6.1.3.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsUsageInfoSub	M	1	201 Created	Successful case. The Spatial Anchors Usage Information Subscription is successfully created and a representation of the created "Individual Spatial Anchors Usage Information Subscription" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.3.2.3.1-4: 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}/ssan-usg/<apiVersion>/subscriptions/{subscriptionId}

6.1.3.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.1.3.3.3 Resource: Individual Spatial Anchors Usage Information Subscription

6.1.3.3.3.1 Description

This resource represents an Individual Spatial Anchors Usage Information Subscription managed by the SAn Server.

6.1.3.3.3.2 Resource Definition

Resource URI: {apiRoot}/ssan-usg/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.3.3.3.2-1.

Table 6.1.3.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.3.1.
subscriptionId	string	Represents the identifier of the "Individual Spatial Anchors Usage Information Subscription" resource.

6.1.3.3.3.3 Resource Standard Methods

6.1.3.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Spatial Anchors Usage Information Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in table 6.1.3.3.3.3.1-1.

Table 6.1.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.3.3.3.1-3.

Table 6.1.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsUsageInfoSub	M	1	200 OK	Successful case. The requested "Individual Spatial Anchors Usage Information Subscription" 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 SAn 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 URI of the resource located in an alternative SAn Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.3.3.1-4: 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 SAn Server.

Table 6.1.3.3.3.1-5: 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 SAn Server.

6.1.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Spatial Anchors Usage Information Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.3.3.3.2-1.

Table 6.1.3.3.3.2-1: 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 6.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.3.3.3.2-3.

Table 6.1.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsUsageInfoSub	M	1	Represents the updated representation of the "Individual Spatial Anchors Usage Information Subscription" resource.

Table 6.1.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsUsageInfoSub	M	1	200 OK	Successful case. The "Individual Spatial Anchors Usage Information Subscription" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors Usage Information 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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAN Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.3.3.2-4: 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 SAN Server.

Table 6.1.3.3.3.2-5: 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 SAN Server.

6.1.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Spatial Anchors Usage Information Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.3.3.3.3-1.

Table 6.1.3.3.3.3-1: 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 6.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.3.3.3.3-3.

Table 6.1.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorsUsageInfoSubPatch	M	1	Represents the parameters to request the modification of the "Individual Spatial Anchors Usage Information Subscription" resource.

Table 6.1.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialAnchorsUsageInfoSub	M	1	200 OK	Successful case. The "Individual Spatial Anchors Usage Information Subscription" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Anchors Usage Information Subscription" 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.3.3.3-4: 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 SAn Server.

Table 6.1.3.3.3.3-5: 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 SAn Server.

6.1.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Spatial Anchors Usage Information Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.1.3.3.3.4-1.

Table 6.1.3.3.3.4-1: 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 6.1.3.3.3.4-2 and the response data structures and response codes specified in table 6.1.3.3.3.4-3.

Table 6.1.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.3.3.3.4-3: 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 Spatial Anchors Usage Information 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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SAn Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.3.3.4-4: 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 SEAL SAn server.

Table 6.1.3.3.3.4-5: 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 SEAL SAn server.

6.1.3.3.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification

6.1.3.4 Custom Operations without associated resources

6.1.3.4.1 Overview

The structure of the custom operation URIs of the SS_SAnUsage API is shown in Figure 6.1.3.4.1-1.

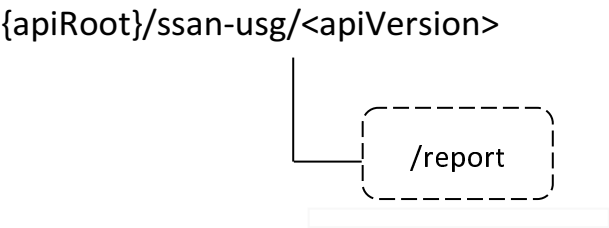


Figure 6.1.3.4.1-1: Custom operation URI structure of the SS_SAnUsage API

Table 6.1.3.4.1-1: Custom operations without associated resources

Custom operation Name	Custom operation URI	Mapped HTTP method	Description
Report	/report	POST	Enables a service consumer to report the spatial anchor usage information.

6.1.3.4.2 Operation: Report

6.1.3.4.2.1 Description

The custom operation enables a service consumer to report the spatial anchor usage information to the SAn server.

6.1.3.4.2.2 Operation Definition

This operation shall support the response data structures and response codes specified in tables 6.1.3.4.2.2-1 and 6.1.3.4.2.2-2.

Table 6.1.3.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialAnchorUsageReportReq	M	1	Contains the reported spatial anchor usage information.

Table 6.1.3.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The reported spatial anchor usage information 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 SAn 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 SAn Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.4.2.2-3: 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 SAn Server.

Table 6.1.3.4.2.2-4: 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 SAn Server.

6.1.3.5 Notifications

6.1.3.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [17].

Table 6.1.3.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Spatial Anchors Usage Information Notification	{notifUri}	POST	Enables the SAn Server to notify a previously subscribed service consumer on Spatial Anchors Usage Information.

6.1.3.5.2 Spatial Anchors Usage Information Notification

6.1.3.5.2.1 Description

The Spatial Anchors Notification is used by the SAn Server to notify a previously subscribed service consumer on Spatial Anchors Usage Information.

6.1.3.5.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 6.1.3.5.2.1.2-1.

Table 6.1.3.5.2.1.2-1: Callback URI variables

Name	Definition
notifUri	String formatted as URI with the Callback Uri

6.1.3.5.2.3 Standard Methods

6.1.3.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.3.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.3.5.2.3.1-1.

Table 6.1.3.5.2.3.1-2: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
SpatialAnchorsUsageInfoNotif	M	1	Contains the Spatial Anchors Usage Information Notification.

Table 6.1.3.5.2.3.1-3: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Spatial Anchors 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 service consumer where the notification should be sent. 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 URI representing the end point of an alternative service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.3.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.3.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.1.3.6 Data Model

6.1.3.6.1 General

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

Table 6.1.3.6.1-1 specifies the data types defined for the SS_SAnUsage API.

Table 6.1.3.6.1-1: SS_SAnUsage API specific Data Types

Data type	Clause defined	Description	Applicability
AnchorsUsageFilter	6.1.3.6.2.6	Represents the spatial anchors usage filter information.	
AnchorUsage	6.1.3.6.2.11	Represents the anchor usage information reported.	
AnchorUsageEvent	6.1.3.6.3.3	Represents the spatial anchors usage information event.	
AnchorsUsageEventFilter	6.1.3.6.2.5	Represents the filter information for anchors usage event.	
AnchorsUsageInfo	6.1.3.6.2.9	Represents the anchor usage details.	
AnchorsUsageSub	6.1.3.6.2.4	Represent the subscription details related to spatial anchor usage.	
SpatialAnchorsUsageInfoNotif	6.1.3.6.2.7	Represents the spatial anchors usage information notification.	
SpatialAnchorsUsageInfoSub	6.1.3.6.2.2	Represents the spatial anchors usage information subscription.	
SpatialAnchorsUsageInfoSubPatch	6.1.3.6.2.3	Represents the spatial anchors usage information subscription patch.	
SpatialAnchorsUsageReport	6.1.3.6.2.8	Represents the usage report in the notification.	
SpatialAnchorsUsageReportReq	6.1.3.6.2.10	Represents the request for spatial anchor usage report.	

Table 6.1.3.6.1-2 specifies data types re-used by the SS_SAnUsage API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SAnUsage API.

Table 6.1.3.6.1-2: SS_SAnUsage API re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
DurationSec	3GPP TS 29.122 [2]	Represents a period of time in units of seconds.	
LocationInfo	3GPP TS 29.122 [2]	Represents the location information.	
ReportingInformation	3GPP TS 29.523 [19]	Represents the reporting requirements information.	
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SpatialAnchorId	6.1.1.6.3.2	Represents the Spatial Anchor identifier.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
TimeWindow	3GPP TS 29.122 [2]	Represents a time window.	
Uri	3GPP TS 29.122 [2]	Represent a URI.	

6.1.3.6.2 Structured data types

6.1.3.6.2.1 Introduction

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

6.1.3.6.2.2 Type: SpatialAnchorsUsageInfoSub

Table 6.1.3.6.2.2-1: Definition of type SpatialAnchorsUsageInfoSub

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(AnchorsUsageSub)	M	1..N	Contains the spatial anchors usage information subscription details.	
notifUri	Uri	C	0..1	Contains the URI via which notifications shall be delivered. This attribute shall be present unless one-time immediate reporting is requested as per the procedure defined in clause 5.2.3.2.2.3.	
report	SpatialAnchorsUsageInfoNotif	C	0..1	Contains the Spatial Anchors Usage Information related report(s). This attribute shall be present only if the immediate and one time reporting was requested and the outputs are available.	
sampInt	DurationSec	O	0..1	Indicates the interval to sample the spatial anchor(s) related information.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the absolute time at which the subscription is to expire.	
supFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.1.3.6.2.3 Type: SpatialAnchorsUsageInfoSubPatch

Table 6.1.3.6.2.3-1: Definition of type SpatialAnchorsUsageInfoSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(AnchorsUsageSub)	O	1..N	Contains the spatial anchors usage information subscription details.	
notifUri	Uri	O	0..1	Contains the URI via which notifications shall be delivered.	
sampInt	DurationSec	O	0..1	Indicates the interval to sample the spatial anchor(s) related information.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the absolute time at which the subscription is to expire.	

6.1.3.6.2.4 Type: AnchorsUsageSub

Table 6.1.3.6.2.4-1: Definition of type AnchorsUsageSub

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AnchorUsageEvent	M	1	Contains the Spatial Anchor usage information event.	
evntFiltr	AnchorsUsageEventFilter	M	1	Contains the filters for the Spatial Anchor usage information event.	

6.1.3.6.2.5 Type: AnchorsUsageEventFilter

Table 6.1.3.6.2.5-1: Definition of type AnchorsUsageEventFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
anchAnlFiltr	AnchorsUsageFilter	C	0..1	Contains the Spatial Anchor usage information event. This attribute shall be present for the "SPATIAL_ANCHOR_USAGE_INFORMATION" event.	

6.1.3.6.2.6 Type: AnchorsUsageFilter

Table 6.1.3.6.2.6-1: Definition of type AnchorsUsageFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
anchIds	array(SpatialAnchorId)	C	1..N	Contains the identities of the spatial anchors. (NOTE)	
anchLoc	LocationInfo	C	0..1	Contains the spatial anchor location information. (NOTE)	
area	ServiceArea	C	0..1	Contains the area information. (NOTE)	
appld	string	C	0..1	Contains the application service identifier. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.3.6.2.7 Type: SpatialAnchorsUsageInfoNotif

Table 6.1.3.6.2.7-1: Definition of type SpatialAnchorsUsageInfoNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subId	string	M	1	Contains the identifier of the spatial anchor event subscription.	
reports	array(SpatialAnchorsUsageReport)	M	1..N	Contains the spatial anchors usage information reports.	

6.1.3.6.2.8 Type: SpatialAnchorsUsageReport

Table 6.1.3.6.2.8-1: Definition of type SpatialAnchorsUsageReport

Attribute name	Data type	P	Cardinality	Description	Applicability
event	AnchorUsageEvent	M	1	Contains the spatial anchor usage information event.	
anchUsgInf	array(AnchorUsageInfo)	C	1..N	Contains the spatial anchors usage information details. This attribute shall be present for the "SPATIAL_ANCHOR_USAGE_INFORMATION" event.	

6.1.3.6.2.9 Type: AnchorsUsageInfo

Table 6.1.3.6.2.9-1: Definition of type AnchorsUsageInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
anchIds	array(SpatialAnchorId)	M	1..N	Contains the identities of the spatial anchors.	
discAcc	UInteger	M	1	Contains the number of times the spatial anchors was discovered.	
serAcc	UInteger	M	1	Contains the number of times the spatial anchors services were accessed.	
anchDensity	UInteger	M	1	Contains the number of the spatial anchor in the given area.	
usrDensity	UInteger	M	1	Contains the number of users within proximity to the spatial anchors.	

6.1.3.6.2.10 Type: SpatialAnchorUsageReportReq

Table 6.1.3.6.2.10-1: Definition of type SpatialAnchorUsageReportReq

Attribute name	Data type	P	Cardinality	Description	Applicability
anchUsg	array(AnchorUsage)	M	1..N	Contains the list of usage information of the spatial anchors.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.1.3.8. This attribute shall be present only when feature negotiation is required.	

6.1.3.6.2.11 Type: AnchorUsage

Table 6.1.3.6.2.11-1: Definition of type AnchorUsage

Attribute name	Data type	P	Cardinality	Description	Applicability
anchId	SpatialAnchorId	M	1	Contains the identifier of the spatial anchor.	
access	UInteger	M	1	Contains the number of times the spatial anchor was accessed.	
repPer	TimeWindow	O	0..1	Contains the time period for which the value of the "access" attribute applies. If omitted, then the value of the "access" attribute corresponds to the number of times the spatial anchor was accessed since the last spatial anchor usage report.	

6.1.3.6.2.12 Type: SpatialAnchorsUsageInfo

Table 6.1.3.6.2.12-1: Definition of type SpatialAnchorsUsageInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
reports	array(SpatialAnchorsUsageReport)	M	0..N	Contains the spatial anchors usage information report(s). If there are no available spatial anchors usage information report(s) matching the filtering criteria provided in the corresponding request, an empty array shall be provided within this attribute.	
supFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.1.3.8. This attribute shall be present only when feature negotiation is required.	

6.1.3.6.3 Simple data types and enumerations

6.1.3.6.3.1 Introduction

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

6.1.3.6.3.2 Simple data types

The simple data types defined in table 6.1.3.6.3.2-1 shall be supported.

Table 6.1.3.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.3.6.3.3 Enumeration: AnchorUsageEvent

The enumeration AnchorUsageEvent represents the Spatial Anchor usage event. It shall comply with the provisions defined in table 6.1.3.6.3.3-1.

Table 6.1.3.6.3.3-1: AnchorUsageEvent

Enumeration value	Description	Applicability
SPATIAL_ANCHOR_USAGE_INFORMATION	Indicates that the event is related to spatial anchors usage.	

6.1.3.6.4 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.

6.1.3.6.5 Binary data

6.1.3.6.5.1 Binary Data Types

Table 6.1.3.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.1.3.7 Error Handling

6.1.3.7.1 General

For the SS_SAnUsage API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.1.3.7.2 Protocol Errors

No specific procedures for the SS_SAnUsage API are specified.

6.1.3.7.3 Application Errors

The application errors defined for the SS_SAnUsage API are listed in Table 6.1.3.7.3-1.

Table 6.1.3.7.3-1: Application errors

Application Error	HTTP status code	Description

6.1.3.8 Feature negotiation

The optional features in table 6.1.3.8-1 are defined for the SS_SAnUsage API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.1.3.8-1: Supported Features

Feature number	Feature Name	Description

6.1.3.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SAnUsage API.

6.2 Spatial Map Server APIs

6.2.1 SS_SmManagement API

6.2.1.1 Introduction

The SS_SmManagement service shall use the SS_SmManagement API.

The API URI of the SS_SmManagement API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssm-smm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.2.1.3 and 6.2.1.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.2.1, the SM server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.2.1.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SmManagement API.

6.2.1.3 Resources

6.2.1.3.1 Overview

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

Figure 6.2.1.3.1-1 depicts the resource URIs structure for the SS_SmManagement API.

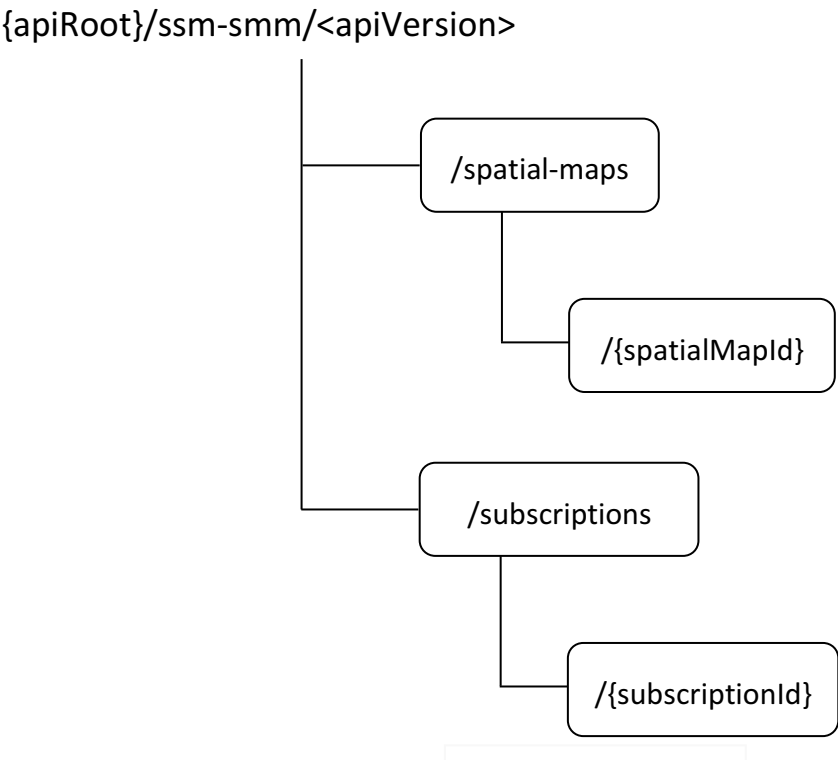


Figure 6.2.1.3.1-1: Resource URI structure of the SS_SmManagement API

Table 6.2.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.1.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Maps	/spatial-maps	POST	Create a new Spatial Map.
		GET	Retrieve spatial map information.
Individual Spatial Map	/spatial-maps/{spatialMapId}	GET	Retrieve an existing "Individual Spatial Map" resource.
		PUT	Update an existing "Individual Spatial Map" resource.
		PATCH	Modify an existing "Individual Spatial Map" resource.
		DELETE	Delete an existing "Individual Spatial Map" resource.
Spatial Maps Subscriptions	/subscriptions	POST	Create a new Spatial Maps Subscription.
Individual Spatial Maps Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual Spatial Maps Subscription" resource.
		PUT	Update an existing "Individual Spatial Maps Subscription" resource.
		PATCH	Modify an existing "Individual Spatial Maps Subscription" resource.
		DELETE	Delete an existing "Individual Spatial Maps Subscription" resource.

6.2.1.3.2 Resource: Spatial Maps

6.2.1.3.2.1 Description

This resource represents the collection of Spatial Maps managed by the SM Server.

6.2.1.3.2.2 Resource Definition

Resource URI: {apiRoot}/ssm-smm/<apiVersion>/spatial-maps

This resource shall support the resource URI variables defined in table 6.2.1.3.2.2-1.

Table 6.2.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1

6.2.1.3.2.3 Resource Standard Methods

6.2.1.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Spatial Map at the SM Server.

This method shall support the URI query parameters specified in table 6.2.1.3.2.3.1-1.

Table 6.2.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.1.3.2.3.1-3.

Table 6.2.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialMapCreate Req	M	1	Represents the parameters to request the creation of a new Spatial Map.

Table 6.2.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMap	M	1	201 Created	Successful case. The Spatial Map is successfully created and a representation of the created "Individual Spatial Map" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
SpatialMapTemp Resp	M	1	202 Accepted	Successful case. The SM server has accepted the request and processing it. The assigned Spatial Map Identifier shall be returned.
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.2.3.1-4: 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}/ssm-smm/<apiVersion>/spatial-maps/{spatialMapId}

6.2.1.3.2.3.2 GET

The HTTP GET method allows a service consumer to retrieve a spatial map information from the SM Server.

This method shall support the URI query parameters specified in table 6.2.1.3.2.3.2-1.

Table 6.2.1.3.2.3.2-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
svc-id	string	M	1	Contains the VAL application service identifier.	
map-id	SpatialMapId	M	1	Contains the identifier of the spatial map.	
map-layer-list	SpatialMapLayers	O	0..1	Contains a list of spatial map layers.	
aug-with	AugmentLayerList	O	0..1	Contains the information augmented with the spatial map layers.	

This method shall support the request data structures specified in table 6.2.1.3.2.3.2-2 and the response data structures and response codes specified in table 6.2.1.3.2.3.2-3.

Table 6.2.1.3.2.3.2-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.2.3.2-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapRetResp	M	1	200 OK	Successful case. The requested spatial map information 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.2.3-4: 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 SM Server.

Table 6.2.1.3.2.3-5: 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 SM Server.

6.2.1.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.1.3.3 Resource: Individual Spatial Map

6.2.1.3.3.1 Description

This resource represents a Spatial Map managed by the SM Server.

6.2.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/ssm-smm/<apiVersion>/spatial-maps/{spatialMapId}**

This resource shall support the resource URI variables defined in table 6.2.1.3.3.2-1.

Table 6.2.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1
spatialMapId	string	Represents the identifier of the "Individual Spatial Map" resource.

6.2.1.3.3.3 Resource Standard Methods

6.2.1.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Spatial Map" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.1.3.3.3.1-1.

Table 6.2.1.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.1-3.

Table 6.2.1.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMap	M	1	200 OK	Successful case. The requested "Individual Spatial Map" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.1-4: 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 SM Server.

Table 6.2.1.3.3.1-5: 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 SM Server.

6.2.1.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Spatial Map" resource at the SM Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.3.2-1.

Table 6.2.1.3.3.2-1: 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 6.2.1.3.3.2-2 and the response data structures and response codes specified in table 6.2.1.3.3.2-3.

Table 6.2.1.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpatialMap	M	1	Represents the updated representation of the "Individual Spatial Map" resource.

Table 6.2.1.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMap	M	1	200 OK	Successful case. The "Individual Spatial Map" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Map" 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.2-4: 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 SM Server.

Table 6.2.1.3.3.3.2-5: 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 SM Server.

6.2.1.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Spatial Map" resource at the SM Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.3.3.3-1.

Table 6.2.1.3.3.3.3-1: 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 6.2.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.3-3.

Table 6.2.1.3.3.3.4-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SpatialMapPatch	M	1	Represents the parameters to request the modification of the "Individual Spatial Map" resource.

Table 6.2.1.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMap	M	1	200 OK	Successful case. The "Individual Spatial Map" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Map" 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.3-4: 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 SM Server.

Table 6.2.1.3.3.3.3-5: 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 SM Server.

6.2.1.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Spatial Map" resource at the SM Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.3.3.4-1.

Table 6.2.1.3.3.3.4-1: 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 6.2.1.3.3.3.4-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.4-3.

Table 6.2.1.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.3.3.4-3: 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 Spatial Map" 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.4-4: 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 SEAL SM server.

Table 6.2.1.3.3.3.4-5: 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 SEAL SM server.

6.2.1.3.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.1.3.4 Resource: Spatial Maps Subscriptions

6.2.1.3.4.1 Description

This resource represents the collection of Spatial Maps Subscriptions managed by the SM Server.

6.2.1.3.4.2 Resource Definition

Resource URI: {apiRoot}/ssm-smm/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.2.1.3.4.2-1.

Table 6.2.1.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1.

6.2.1.3.4.3 Resource Standard Methods

6.2.1.3.4.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Spatial Maps Subscription at the SM Server.

This method shall support the URI query parameters specified in table 6.2.1.3.4.3.1-1.

Table 6.2.1.3.4.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.4.3.1-2 and the response data structures and response codes specified in table 6.2.1.3.4.3.1-3.

Table 6.2.1.3.4.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SpatialMapsSub	M	1	Represents the parameters to request the creation of a new Spatial Maps Subscription.

Table 6.2.1.3.4.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapsSub	M	1	201 Created	Successful case. The Spatial Maps Subscription is successfully created and a representation of the created "Individual Spatial Maps Subscription" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.4.3.1-4: 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}/ssm-smm/<apiVersion>/subscriptions/{subscriptionId}

6.2.1.3.4.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.1.3.5 Resource: Individual Spatial Maps Subscription

6.2.1.3.5.1 Description

This resource represents an Individual Spatial Maps Subscription managed by the SM Server.

6.2.1.3.5.2 Resource Definition

Resource URI: **{apiRoot}/ssm-smm/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.2.1.3.5.2-1.

Table 6.2.1.3.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1.
subscriptionId	string	Represents the identifier of the "Individual Spatial Maps Subscription" resource.

6.2.1.3.5.3 Resource Standard Methods

6.2.1.3.5.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Spatial Maps Subscription" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.1.3.5.3.1-1.

Table 6.2.1.3.5.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.5.3.1-2 and the response data structures and response codes specified in table 6.2.1.3.5.3.1-3.

Table 6.2.1.3.5.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.5.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapsSub	M	1	200 OK	Successful case. The requested "Individual Spatial Maps Subscription" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.5.3.1-4: 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 SM Server.

Table 6.2.1.3.5.3.1-5: 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 SM Server.

6.2.1.3.5.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Spatial Maps Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.5.3.2-1.

Table 6.2.1.3.5.3.2-1: 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 6.2.1.3.5.3.2-2 and the response data structures and response codes specified in table 6.2.1.3.5.3.2-3.

Table 6.2.1.3.5.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SpatialMapsSub	M	1	Represents the updated representation of the "Individual Spatial Maps Subscription" resource.

Table 6.2.1.3.5.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapsSub	M	1	200 OK	Successful case. The "Individual Spatial Maps Subscription" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Maps 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.5.3.2-4: 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 SM Server.

Table 6.2.1.3.5.3.2-5: 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 SM Server.

6.2.1.3.5.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Spatial Maps Subscription" resource at the SAn Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.5.3.3-1.

Table 6.2.1.3.5.3.3-1: 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 6.2.1.3.5.3.3-2 and the response data structures and response codes specified in table 6.2.1.3.5.3.3-3.

Table 6.2.1.3.5.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SpatialMapsSubPatch	M	1	Represents the parameters to request the modification of the "Individual Spatial Maps Subscription" resource.

Table 6.2.1.3.5.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapsSub	M	1	200 OK	Successful case. The "Individual Spatial Maps Subscription" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual Spatial Maps Subscription" 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.5.3.3-4: 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 SM Server.

Table 6.2.1.3.5.3.3-5: 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 SM Server.

6.2.1.3.5.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Spatial Maps Subscription" resource at the SM Server.

This method shall support the URI query parameters specified in the table 6.2.1.3.5.3.4-1.

Table 6.2.1.3.5.3.4-1: 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 6.2.1.3.5.3.4-2 and the response data structures and response codes specified in table 6.2.1.3.5.3.4-3.

Table 6.2.1.3.5.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.5.3.4-3: 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 Spatial Maps 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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
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 SM Server. Redirection handling is described in clause 5.2.10 of TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.5.3.4-4: 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 SEAL SM server.

Table 6.2.1.3.5.3.4-5: 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 SEAL SM server.

6.2.1.3.5.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification

6.2.1.4 Custom Operations without associated resources

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

6.2.1.5 Notifications

6.2.1.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [17].

Table 6.2.1.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Spatial Maps Notification	{notifUri}	POST	Enables the SM Server to notify a previously subscribed service consumer on Spatial Maps related event(s).

6.2.1.5.2 Spatial Maps Notification

6.2.1.5.2.1 Description

The Spatial Anchors Notification is used by the SM Server to notify a previously subscribed service consumer on Spatial Maps related event(s).

6.2.1.5.2.2 Target URI

The Callback URI "{notifUri}" shall be used with the callback URI variables defined in table 6.2.1.5.2.2-1.

Table 6.2.1.5.2.2-1: Callback URI variables

Name	Definition
notifUri	Represents the callback URI encoded as a string formatted as a URI.

6.2.1.5.2.3 Standard Methods

6.2.1.5.2.3.1 POST

This method shall support the request data structures specified in table 6.2.1.5.2.3.1-1 and the response data structures and response codes specified in table 6.2.1.5.2.3.1-1.

Table 6.2.1.5.2.3.1-2: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
SpatialMapsNotif	M	1	Contains the Spatial Maps Notification.

Table 6.2.1.5.2.3.1-3: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Spatial Maps 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 service consumer where the notification should be sent. 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 URI representing the end point of an alternative service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.1.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.2.1.6 Data Model

6.2.1.6.1 General

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

Table 6.2.1.6.1-1 specifies the data types defined for the SS_SmManagement API.

Table 6.2.1.6.1-1: SS_SmManagement API specific Data Types

Data type	Clause defined	Description	Applicability
AugmentLayer	6.2.1.6.3.3	Represents the information about layer augmentation.	
AugmentLayerInfo	6.2.1.6.2.4	Represents the augmented spatial map layer information.	
AugmentLayerList	6.2.1.6.2.22	Represents the list of augment layer values.	
EventFilter	6.2.1.6.2.16	Represents the event filters for spatial map events subscription.	
MapEvent	6.2.1.6.3.4	Represents the spatial map event.	
MapEventSub	6.2.1.6.2.14	Represents the spatial map event subscription details.	
MapLayerInfo	6.2.1.6.2.9	Represents the layer specific information of an spatial map layer.	
MapObjectChangeEvent	6.2.1.6.3.5	Represents the detected change in spatial map object.	
MapObjectChangeReport	6.2.1.6.2.20	Represents the map object change details.	
MapObjectInfo	6.2.1.6.2.10	Represents the spatial map object.	
MapsReport	6.2.1.6.2.19	Represents the spatial map event report details.	
SpatialMap	6.2.1.6.2.5	Represents the spatial map resource representation.	
SpatialMapCreateInfo	6.2.1.6.2.3	Represents the spatial map information to create.	
SpatialMapCreateReq	6.2.1.6.2.2	Represents the spatial map creation request.	
SpatialMapId	6.2.1.6.3.2	Represents the spatial map identifier.	
SpatialMapLayers	6.2.1.6.2.7	Represents the spatial map layers information.	
SpatialMapLayerInfo	6.2.1.6.2.8	Represents the individual spatial map layer.	
SpatialMapProfile	6.2.1.6.2.6	Represents the spatial map profile information.	
SpatialMapPatch	6.2.1.6.2.11	Represents the partial spatial map resource representation.	
SpatialMapRetResp	6.2.1.6.2.12	Represents the spatial map information returned in response.	
SpatialMapsNotif	6.2.1.6.2.18	Represents the spatial maps event notification.	
SpatialMapSub	6.2.1.6.2.13	Represents the spatial map events subscription request.	
SpatialMapSubPatch	6.2.1.6.2.17	Represents the spatial map event subscription modification.	
SpatialMapTempRes	6.2.1.6.2.21	Represents the spatial map temporary response.	
TargetSpatialMaps	6.2.1.6.2.15	Represents the target spatial maps for events.	

Table 6.2.1.6.1-2 specifies data types re-used by the SS_SmManagement API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SmManagement API.

Table 6.2.1.6.1-2: SS_SmManagement API re-used Data Types

Data type	Reference	Comments	Applicability
AllowedRules	6.1.1.6.2.8	Represents the allowed entity details.	
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
Local3dPointUncertaintyEllipsoid	3GPP TS 29.572 [16]	Represents a 3D point.	
LocationInfo	3GPP TS 29.122 [2]	Represents location information.	
Pose	6.1.1.6.2.25	Represents the Pose details.	
ReportingInformation	3GPP TS 29.523 [19]	Represents the reporting requirements information.	
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
UInt32	3GPP TS 29.571 [15]	Represents an unsigned integer.	
Uri	3GPP TS 29.122 [2]	Represents an URI.	

6.2.1.6.2 Structured data types

6.2.1.6.2.1 Introduction

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

6.2.1.6.2.2 Type: SpatialMapCreateReq

Table 6.2.1.6.2.2-1: Definition of type SpatialMapCreateReq

Attribute name	Data type	P	Cardinality	Description	Applicability
svclId	string	M	1	Contains the identifier of the requesting VAL application service.	
arealnt	ServiceArea	M	1	Contains the three-dimensional area information to produce the spatial map.	
notifUri	Uri	O	0..1	Contains the URI via which the created spatial map notification shall be delivered.	
mapInf	SpatialMapCreateInfo	O	0..1	Contains the information to be included in the spatial map.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.2.1.6.2.3 Type: SpatialMapCreateInfo

Table 6.2.1.6.2.3-1: Definition of type SpatialMapCreateInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
allwEnt	AllowedRules	C	0..1	Contains the identities of entities (e.g. VAL client, VAL server or VAL service identity) which are permitted to discover and access the spatial map.	
lyrInf	array(MapLayerInfo)	C	1..N	Contains the list of spatial map layer information.	
augLyrInf	array(AugmentLayerInfo)	C	1..N	Contains the list of information augmented with the spatial map layers.	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.4 Type: AugmentLayerInfo

Table 6.2.1.6.2.4-1: Definition of type AugmentLayerInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
augWith	AugmentLayer	M	1	Contains the information augmented with the spatial map layers.	
augLyrDet	array(string)	O	1..N	Contains the augmented spatial map layer information.	

6.2.1.6.2.5 Type: SpatialMap

Table 6.2.1.6.2.5-1: Definition of type SpatialMap

Attribute name	Data type	P	Cardinality	Description	Applicability
svclId	string	O	0..1	Contains the identifier of the VAL application service.	
smProf	SpatialMapProfile	M	1	Contains the information of the spatial map.	
augLyrInf	AugmentLayerInfo	O	0..1	Contains the augmented spatial map layer information.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.2.1.6.2.6 Type: SpatialMapProfile

Table 6.2.1.6.2.6-1: Definition of type SpatialMapProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
mapId	SpatialMapId	M	1	Contains the identifier of the spatial map.	
mapCov	ServiceArea	M	1	Contains the three-dimensional space coordinates information of the spatial map.	
allwEnt	AllowedRules	O	0..1	Contains the identities of entities (e.g. VAL client, VAL server or VAL service identity) which are permitted to discover and access the spatial map.	
mapLyrList	SpatialMapLayers	M	1	Contains the list of spatial map layers information.	
objList	array(MapObjectInfo)	O	1..N	Contains the list of objects information.	

6.2.1.6.2.7 Type: SpatialMapLayers

Table 6.2.1.6.2.7-1: Definition of type SpatialMapLayers

Attribute name	Data type	P	Cardinality	Description	Applicability
lyrList	array(SpatialMapLayerInfo)	M	1..N	The list of spatial map layers information.	

6.2.1.6.2.8 Type: SpatialMapLayerInfo

Table 6.2.1.6.2.8-1: Definition of type SpatialMapLayerInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mapLyrId	string	M	1	Contains the identifier of the spatial map layer. The identity is unique within a spatial map.	
mapLyrInf	MapLayerInfo	O	0..1	Contains the spatial map layer specific information.	

6.2.1.6.2.9 Type: MapLayerInfo

Table 6.2.1.6.2.9-1: Definition of type MapLayerInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
area	ServiceArea	C	0..1	Contains the area covered by the spatial map layer. This can be same or subset of the spatial map coverage area. (NOTE)	
mapAsc	string	C	0..1	Contains the details about a spatial map associated with this layer. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.10 Type: MapObjectInfo

Table 6.2.1.6.2.10-1: Definition of type MapObjectInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
objId	string	M	1	Contains the identifier of the object.	
objType	string	M	1	Contains the type of the object.	
objPos	Local3dPointUncertaintyEllipsoid	O	0..1	Contains the 3D position of the object in the layer.	
objInf	string	O	0..1	Contains object specific information.	

6.2.1.6.2.11 Type: SpatialMapPatch

Table 6.2.1.6.2.11-1: Definition of type SpatialMapPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
svcId	string	O	0..1	Contains the identifier of the VAL application service.	
smProf	SpatialMapProfile	O	0..1	Contains the information of the spatial map.	
augLyrInf	array(AugmentLayerInfo)	O	1..N	Contains the augmented spatial map layer information.	

6.2.1.6.2.12 Type: SpatialMapRetResp

Table 6.2.1.6.2.12-1: Definition of type SpatialMapRetResp

Attribute name	Data type	P	Cardinality	Description	Applicability
svcId	string	O	0..1	Contains the identifier of the VAL application service.	
mapInf	SpatialMapProfile	M	1	Contains the information of the spatial map.	
augLyrInf	AugmentLayerInfo	O	0..1	Contains the augmented spatial map layer information.	

6.2.1.6.2.13

Type: SpatialMapsSub

Table 6.2.1.6.2.13-1: Definition of type SpatialMapsSub

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(MapEventSub)	M	1..N	Contains the spatial maps events subscription details.	
svcId	string	M	1	Contains the identifier of the VAL application service.	
notifUri	Uri	M	1	Contains the URI via which notifications shall be delivered.	
report	SpatialMapsNotif	C	0..1	Contains the Spatial Maps related event(s) report(s). This attribute shall be present only if immediate reporting was requested and the outputs are available.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the absolute time at which the subscription is to expire.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.2.1.6.2.14

Type: MapEventSub

Table 6.2.1.6.2.14-1: Definition of type MapEventSub

Attribute name	Data type	P	Cardinality	Description	Applicability
event	MapEvent	M	1	Contains the Spatial Map event.	
mapId	TargetSpatialMaps	M	1	Contains the target spatial maps that the event subscription applies to.	
evntFiltr	EventFilter	O	0..1	Contains the filters for the Spatial Map event.	

6.2.1.6.2.15

Type: TargetSpatialMaps

Table 6.2.1.6.2.15-1: Definition of type TargetSpatialMaps

Attribute name	Data type	P	Cardinality	Description	Applicability
mapIds	array(SpatialMapId)	C	1..N	Contains the list of spatial map identifiers.	
area	ServiceArea	C	0..1	Contains the three dimensional area of information related to spatial maps.	
locInfo	LocationInfo	C	0..1	Contains the current location information related to the spatial maps.	
pose	Pose	C	0..1	Contains the current pose information related to the spatial maps.	

NOTE: At least one of these attributes shall be present.

6.2.1.6.2.16

Type: EventFilter

Table 6.2.1.6.2.16-1: Definition of type EventFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
objList	array(string)	C	1..N	Contains the list of spatial map objects identifiers, to trigger notification when added, removed, updated etc. This attribute may be present only for "CHANGE_OF_OBJECTS" event. When absent, then the "CHANGE_OF_OBJECTS" event is applicable for any map objects.	
layers	array(string)	C	1..N	Contains the list of spatial map layers identifiers, to trigger notification when the spatial map layers change is detected. This attribute may be present only for "LAYERS_MODIFICATION" event. When absent, then the "LAYERS_MODIFICATION" event is applicable for any spatial map layer.	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.17

Type: SpatialMapsSubPatch

Table 6.2.1.6.2.17-1: Definition of type SpatialMapsSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
eventSubs	array(MapEvent Sub)	O	1..N	Contains the spatial maps events subscription details.	
notifUri	Uri	O	0..1	Contains the URI via which notifications shall be delivered.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
expTime	DateTime	O	0..1	Contains the absolute time at which the subscription is to expire.	

6.2.1.6.2.18

Type: SpatialMapsNotif

Table 6.2.1.6.2.18-1: Definition of type SpatialMapsNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subId	string	M	1	Contains the identifier of either the "Individual Spatial Maps Subscription" resource or the "Individual Spatial Map" resource to which the notification is related.	
reports	array(MapsReport)	M	1..N	Contains the Spatial Maps related event(s) report(s).	

6.2.1.6.2.19 Type: MapsReport

Table 6.2.1.6.2.19-1: Definition of type MapsReport

Attribute name	Data type	P	Cardinality	Description	Applicability
mapIds	array(SpatialMapId)	M	1..N	Contains the identifiers of the spatial maps that the report applies to.	
event	MapEvent	M	1	Contains the Spatial Map event detected.	
objDet	array(MapObjectChangeEvent)	C	1..N	Contains the information about the changed Spatial Map objects. This attribute shall be present only when the "event" attribute's value is "CHANGE_OF_OBJECTS".	
lyrDet	SpatialMapLayers	C	0..1	Contains the information about the layers of the Spatial Map. This attribute shall be present only when the "event" attribute's value is "LAYERS_MODIFICATION".	

6.2.1.6.2.20 Type: MapObjectChangeEvent

Table 6.2.1.6.2.20-1: Definition of type MapObjectChangeEvent

Attribute name	Data type	P	Cardinality	Description	Applicability
objInf	MapObjectInfo	M	1	Contains the changed spatial map object information.	
objChgEvt	MapObjectChangeEvent	O	0..1	Contains the detected event on the changes Spatial Map object.	

6.2.1.6.2.21 Type: SpatialMapTempResp

Table 6.2.1.6.2.21-1: Definition of type SpatialMapTempResp

Attribute name	Data type	P	Cardinality	Description	Applicability
mapId	SpatialMapId	M	1	Contains the identifier of the spatial map.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.2.1.6.2.22 Type: AugmentLayerList

Table 6.2.1.6.2.22-1: Definition of type AugmentLayerList

Attribute name	Data type	P	Cardinality	Description	Applicability
augLyrs	array(AugmentLayer)	M	1..N	Contains the information augmented with the spatial map layers.	

6.2.1.6.3 Simple data types and enumerations

6.2.1.6.3.1 Introduction

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

6.2.1.6.3.2 Simple data types

The simple data types defined in table 6.2.1.6.3.2-1 shall be supported.

Table 6.2.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
SpatialMapId	Uint32	Represents the unique identifier of a Spatial Map.	

6.2.1.6.3.3 Enumeration: AugmentLayer

The enumeration AugmentLayer represents information augmented with spatial map layer. It shall comply with the provisions defined in table 6.2.1.6.3.3-1.

Table 6.2.1.6.3.3-1: Enumeration AugmentLayer

Enumeration value	Description	Applicability
VAL_USERS	Indicates that the spatial map layer augment information is VAL users.	
SPATIAL_ANCHORS	Indicates that the spatial map layer augment information is Spatial Anchors.	

6.2.1.6.3.4 Enumeration: MapEvent

The enumeration MapEvent represents the Spatial Map event. It shall comply with the provisions defined in table 6.2.1.6.3.4-1.

Table 6.2.1.6.3.4-1: Enumeration MapEvent

Enumeration value	Description	Applicability
CHANGE_OF_OBJECTS	Indicates that the spatial map event is change of objects.	
LAYERS_MODIFICATION	Indicates that the spatial map event is modification of spatial map layers.	
SPATIAL_MAP_READY	Indicates that the spatial map event is spatial map ready.	

6.2.1.6.3.5 Enumeration: MapObjectChangeEvent

The enumeration MapObjectChangeEvent represents the Spatial Map object change event. It shall comply with the provisions defined in table 6.2.1.6.3.5-1.

Table 6.2.1.6.3.5-1: Enumeration MapObjectChangeEvent

Enumeration value	Description	Applicability
ADDED	Indicates that the spatial map object is added.	
REMOVED	Indicates that the spatial map object is removed.	
CHANGED_POSITION	Indicates that the spatial map object is changed position.	
CHANGED_DIRECTION	Indicates that the spatial map object is changed direction.	
ANY_OTHER	Indicates that the spatial map object is any other.	

6.2.1.6.4 Data types describing alternative data types or combinations of data types

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

6.2.1.6.5 Binary data

6.2.1.6.5.1 Binary Data Types

Table 6.2.1.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.2.1.7 Error Handling

6.2.1.7.1 General

For the SS_SmManagement API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.2.1.7.2 Protocol Errors

No specific procedures for the SS_SmManagement API are specified.

6.2.1.7.3 Application Errors

The application errors defined for the SS_SmManagement API are listed in Table 6.2.1.7.3-1.

Table 6.2.1.7.3-1: Application errors

Application Error	HTTP status code	Description

6.2.1.8 Feature negotiation

The optional features in table 6.2.1.8-1 are defined for the SS_SmManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.2.1.8-1: Supported Features

Feature number	Feature Name	Description

6.2.1.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SmManagement API.

6.2.2 SS_SmDiscovery API

6.2.2.1 Introduction

The SS_SmDiscovery shall use the SS_SmDiscovery API.

The API URI of the SS_SmDiscovery API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssm-disc".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.2.2.3 and 6.2.2.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.2.2, the SEAL SM Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.2.2.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SmDiscovery API.

6.2.2.3 Resources

6.2.2.3.1 Overview

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

Figure 6.2.2.3.1-1 depicts the resource URIs structure for the SS_SmDiscovery API.

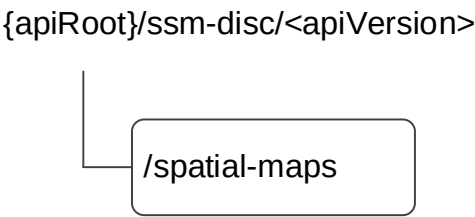


Figure 6.2.2.3.1-1: Resource URI structure of the SS_SmDiscovery API

Table 6.2.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.2.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Maps	/spatial-maps	GET	Retrieve spatial map or SMAS information.

6.2.2.3.2 Resource: Spatial Maps

6.2.2.3.2.1 Description

This resource represents the collection of Spatial Maps or SMAS(s) managed by the SM Server.

6.2.2.3.2.2 Resource Definition

Resource URI: {apiRoot}/ssm-disc/<apiVersion>/spatial-maps

This resource shall support the resource URI variables defined in table 6.2.2.3.2.2-1.

Table 6.2.2.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.2.1.

6.2.2.3.2.3 Resource Standard Methods

The HTTP GET method allows a service consumer to retrieve a spatial map information from the SM Server.

This method shall support the URI query parameters specified in table 6.2.2.3.2.3.1-1.

Table 6.2.2.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
app-svc-id	string	O	0..1	Contains the identifier of VAL application service.	
loc-info	LocationInfo	O	0..1	Contains the three-dimensional area information, location information and direction.	
map-disc-fltr	SpatialMapsDiscFilter	O	0..1	Contains the set of characteristics related to spatial maps.	
pose	Pose	O	0..1	Contains the current pose information.	
supp-feats	SupportedFeatures	O	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.2.8. This query parameter shall be present only when feature negotiation is required.	

This method shall support the request data structures specified in table 6.2.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.2.3.2.3.1-3.

Table 6.2.2.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.2.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapsDiscResp	M	1	200 OK	Successful case. The requested spatial map or SMAS information 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.2.3.2.3.1-4: 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 SM Server.

Table 6.2.2.3.2.3.1-5: 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 SM Server.

6.2.2.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.2.4 Custom Operations without associated resources

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

6.2.2.5 Notifications

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

6.2.2.6 Data Model

6.2.2.6.1 General

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

Table 6.2.2.6.1-1 specifies the data types defined for the SS_SmDiscovery API.

Table 6.2.2.6.1-1: SS_SmDiscovery API specific Data Types

Data type	Clause defined	Description	Applicability
SpatialMapDiscovered	6.2.2.6.2.4	Represents the discovered spatial maps.	
SpatialMapsDiscFilter	6.2.2.6.2.2	Represents the discovery filter information for spatial maps.	
SpatialMapsDiscResp	6.2.2.6.2.3	Represents the spatial maps discovery response.	

Table 6.2.2.6.1-2 specifies data types re-used by the SS_SmDiscovery API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SmDiscovery API.

Table 6.2.2.6.1-2: SS_SmDiscovery API re-used Data Types

Data type	Clause defined	Description	Applicability
LocationInfo	3GPP TS 29.122	Represents the location information and direction.	
Pose	6.1.1.6.2.25	Represents the pose details.	
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SMASProfile	6.2.5.6.2.4	Represents the SMAS profile information.	
SpatialMapId	6.2.1.6.3.2	Represents the spatial map identifier.	
SpatialMapLayers	6.2.1.6.2.7	Represents the spatial map layers information.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

6.2.2.6.2 Structured data types

6.2.2.6.2.1 Introduction

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

6.2.2.6.2.2 Type: SpatialMapsDiscFilter

Table 6.2.2.6.2.2-1: Definition of type SpatialMapsDiscFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
mapLyrList	SpatialMapLayers	O	0..1	Contains the list of spatial map layers specific information to discover the Spatial Map(s) with matching layers.	

6.2.2.6.2.3 Type: SpatialMapsDiscResp

Table 6.2.2.6.2.3-1: Definition of type SpatialMapsDiscResp

Attribute name	Data type	P	Cardinality	Description	Applicability
svclId	string	O	0..1	Contains the identifier of the VAL application service.	
mapsDisc	array(SpatialMapDiscovered)	C	0..N	Contains the list of discovered Spatial Map(s). (NOTE)	
smasList	array(SMASProfile)	C	0..N	Contains the list of SMAS profiles. (NOTE)	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.2.8. This attribute shall be present only when feature negotiation is required.	
NOTE: At least one of these attributes shall be present.					

6.2.2.6.2.4 Type: SpatialMapDiscovered

Table 6.2.2.6.2.4-1: Definition of type SpatialMapDiscovered

Attribute name	Data type	P	Cardinality	Description	Applicability
mapId	SpatialMapId	M	1	Contains the identifier of the spatial map.	

6.2.2.6.3 Simple data types and enumerations

6.2.2.6.3.1 Introduction

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

6.2.2.6.3.2 Simple data types

The simple data types defined in table 6.2.2.6.3.2-1 shall be supported.

Table 6.2.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.2.6.4 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.

6.2.2.6.5 Binary data

6.2.2.6.5.1 Binary Data Types

Table 6.2.2.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.2.2.7 Error Handling

6.2.2.7.1 General

For the SS_SmDiscovery API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.2.2.7.2 Protocol Errors

No specific procedures for the SS_SmDiscovery API are specified.

6.2.2.7.3 Application Errors

The application errors defined for the SS_SmDiscovery API are listed in Table 6.2.2.7.3-1.

Table 6.2.2.7.3-1: Application errors

Application Error	HTTP status code	Description

6.2.2.8 Feature negotiation

The optional features in table 6.2.2.8-1 are defined for the SS_SmDiscovery API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.2.2.8-1: Supported Features

Feature number	Feature Name	Description

6.2.2.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SmDiscovery API.

6.2.3 SS_SmLocalization API

6.2.3.1 Introduction

The SS_SmLocalization service shall use the SS_SmLocalization API.

The API URI of the SS_SmLocalization API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssm-loc".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.2.3.3 and 6.2.3.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.2.3, the SM Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.2.3.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SmLocalization API.

6.2.3.3 Resources

6.2.3.3.1 Overview

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

Figure 6.2.3.3.1-1 depicts the resource URIs structure for the SS_SmLocalization API.

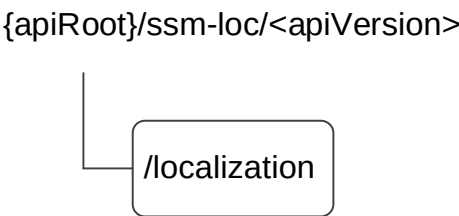


Figure 6.2.3.3.1-1: Resource URI structure of the SS_SmLocalization API

Table 6.2.3.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.3.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Localization	/localization	GET	Retrieve Spatial Map localization information.

6.2.3.3.2 Resource: Spatial Localization

6.2.3.3.2.1 Description

This resource represents the collection of SM Data Source Discoveries managed by the SM Server.

6.2.3.3.2.2 Resource Definition

Resource URI: {apiRoot}/ssm-loc/<apiVersion>/localization

This resource shall support the resource URI variables defined in table 6.2.3.3.2.2-1.

Table 6.2.3.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.3.1.

6.2.3.3.2.3 Resource Standard Methods

6.2.3.3.2.3.1 GET

The HTTP GET method allows a service consumer to discover SM data source information from the SM Server.

This method shall support the URI query parameters specified in table 6.2.3.3.2.3.1-1.

Table 6.2.3.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
area-int	ServiceArea	O	0..1	Contains the three-dimensional area or localization information.	
map-id	SpatialMapId	M	1	Contains the spatial map identifier.	
target-id	ValTargetUe	O	0..1	Contains the identifier of the user or object to localize. (NOTE)	
target-ids	array(ValTargetUe)	O	1..N	Contains the list of the identifier(s) of the user(s) or object(s) to localize. (NOTE)	
supp-feats	SupportedFeatures	O	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.3.8. This attribute shall be present only when feature negotiation is required.	
NOTE: These query parameters are mutually exclusive.					

This method shall support the request data structures specified in Table 6.2.3.3.2.3.1-2 and the response data structures and response codes specified in Table 6.2.3.3.2.3.1-3.

Table 6.2.3.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.3.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SpatialMapLocalizeResp	M	1	200 OK	Successful case. The requested SM data source information 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.3.2.3.1-4: 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 SM Server.

Table 6.2.3.3.2.3.1-5: 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 SM Server.

6.2.3.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.3.4 Custom Operations without associated resources

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

6.2.3.5 Notifications

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

6.2.3.6 Data Model

6.2.3.6.1 General

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

Table 6.2.3.6.1-1 specifies the data types defined for the SS_SmLocalization API.

Table 6.2.3.6.1-1: SS_SmLocalization API specific Data Types

Data type	Clause defined	Description	Applicability
SpatialMapLocDetails	6.2.3.6.2.5	Represents the localization details of the spatial map.	

Table 6.2.3.6.1-2 specifies data types re-used by the SS_SmLocalization API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SmLocalization API.

Table 6.2.3.6.1-2: SS_SmLocalization API re-used Data Types

Data type	Reference	Comments	Applicability
LocationInfo	3GPP TS 29.122 [2]	Represents the location information.	
Pose	6.1.1.6.2.25	Represents the Pose details.	
RelativeCartesianLocation	3GPP TS 29.572 [16]	Represents the relative cartesian location.	
SpatialMapId	6.2.1.6.3.2	Represents the spatial map identifier.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
ValTargetUe	3GPP TS 29.549 [17]	Represents the VAL UE or VAL user identifier.	

6.2.3.6.2 Structured data types

6.2.3.6.2.1 Introduction

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

6.2.3.6.2.2 Type: SpatialMapLocalizeResp

Table 6.2.3.6.2.2-1: Definition of type SpatialMapLocalizeResp

Attribute name	Data type	P	Cardinality	Description	Applicability
results	array(SpatialMapLocDetails)	M	0..N	Contains the lists of localization information If there are no target identities (for e.g., VAL UEs or VAL Users) matching the provided localization filter criteria, an empty array shall be returned within this attribute.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.3.8. This attribute shall be present only when feature negotiation is required.	

6.2.3.6.2.3 Type: SpatialMapLocDetails

Table 6.2.3.6.2.3-1: Definition of type SpatialMapLocDetails

Attribute name	Data type	P	Cardinality	Description	Applicability
targetId	ValTargetUe	O	0..1	Contains the identifier of the target VAL UE or VAL user.	
position	RelativeCartesianLocation	O	0..1	Contains the three-dimensional position of the VAL UE or VAL user in the spatial map.	
pose	Pose	O	0..1	Contains the pose of the VAL UE or VAL user.	

6.2.3.6.3 Simple data types and enumerations

6.2.3.6.3.1 Introduction

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

6.2.3.6.3.2 Simple data types

The simple data types defined in table 6.2.3.6.3.2-1 shall be supported.

Table 6.2.3.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.3.6.4 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.

6.2.3.6.5 Binary data

6.2.3.6.5.1 Binary Data Types

Table 6.2.3.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.2.3.7 Error Handling

6.2.3.7.1 General

For the SS_SmLocalization API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.2.3.7.2 Protocol Errors

No specific procedures for the SS_SmLocalization API are specified.

6.2.3.7.3 Application Errors

The application errors defined for the SS_SmLocalization API are listed in Table 6.2.3.7.3-1.

Table 6.2.3.7.3-1: Application errors

Application Error	HTTP status code	Description

6.2.3.8 Feature negotiation

The optional features in table 6.2.3.8-1 are defined for the SS_SmLocalization API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.2.3.8-1: Supported Features

Feature number	Feature Name	Description

6.2.3.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SmLocalization API.

6.2.4 SS_SmDataSourceDiscovery API

6.2.4.1 Introduction

The SS_SmDataSourceDiscovery service shall use the SS_SmDataSourceDiscovery API.

The API URI of the SS_SmDataSourceDiscovery API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssm-dsdisc".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.2.4.3 and 6.2.4.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.2.4, the SEAL SM Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.2.4.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SmDataSourceDiscovery API.

6.2.4.3 Resources

6.2.4.3.1 Overview

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

Figure 6.2.4.3.1-1 depicts the resource URIs structure for the SS_SmDataSourceDiscovery API.

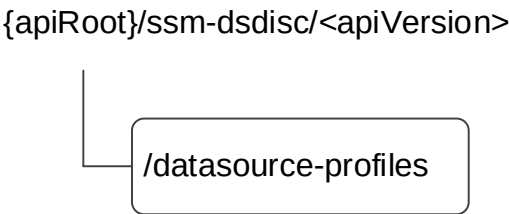


Figure 6.2.4.3.1-1: Resource URI structure of the SS_SmDataSourceDiscovery API

Table 6.2.4.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.4.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
Spatial Maps Data Source Profiles	/datasource-profiles	GET	Retrieve Spatial Map data source profiles information.

6.2.4.3.2 Resource: Spatial Maps Data Source Profiles

6.2.4.3.2.1 Description

This resource represents the collection of SM Data Source Discoveries managed by the SM Server.

6.2.4.3.2.2 Resource Definition

Resource URI: **{apiRoot}/ssm-dsdisc/<apiVersion>/datasource-profiles**

This resource shall support the resource URI variables defined in table 6.2.4.3.2.2-1.

Table 6.2.4.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.4.1.

6.2.4.3.2.3 Resource Standard Methods

6.2.4.3.2.3.1 GET

The HTTP GET method allows a service consumer to discover SM data source information from the SEAL SM Server.

This method shall support the URI query parameters specified in table 6.2.4.3.2.3.1-1.

Table 6.2.4.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
area-int	ServiceArea	O	0..1	Contains the three-dimensional area or localization information.	
end-point	EndPoint	O	0..1	Contains the end point information where the Spatial Map data source sends the SM data.	
ds-disc-fltr	SMDataSourceDiscFilter	O	0..1	Contains the set of characteristics related to Spatial Map data sources.	
supp-feats	SupportedFeatures	O	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.4.8. This query parameter shall be present only when feature negotiation is required.	

This method shall support the request data structures specified in Table 6.2.4.3.2.3.1-2 and the response data structures and response codes specified in Table 6.2.4.3.2.3.1-3.

Table 6.2.4.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.4.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SMDataSourceDiscResp	M	1	200 OK	Successful case. The requested SM data source information 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.4.3.2.3.2-4: 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 SM Server.

Table 6.2.4.3.2.3.2-5: 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 SM Server.

6.2.4.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.4.4 Custom Operations without associated resources

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

6.2.4.5 Notifications

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

6.2.4.6 Data Model

6.2.4.6.1 General

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

Table 6.2.4.6.1-1 specifies the data types defined for the SS_SmDataSourceDiscovery API.

Table 6.2.4.6.1-1: SS_SmDataSourceDiscovery API specific Data Types

Data type	Clause defined	Description	Applicability
SMDDataSourceDiscFilter	6.2.4.6.2.2	Represents the SM data source discovery filters.	
SMDDataSourceDiscResp	6.2.4.6.2.3	Represents the SM data source discovery response.	

Table 6.2.4.6.1-2 specifies data types re-used by the SS_SmDataSourceDiscovery API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SmDataSourceDiscovery API.

Table 6.2.4.6.1-2: SS_SmDataSourceDiscovery API re-used Data Types

Data type	Reference	Comments	Applicability
DataSourceProfile	3GPP TS 24.550 [20]	Represents the SM data source profile information.	
EndPoint	3GPP TS 29.558 [18]	Represents the end point information.	
ServiceArea	3GPP TS 29.558 [18]	Represents the service area information.	
SpatialMapInfoDetails	3GPP TS 24.550 [20]	Represents the SM Information details.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

6.2.4.6.2 Structured data types

6.2.4.6.2.1 Introduction

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

6.2.4.6.2.2 Type: SMDDataSourceDiscFilter

Table 6.2.4.6.2.2-1: Definition of type SMDDataSourceDiscFilter

Attribute name	Data type	P	Cardinality	Description	Applicability
smInfoDets	array(SpatialMapInfoDetails)	M	1..N	Contains the list of SM information details. Each attribute of SpatialMapInfoDetails data type is optional and at least one of the attributes within SpatialMapInfoDetails data type shall be present.	

6.2.4.6.2.3 Type: SMDDataSourceDiscResp

Table 6.2.4.6.2.3-1: Definition of type SMDDataSourceDiscResp

Attribute name	Data type	P	Cardinality	Description	Applicability
results	array(DataSourceProfile)	M	0..N	Contains the list of SM data source profiles matching the filter criteria. If there are no SM data source(s) matching the provided data source profile filter criteria, an empty array shall be returned within this attribute.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.4.8. This attribute shall be present only when feature negotiation is required.	

6.2.4.6.3 Simple data types and enumerations

6.2.4.6.3.1 Introduction

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

6.2.4.6.3.2 Simple data types

The simple data types defined in table 6.2.4.6.3.2-1 shall be supported.

Table 6.2.4.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.4.6.4 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.

6.2.4.6.5 Binary data

6.2.4.6.5.1 Binary Data Types

Table 6.2.4.6.5.1-1: Binary Data Types

Name	Clause defined	Content type
n/a		

6.2.4.7 Error Handling

6.2.4.7.1 General

For the SS_SmDataSourceDiscovery API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.2.4.7.2 Protocol Errors

No specific procedures for the SS_SmDataSourceDiscovery API are specified.

6.2.4.7.3 Application Errors

The application errors defined for the SS_SmDataSourceDiscovery API are listed in Table 6.2.4.7.3-1.

Table 6.2.4.7.3-1: Application errors

Application Error	HTTP status code	Description

6.2.4.8 Feature negotiation

The optional features in table 6.2.4.8-1 are defined for the SS_SmDataSourceDiscovery API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.2.4.8-1: Supported Features

Feature number	Feature Name	Description

6.2.4.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SmDataSourceDiscovery API.

6.2.5 SS_SmSmasRegistration API

6.2.5.1 Introduction

The SS_SmSmasRegistration service shall use the SS_SmSmasRegistration API.

The API URI of the SS_SmSmasRegistration Service API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [17], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [17].
- The <apiName> shall be "ssm-smasr".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as defined in clauses 6.2.5.3 and 6.2.5.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.2.5, the SM Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.2.5.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [17] shall apply for the SS_SmSmasRegistration API.

6.2.5.3Resources

6.2.5.3.1Overview

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

Figure 6.2.5.3.1-1 depicts the resource URIs structure for the SS_SmSmasRegistration API.

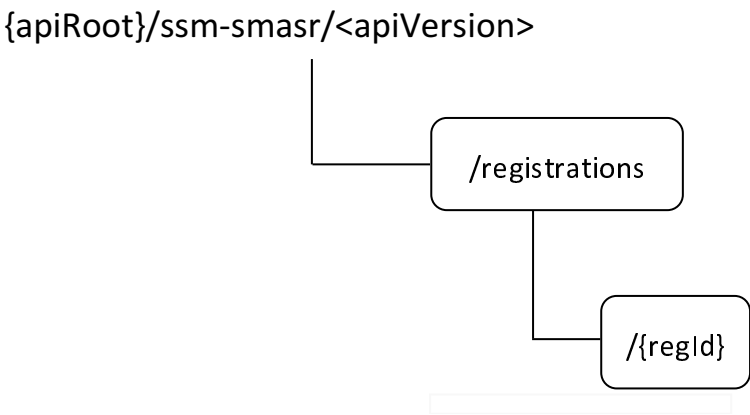


Figure 6.2.5.3.1-1: Resource URIs structure of the SS_SmSmasRegistration API

Table 6.2.5.3.1-1 provides an overview of the resources and applicable HTTP methods for the SS_SmSmasRegistration API.

Table 6.2.5.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
SMAS Registrations	/registrations	POST	Request the creation of a SMAS Registration.
Individual SMAS Registration	/registrations/{regId}	GET	Retrieve an existing "Individual SMAS Registration" resource.
		PUT	Request the update of an existing "Individual SMAS Registration" resource.
		PATCH	Request the modification of an existing "Individual SMAS Registration" resource.
		DELETE	Request the deletion of an existing "Individual SMAS Registration" resource.

6.2.5.3.2Resource: SMAS Registrations

6.2.5.3.2.1Description

This resource represents the collection of SM SMAS Registration(s) managed by the SM Server.

6.2.5.3.2.2Resource Definition

Resource URI: **{apiRoot}/ssm-smasr/<apiVersion>/registrations**

This resource shall support the resource URI variables defined in table 6.2.5.3.2.2-1.

Table 6.2.5.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.5.1.

6.2.5.3.2.3 Resource Standard Methods

6.2.5.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a SMAS Registration at the SM Server.

This method shall support the URI query parameters specified in table 6.2.5.3.2.3.1-1.

Table 6.2.5.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.5.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.5.3.2.3.1-3.

Table 6.2.5.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SMASReg	M	1	Represents the parameters to request the creation of a SMAS Registration.

Table 6.2.5.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SMASReg	M	1	201 Created	Successful case. The SMAS Registration is successfully created and a representation of the created "Individual SMAS Registration" resource shall be returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.5.3.2.3.1-4: 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}/ssm-smasr/<apiVersion>/registrations/{regId}

6.2.5.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.5.3.3 Resource: Individual SMAS Registration

6.2.5.3.3.1 Description

This resource represents an "Individual SM SMAS Registration" resource managed by the SM Server.

6.2.5.3.3.2 Resource Definition

Resource URI: {apiRoot}/ssm-smasr/<apiVersion>/registrations/{regId}

This resource shall support the resource URI variables defined in table 6.2.5.3.3.2-1.

Table 6.2.5.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.5.1.
regId	string	Represents the identifier of the "Individual SMAS Registration" resource.

6.2.5.3.3.3 Resource Standard Methods

6.2.5.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual SMAS Registration" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.5.3.3.3.1-1.

Table 6.2.5.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.5.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.5.3.3.3.1-3.

Table 6.2.5.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.5.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SMASReg	M	1	200 OK	Successful case. The requested "Individual SMAS Registration" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.5.3.3.1-4: 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 SM Server.

Table 6.2.5.3.3.1-5: 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 SM Server.

6.2.5.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual SMAS Registration" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.5.3.3.3.2-1.

Table 6.2.5.3.3.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.5.3.3.3.2-2 and the response data structures and response codes specified in table 6.2.5.3.3.3.2-3.

Table 6.2.5.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SMASReg	M	1	Represents the updated representation of the "Individual SMAS Registration" resource.

Table 6.2.5.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SMASReg	M	1	200 OK	Successful case. The "Individual SMAS Registration" resource is successfully updated and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual SMAS Registration" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.5.3.3.2-4: 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 SM Server.

Table 6.2.5.3.3.2-5: 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 SM Server.

6.2.5.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual SMAS Registration" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.5.3.3.3-1.

Table 6.2.5.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.5.3.3.3-2 and the response data structures and response codes specified in table 6.2.5.3.3.3-3.

Table 6.2.5.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SMASRegPatch	M	1	Represents the parameters to request the modification of the "Individual SMAS Registration" resource.

Table 6.2.5.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SMASReg	M	1	200 OK	Successful case. The "Individual SMAS Registration" resource is successfully modified and a representation of the updated resource shall be returned in the response body.
n/a			204 No Content	Successful case. The "Individual SMAS Registration" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.5.3.3.3-4: 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 SM Server.

Table 6.2.5.3.3.3-5: 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 SM Server.

6.2.5.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual SMAS Registration" resource at the SM Server.

This method shall support the URI query parameters specified in table 6.2.5.3.3.4-1.

Table 6.2.5.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.5.3.3.3.4-2 and the response data structures and response codes specified in table 6.2.5.3.3.3.4-3.

Table 6.2.5.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.5.3.3.3.4-3: 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 SMAS Registration" 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 SM 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 URI of the resource located in an alternative SM Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.5.3.3.3.4-4: 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 SM Server.

Table 6.2.5.3.3.3.4-5: 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 SM Server.

6.2.5.3.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

6.2.5.4 Custom Operations without associated resources

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

6.2.5.5 Notifications

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

6.2.5.6 Data Model

6.2.5.6.1 General

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

Table 6.2.5.6.1-1 specifies the data types defined for the SS_SmSmasRegistration API.

Table 6.2.5.6.1-1: SS_SmSmasRegistration API specific Data Types

Data type	Clause defined	Description	Applicability
SMASInfo	6.2.5.6.2.5	Represents the SMAS information.	
SMASProfile	6.2.5.6.2.4	Represents the SMAS Profile.	
SMASReg	6.2.5.6.2.2	Represents a SMAS Registration.	
SMASRegPatch	6.2.5.6.2.3	Represents the parameters to request the modification of a SMAS Registration.	
SpatialMapInfo	6.2.5.6.2.6	Represents the spatial map related information.	

Table 6.2.5.6.1-2 specifies data types re-used by the SS_SmSmasRegistration API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the SS_SmSmasRegistration API.

Table 6.2.5.6.1-2: SS_SmSmasRegistration API re-used Data Types

Data type	Reference	Comments	Applicability
EndPoint	3GPP TS 29.558 [18]	Represents endpoint related information.	
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
DateTimeRm	3GPP TS 29.122 [2]	Represents the same as the DateTime data type but with the OpenAPI "nullable" property set to "true".	
ServiceArea	3GPP TS 29.558 [18]	Represents service area information.	
SpatialMapId	Clause 6.2.1.6.3.2	Represents the spatial map identifier.	
SupportedFeatures	3GPP TS 29.571 [15]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
TimeReqs	3GPP TS 29.549 [17]	Represents time related requirements.	

6.2.5.6.2 Structured data types

6.2.5.6.2.1 Introduction

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

6.2.5.6.2.2

Type: SMASReg

Table 6.2.5.6.2.2-1: Definition of type SMASReg

Attribute name	Data type	P	Cardinality	Description	Applicability
profile	SMASProfile	M	1	Contains the SMAS Profile.	
expTime	DateTime	O	0..1	Contains the expiration time of the SMAS Registration. - When present in a SMAS Registration creation or update (using the HTTP PUT method) request, it indicates the expiration time proposed by the service consumer for the SMAS Registration. - When present in a SMAS Registration creation or update/modification response, it indicates the expiration time granted by the SM Server for the SMAS Registration. If this attribute is absent, this means that the SMAS Registration shall not expire until explicitly deleted by the service consumer.	
supFeat	SupportedFeatures	C	0..1	Contains the list of supported feature(s) among the ones defined in clause 6.2.5.8. This attribute shall be present only when feature negotiation is required.	

6.2.5.6.2.3

Type: SMASRegPatch

Table 6.2.5.6.2.3-1: Definition of type SMASRegPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
profile	SMASProfile	O	0..1	Contains the updated SMAS Profile.	
expTime	DateTimeRm	O	0..1	Contains the expiration time proposed by the service consumer for the SMAS Registration.	

6.2.5.6.2.4

Type: SMASProfile

Table 6.2.5.6.2.4-1: Definition of type SMASProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
smasInfo	SMASInfo	M	1	Contains the SMAS information.	
spatMapInfoList	array(SpatialMapInfo)	M	1..N	Contains information about the spatial map(s) available at the SM Service.	

6.2.5.6.2.5

Type: SMASInfo

Table 6.2.5.6.2.5-1: Definition of type SMASInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
endpoint	EndPoint	C	0..1	Contains the endpoint information used to communicate with the SM Service.	
availPeriod	TimeReqs	C	0..1	Contains the time period(s) during which the SM Service can be accessed.	
availLoc	ServiceArea	C	0..1	Contains the location area within which the SM Service can be accessed.	
NOTE: At least one of these attributes shall be present.					

6.2.5.6.2.6 Type: SpatialMapInfo

Table 6.2.5.6.2.6-1: Definition of type SpatialMapInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mapId	SpatialMapId	M	1	Contains the identifier of the spatial map.	
covArea	ServiceArea	M	1	Contains the coverage area of the spatial map.	

6.2.5.6.3 Simple data types and enumerations

6.2.5.6.3.1 Introduction

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

6.2.5.6.3.2 Simple data types

The simple data types defined in table 6.2.5.6.3.2-1 shall be supported.

Table 6.2.5.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.5.6.4 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.

6.2.5.6.5 Binary data

6.2.5.6.5.1 Binary Data Types

Table 6.2.5.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.2.5.7 Error Handling

6.2.5.7.1 General

For the SS_SmSmasRegistration API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [17].

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

6.2.5.7.2 Protocol Errors

No specific protocol errors for the SS_SmSmasRegistration API are specified.

6.2.5.7.3 Application Errors

The application errors defined for the SS_SmSmasRegistration API are listed in Table 6.2.5.7.3-1.

Table 6.2.5.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.2.5.8 Feature negotiation

The optional features listed in table 6.2.5.8-1 are defined for the SS_SmSmasRegistration API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [17].

Table 6.2.5.8-1: Supported Features

Feature number	Feature Name	Description

6.2.5.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [17] shall apply for the SS_SmSmasRegistration API.

7 Using Common API Framework

The provisions of clause 8 of 3GPP TS 29.549 [17] shall apply for the Metaverse APIs defined in this specification.

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI [4] specifications in YAML format.

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

NOTE: 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 [4] definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI [4] specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [3] and clause 5B of 3GPP TR 21.900 [5]).

A.2 SS_SAnManagement API

openapi: 3.0.0

info:

```
title: SAn Server Spatial Anchors Management Service
version: 1.0.1
description: |
  API for Spatial Anchor Management Service.
  ©2026, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
  Metaverse Enablement Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/
```

servers:

```
- url: "{apiRoot}/ssan-sanm/v1"
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.
```

security:

```
- {}
- oAuth2ClientCredentials: []
```

paths:

```
/anchors-lists:
  post:
    summary: Create a new Spatial Anchors List.
    operationId: CreateSpatialAnchorsList
    tags:
      - Spatial Anchors List (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialAnchorsList'
    responses:
      '201':
        description: >
          Created. The Spatial Anchors List is successfully created and a representation of the
          created Individual Spatial Anchors List resource is returned.
        content:
```

```

    application/json:
      schema:
        $ref: '#/components/schemas/SpatialAnchorsList'
    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'

/anchors-lists/{anchorsListId}:
  parameters:
    - name: anchorsListId
      in: path
      description: Represents the identifier of the Individual Spatial Anchors List resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual Spatial Anchors List.
    operationId: GetIndSpatialAnchorsList
    tags:
      - Individual Spatial Anchors List (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual Spatial Anchors List resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SpatialAnchorsList'
      '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 Spatial Anchors list.
operationId: UpdateIndSpatialAnchorsList
tags:
  - Individual Spatial Anchors List (Document)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SpatialAnchorsList'
responses:
  '200':
    description: >
      OK. The Individual Spatial Anchors List resource is successfully updated and
      a representation of the updated resource shall be returned in the response body.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialAnchorsList'
  '204':
    description: >
      No Content. The Individual Spatial Anchors List 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: Modify an existing Individual Spatial Anchors List.
operationId: ModifyIndSpatialAnchorsList
tags:
  - Individual Spatial Anchors List (Document)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SpatialAnchorsListPatch'
responses:
  '200':
    description: >
      OK. The Individual Spatial Anchors List resource is successfully modified and
      a representation of the updated resource shall be returned in the response body.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialAnchorsList'
  '204':
    description: >
      No Content. The Individual Spatial Anchors List 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 Spatial Anchors List.
 operationId: DeleteIndSpatialAnchorsList

tags:

- Individual Spatial Anchors List

responses:

```

'204':
  description: >
    No Content. The 'Individual Spatial Anchors List' 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'

```

/subscriptions:

post:

summary: Create a new Spatial Anchors Subscription.
 operationId: CreateSpatialAnchorsSubsc

tags:

- Spatial Anchors Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialAnchorsSub'

responses:

```

'201':
  description: >
    Created. The Spatial Anchors Subscription is successfully created and a
    representation of the created Individual Spatial Anchors Subscription
    resource shall be returned in the response body.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SpatialAnchorsSub'
  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:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    SpatialAnchorsNotif:
      '{$request.body#/notifUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/SpatialAnchorsNotif'
          responses:
            '204':
              description: >
                No Content. The Spatial Anchors Notification is successfully
                received and acknowledged.
            '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 the Spatial Anchors Subscription.
      required: true
      schema:
        type: string

  get:

```

summary: Retrieve an existing Individual Spatial Anchors Subscription resource.
 operationId: GetIndSpatialAnchorsSubsc
 tags:

- Individual Spatial Anchors Subscription (Document)

responses:

'200':
 description: >
 OK. The requested Individual Spatial Anchors Subscription resource is returned.
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/SpatialAnchorsSub'
 '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 Spatial Anchors Subscription resource.
 operationId: UpdateIndSpatialAnchorsSubsc

tags:

- Individual Spatial Anchors Subscription (Document)

requestBody:

 required: true

 content:

 application/json:
 schema:
 \$ref: '#/components/schemas/SpatialAnchorsSub'

responses:

'200':
 description: >
 OK. The Individual Spatial Anchors Subscription resource is successfully updated and a representation of the updated resource shall be returned in the response body.
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/SpatialAnchorsSub'
 '204':
 description: >
 No Content. The Individual Spatial Anchors Subscription 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 Spatial Anchors Subscription
resource.
  operationId: ModifyIndSpatialAnchorsSubsc
  tags:
    - Individual Spatial Anchors Subscription (Document)
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/SpatialAnchorsSubPatch'
  responses:
    '200':
      description: >
        OK. The Individual Spatial Anchors Subscription resource is successfully
        modified and a representation of the updated resource shall be returned in the response
        body.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialAnchorsSub'
    '204':
      description: >
        No Content. The Individual Spatial Anchors Subscription 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: Request the deletion of an existing Individual Spatial Anchors Subscription resource.
  operationId: RemoveIndSpatialAnchorsSubsc
  tags:
    - Individual Spatial Anchors Subscription (Document)
  responses:
    '204':
      description: >
        The Individual Spatial Anchors Subscription 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'

```

components:

```

  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: "{tokenUrl}"
          scopes: {}

```

schemas:

#

STRUCTURED DATA TYPES

#

```

SpatialAnchorsList:
  description: >
    Represents the Spatial Anchors List.
  type: object
  properties:
    valServInfo:
      $ref: '#/components/schemas/VALServiceInfo'
    anchors:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/SpatialAnchor'
      minProperties: 1
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - valServInfo
    - anchors

```

```

SpatialAnchorsListPatch:
  description: >
    Represents the patch of Spatial Anchors List.
  type: object
  properties:
    valServInfo:
      $ref: '#/components/schemas/VALServiceInfo'
    anchors:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/SpatialAnchorRm'
      minProperties: 1

```

```

VALServiceInfo:
  description: >
    Represents the VAL service information.
  type: object
  properties:
    serviceId:
      type: string
    endPt:
      $ref: 'TS29548_SDD_Transmission.yaml#/components/schemas/ConnInfo'
    servConnInfo:
      $ref: "#/components/schemas/ServConnectInfo"
  required:
    - serviceId
    - endPt

```

ServConnectInfo:

```
description: >
  Represents the connectivity information related to the application service.
type: object
properties:
  dnais:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnai'
    minItems: 1
  dnn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
anyOf:
  - required: [dnais]
  - required: [dnn]

SpatialAnchor:
description: >
  Represents the Spatial Anchor profile information.
type: object
properties:
  anchorId:
    $ref: '#/components/schemas/SpatialAnchorId'
  posInfo:
    $ref: '#/components/schemas/PositionInfo'
  specInfo:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
  svcArea:
    $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  rules:
    $ref: '#/components/schemas/AllowedRules'
required:
  - posInfo

SpatialAnchorRm:
description: >
  Represents the Spatial Anchor profile information.
type: object
properties:
  anchorId:
    $ref: '#/components/schemas/SpatialAnchorId'
  posInfo:
    $ref: '#/components/schemas/PositionInfo'
  specInfo:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
  svcArea:
    $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  rules:
    $ref: '#/components/schemas/AllowedRules'
required:
  - posInfo
nullable: true

AllowedRules:
description: >
  Represents the access control rules.
type: object
properties:
  allowedEntities:
    type: array
    items:
      $ref: '#/components/schemas/AllowedEntity'
    minItems: 1
  valServiceList:
    type: array
    items:
      type: string
    minItems: 1
anyOf:
  - required: [allowedEntities]
  - required: [valServiceList]

AllowedEntity:
description: >
  Represents the allowed application entity.
type: object
properties:
  type:
    $ref: '#/components/schemas/EntityType'
```

```
    identifier:
      type: string
  anyOf:
    - required: [type]
    - required: [identifier]

PositionInfo:
  description: >
    Represents the positioning information of the Spatial Anchor and the related Spatial Map.
  type: object
  properties:
    pos:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Local3dPointUncertaintyEllipsoid'
    spaMapPos:
      $ref: '"/components/schemas/SpatialAnchorMapPosition'
  anyOf:
    - required: [pos]
    - required: [spaMapPos]

SpatialAnchorMapPosition:
  description: >
    Represents the Spatial map positioning of the Spatial Anchor.
  type: object
  properties:
    spaMapId:
      type: string
      description: Contains the Spatial Map Identifier.
    spaMapLayerId:
      type: array
      items:
        type: string
      minItems: 1
      description: Contains the identifier(s) of Spatial Map layer(s).
    localInfo:
      $ref: '"/components/schemas/LocalizationInfo'
  required:
    - spaMapId

LocalizationInfo:
  description: >
    Represents the localization information of the Spatial Anchor.
  type: object
  properties:
    localInfo:
      type: string
      description: Contains the localization information.

SpatialAnchorsSub:
  description: >
    Represents the Spatial Anchors subscription.
  type: object
  properties:
    eventSubs:
      type: array
      items:
        $ref: '"/components/schemas/AnchorsEventsSub'
      minItems: 1
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    report:
      $ref: '"/components/schemas/SpatialAnchorsNotif'
    reportReq:
      $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - eventSubs
    - notifUri

SpatialAnchorsSubPatch:
  description: >
    Represents the partial Spatial Anchors subscription.
  type: object
  properties:
    eventSubs:
      type: array
```

```
    items:
      $ref: '#/components/schemas/AnchorsEventsSub'
    minItems: 1
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  reportReq:
    $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
  expTime:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

SpatialAnchorsNotif:
  description: >
    Represents the Spatial Anchors Notification.
  type: object
  properties:
    subId:
      type: string
    reports:
      type: array
      items:
        $ref: '#/components/schemas/AnchorsReport'
      minItems: 1
  required:
    - subId
    - reports

AnchorsReport:
  description: >
    Represents the Spatial Anchors report.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnchorEvent'
    detEvent:
      $ref: '#/components/schemas/DetectedEvent'
    anchrList:
      type: array
      items:
        $ref: '#/components/schemas/SpatialAnchorProfile'
      minItems: 1
    ueAnchrInt:
      type: array
      items:
        $ref: '#/components/schemas/UEAnchorInterest'
      minItems: 1
  required:
    - event

UEAnchorInterest:
  description: >
    Represents the UE with Spatial Anchors interest.
  type: object
  properties:
    ueId:
      type: string
    anchrId:
      $ref: '#/components/schemas/SpatialAnchorId'
    anchrRng:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  anyOf:
    - required: [ueId]
    - required: [anchrId]
    - required: [anchrRng]

AnchorsEventsSub:
  description: >
    Represents the Spatial Anchors subscription event and filters.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnchorEvent'
    evntFltr:
      $ref: '#/components/schemas/EventFilter'
  required:
    - event
    - evntFltr

EventFilter:
```

```
description: >
  Represents the Spatial Anchors Event filters.
type: object
properties:
  discFltr:
    $ref: '#/components/schemas/DiscoveryFilter'
  ueFltr:
    $ref: '#/components/schemas/UeFilter'
  rngFltr:
    $ref: '#/components/schemas/RangeFilter'
  anchrFltr:
    $ref: '#/components/schemas/AnchorFilter'

DiscoveryFilter:
description: >
  Represents the Spatial Anchors discovery event filters.
type: object
properties:
  mgntEvs:
    type: array
    items:
      $ref: '#/components/schemas/AnchorManagementEvent'
    minItems: 1
required:
  - mgntEvs

UeFilter:
description: >
  Represents the UE with spatial anchors event filters.
type: object
properties:
  rngVal:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  disc:
    type: boolean
    description: >
      Indicates whether the UEs that have discovered spatial anchors are to be
      included in the report. When present, it shall be set as follows:
      true: include UEs that discovered the spatial anchors.
      false: not include UEs that discovered the spatial anchors.
      Default value when omitted is "false".
required:
  - rngVal

RangeFilter:
description: >
  Represents the Spatial Anchors in range event filters.
type: object
properties:
  perSrch:
    type: boolean
    description: >
      Contains the persistent search preference. When present, it shall be set as follows:
      true: enable persistent search.
      false: not enable persistent search.
      Default value when omitted is "false".
  usrLoc:
    $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
  pose:
    $ref: '#/components/schemas/Pose'
  appRng:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
required:
  - appRng

AnchorFilter:
description: >
  Represents the applicable spatial anchors filters.
type: object
properties:
  anchIds:
    type: array
    items:
      $ref: '#/components/schemas/SpatialAnchorId'
    minItems: 1
  svcIds:
    type: array
    items:
```

```

        type: string
        minItems: 1
      areaInt:
        $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
    anyOf:
      - required: [anchIds]
      - required: [svcIds]
      - required: [areaInt]

SpatialAnchorProfile:
  description: >
    Represents the spatial anchor profile.
  type: object
  properties:
    anchInfo:
      $ref: '#/components/schemas/SpatialAnchor'
    valSvcInf:
      $ref: '#/components/schemas/VALServiceInfo'
  required:
    - anchInfo
    - valSvcInf

Pose:
  description: >
    Represents the Pose.
  type: object
  properties:
    orientation:
      $ref: '#/components/schemas/Orientation'
    position:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Local3dPointUncertaintyEllipsoid'
    fov:
      $ref: '#/components/schemas/Fov'
  required:
    - orientation

Orientation:
  description: >
    Represents the Orientation.
  type: object
  properties:
    x:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    y:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    z:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    w:
      $ref: '#/components/schemas/Angle'
  required:
    - x
    - y
    - z
    - w

Fov:
  description: >
    Represents the field of view.
  type: object
  properties:
    angleLeft:
      $ref: '#/components/schemas/Angle'
    angleRight:
      $ref: '#/components/schemas/Angle'
    angleUp:
      $ref: '#/components/schemas/Angle'
    angleDown:
      $ref: '#/components/schemas/Angle'
  required:
    - angleLeft
    - angleRight
    - angleUp
    - angleDown

# SIMPLE DATA TYPES
#

SpatialAnchorId:

```

\$ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'

Angle:

description: Indicates value of angle.

type: integer

minimum: 0

maximum: 360

#

ENUMERATIONS

#

EntityType:

anyOf:

- type: string

enum:

- VAL_SERVER

- VAL_CLIENT

- 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 entity.

Possible values are:

- VAL_SERVER: Indicates that the entity type is a VAL Server

- VAL_CLIENT: Indicates that the entity type is VAL Client.

AnchorEvent:

anyOf:

- type: string

enum:

- ANCHOR_DISCOVERY

- UE_SPATIAL_ANCHOR_INTEREST

- SPATIAL_ANCHOR_IN_RANGE

- 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 entity.

Possible values are:

- ANCHOR_DISCOVERY: Indicates that the Spatial Anchors event is spatial anchors discovery.

- UE_SPATIAL_ANCHOR_INTEREST: Indicates that the Spatial Anchors event is the UE with spatial anchors interest.

- SPATIAL_ANCHOR_IN_RANGE: Indicates that the Spatial Anchors event is the spatial anchors in range.

AnchorManagementEvent:

anyOf:

- type: string

enum:

- ANCHOR_CREATION

- ANCHOR_UPDATE

- ANCHOR_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 entity.

Possible values are:

- ANCHOR_CREATION: Indicates that the spatial anchor management event is spatial anchor creation.

- ANCHOR_UPDATE: Indicates that the spatial anchor management event is spatial anchor updation.

- ANCHOR_DELETION: Indicates that the spatial anchor management event is spatial anchor deletion.

DetectedEvent:

anyOf:

- type: string

enum:

- ANCHOR_IN_RANGE_OF_UE

- ANCHOR_OUT_RANGE_OF_UE

- UE_IN_RANGE_OF_ANCHOR

```

- UE_OUT_RANGE_OF_ANCHOR
- 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 entity.
    Possible values are:
    - ANCHOR_IN_RANGE_OF_UE: Indicates that the triggered event is spatial anchor
      in range of the UE.
    - ANCHOR_OUT_RANGE_OF_UE: Indicates that the triggered event is spatial anchor
      out of range of the UE.
    - UE_IN_RANGE_OF_ANCHOR: Indicates that the triggered event is UE entering
      in range of spatial anchor.
    - UE_OUT_RANGE_OF_ANCHOR: Indicates that the triggered event is UE leaving
      the range of spatial anchor.

```

```

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

```

A.3 SS_SAnDiscovery API

openapi: 3.0.0

info:

```

title: SAn Server Spatial Anchors Discovery Service
version: 1.0.1
description: |
  API for Spatial Anchors Discovery Service.
  ©2026, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.

```

externalDocs:

```

description: >
  3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
  Metaverse Enablement Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/

```

servers:

```

- url: "{apiRoot}/ssan-disc/v1"
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.

```

security:

```

- {}
- OAuth2ClientCredentials: []

```

paths:

```

/spatial-anchors:
  get:
    summary: Discover Spatial Anchors profiles.
    operationId: DiscSpatialAnchorsProfiles
    tags:
      - Spatial Anchors (Collection)
    parameters:
      - name: anchor-ids
        in: query
        description: Contains the identifier(s) of the targeted spatial anchor(s).
        style: form
        explode: false
        schema:
          type: array
          items:
            $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/SpatialAnchorId'
            minItems: 1
      - name: area-int
        in: query
        description: >
          Contains the area of interest within which the targeted spatial anchors are located.
        content:
          application/json:
            schema:

```

```

    $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  - name: svc-id
    in: query
    description: Contains the identifier of the target VAL service.
    schema:
      type: string
  - name: anch-inf
    in: query
    description: >
      Contains the application specific information of the targeted spatial anchors.
    content:
      application/json:
        schema:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
  - name: supp-feats
    in: query
    description: >
      Contains the list of supported feature(s) among the ones defined in clause 6.1.2.8.
    content:
      application/json:
        schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
  '200':
    description: >
      OK. The Spatial Anchors profiles matching the filter criteria are returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialAnchorsDiscResp'
  '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:

#
# STRUCTURED DATA TYPES
#

SpatialAnchorsDiscResp:
  description: >
    Represents the Spatial Anchors discovery response.
  type: object
  properties:
    results:
      type: array
      items:
        $ref: 'TS29437_SS_SANManagement.yaml#/components/schemas/SpatialAnchorProfile'
  suppFeat:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - results

```

```

# SIMPLE DATA TYPES
#

```

```

#
# ENUMERATIONS
#

```

```

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

```

A.4 SS_SAnUsage API

openapi: 3.0.0

```

info:
  title: SAn Server Spatial Anchor Usage Service
  version: 1.0.1
  description: |
    API for SAn Server Spatial Anchor Usage Service.
    ©2026, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

```

```

externalDocs:
  description: >
    3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
    Metaverse Enablement Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/

```

```

servers:
  - url: "{apiRoot}/ssan-usg/v1"
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.

```

```

security:
  - {}
  - oAuth2ClientCredentials: []

```

```

paths:
  /subscriptions:
    post:
      summary: Create a new Spatial Anchors Usage Information Subscription.
      operationId: CreateSpatialAnchorsUsageSub
      tags:
        - Spatial Anchors Usage Information Subscription (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'
      responses:
        '200':
          description: >
            OK. The requested Spatial Anchors Usage Information report(s) are successfully returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialAnchorsUsageInfo'
        '201':
          description: >
            Created. The Spatial Anchors Usage Information Subscription is successfully created and
            a representation of the created Individual Spatial Anchors Usage Information
            Subscription resource is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'
      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:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  SpatialAnchorsUsageInfoNotif:
    '{$request.body#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialAnchorsUsageInfoNotif'
  responses:
    '204':
      description: >
        No Content. The Spatial Anchors Usage Information Notification is successfully
        received and acknowledged.
    '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 the Individual Spatial Anchors Usage Information Subscription
        resource.
      required: true
      schema:

```

```

    type: string

get:
  summary: Retrieve an existing Individual Spatial Anchors Usage Information Subscription
resource.
  operationId: GetIndSpatialAnchorsUsageInfoSub
  tags:
    - Individual Spatial Anchors Usage Information Subscription (Document)
  responses:
    '200':
      description: >
        OK. The requested Individual Spatial Anchors Usage Information Subscription is returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'
    '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 Spatial Anchors Usage Information Subscription
resource.
  operationId: UpdateIndSpatialAnchorsUsageInfoSub
  tags:
    - Individual Spatial Anchors Usage Information Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'
  responses:
    '200':
      description: >
        OK. The Individual Spatial Anchors Usage Information Subscription resource is
        successfully updated and a representation of the updated resource is returned in the
        response body.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'
    '204':
      description: >
        No Content. The Individual Spatial Anchors Usage Information Subscription 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: Modify an existing Individual Spatial Anchors Usage Information Subscription resource.

operationId: ModifyIndSpatialAnchorsUsageInfoSub

tags:

- Individual Spatial Anchors Usage Information Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialAnchorsUsageInfoSubPatch'

responses:

'200':

description: >

OK. The Individual Spatial Anchors Usage Information Subscription resource is successfully modified and a representation of the updated resource shall be returned in the response body.

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialAnchorsUsageInfoSub'

'204':

description: >

No Content. The Individual Spatial Anchors Usage Information Subscription 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 Spatial Anchors Usage Information Subscription resource.

operationId: DeleteIndSpatialAnchorsUsageInfoSub

tags:

- Individual Spatial Anchors Usage Information Subscription (Document)

responses:

'204':

description: >

No Content. The Individual Spatial Anchors Usage Information Subscription 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'
```

/report:

post:

summary: Enables a service consumer to report the spatial anchor usage information.

operationId: ReportSpatialAnchorsUsageInfo

tags:

- Report Spatial Anchor Usage Information

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialAnchorUsageReportReq'

responses:

'204':

description: >

No Content. The reported Spatial Anchor Usage Information 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'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: "{tokenUrl}"

scopes: {}

schemas:

#

STRUCTURED DATA TYPES

#

```
SpatialAnchorsUsageInfoSub:
  description: >
    Represents the spatial anchors usage information subscription.
  type: object
  properties:
    eventSubs:
      type: array
      items:
        $ref: '#/components/schemas/AnchorsUsageSub'
      minItems: 1
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    report:
      $ref: '#/components/schemas/SpatialAnchorsUsageInfoNotif'
    sampInt:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    reportReq:
      $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - eventSubs

SpatialAnchorsUsageInfoSubPatch:
  description: >
    Represents the spatial anchors usage information subscription.
  type: object
  properties:
    eventSubs:
      type: array
      items:
        $ref: '#/components/schemas/AnchorsUsageSub'
      minItems: 1
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    sampInt:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    reportReq:
      $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

AnchorsUsageSub:
  description: >
    Represent the subscription details related to spatial anchor usage.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnchorUsageEvent'
    evntFltr:
      $ref: '#/components/schemas/AnchorsUsageEventFilter'
  required:
    - event
    - evntFltr

AnchorsUsageEventFilter:
  description: >
    Represents the filter information for anchors usage event.
  type: object
  properties:
    anchAnlFltr:
      $ref: '#/components/schemas/AnchorsUsageFilter'

AnchorsUsageFilter:
  description: >
    Represents the spatial anchors usage filter information.
  type: object
  properties:
    anchIds:
      type: array
      items:
        $ref: 'TS29437_SS_SANManagement.yaml#/components/schemas/SpatialAnchorId'
      minItems: 1
    anchLoc:
      $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
  area:
```

```
    $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  appId:
    type: string
  anyOf:
    - required: [anchIds]
    - required: [anchLoc]
    - required: [area]
    - required: [appId]

SpatialAnchorsUsageInfoNotif:
  description: >
    Represents the spatial anchors usage information notification.
  type: object
  properties:
    subId:
      type: string
    reports:
      type: array
      items:
        $ref: '#/components/schemas/SpatialAnchorsUsageReport'
      minItems: 1
  required:
    - subId
    - reports

SpatialAnchorsUsageReport:
  description: >
    Represents the usage report in the notification.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/AnchorUsageEvent'
    anchUsgInf:
      type: array
      items:
        $ref: '#/components/schemas/AnchorsUsageInfo'
      minItems: 1
  required:
    - event

AnchorsUsageInfo:
  description: >
    Represents the anchor usage details.
  type: object
  properties:
    anchIds:
      type: array
      items:
        $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/SpatialAnchorId'
      minItems: 1
    discAcc:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    serAcc:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    anchDensity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    usrDensity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - anchIds
    - discAcc
    - serAcc
    - anchDensity
    - usrDensity

SpatialAnchorUsageReportReq:
  description: >
    Represents the request for spatial anchor usage report.
  type: object
  properties:
    anchUsg:
      type: array
      items:
        $ref: '#/components/schemas/AnchorUsage'
      minItems: 1
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
```

```

    - anchUsg

AnchorUsage:
  description: >
    Represents the anchor usage information reported.
  type: object
  properties:
    anchId:
      $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/SpatialAnchorId'
    access:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    repPer:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
  required:
    - anchId
    - access

SpatialAnchorsUsageInfo:
  description: >
    Represents the response to the spatial anchor usage information request.
  type: object
  properties:
    reports:
      type: array
      items:
        $ref: '#/components/schemas/SpatialAnchorsUsageReport'
      minItems: 0
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - reports

# SIMPLE DATA TYPES
#
#
# ENUMERATIONS
#
AnchorUsageEvent:
  anyOf:
    - type: string
      enum:
        - SPATIAL_ANCHOR_USAGE_INFORMATION
    - 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 entity.
        Possible values are:
        - SPATIAL_ANCHOR_USAGE_INFORMATION: Indicates that the event is related to spatial
          anchors usage.
# Data types describing alternative data types or combinations of data types:
#

```

A.5 SS_SmManagement API

openapi: 3.0.0

```

info:
  title: SM Server Spatial Map Management Service
  version: 1.0.1
  description: |
    API for Spatial Map Management Service.
    ©2026, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.

externalDocs:
  description: >
    3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
    Metaverse Enablement Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/

servers:
  - url: "{apiRoot}/ssm-smm/v1"

```

```
variables:
  apiRoot:
    default: https://example.com
    description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.

security:
- {}
- OAuth2ClientCredentials: []

paths:
  /spatial-maps:
    post:
      summary: Create a new Spatial Map.
      operationId: CreateSpatialMap
      tags:
        - Spatial Maps (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SpatialMapCreateReq'
      responses:
        '201':
          description: >
            Created. The Spatial Map is successfully created and a representation of the created
            Individual Spatial Map resource shall be returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialMap'
          headers:
            Location:
              description: Contains the URI of the newly created resource.
              required: true
              schema:
                type: string
        '202':
          description: >
            Accepted. The SM server has accepted the request and processing it.
            The assigned Spatial Map Identifier shall be returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialMapTempResp'
        '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:
          $ref: 'TS29122_CommonData.yaml#/components/responses/default'
      callbacks:
        SpatialMapsNotif:
          '{$request.body#/notifUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/SpatialMapsNotif'
              responses:
```

```

    '204':
      description: >
        No Content. The Spatial Maps Notification is successfully
        received and acknowledged.
    '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'

get:
  summary: Retrieve spatial map information.
  operationId: GetSpatialMap
  tags:
    - Spatial Maps (Collection)
  parameters:
    - name: svc-id
      in: query
      description: >
        Contains the VAL application service identifier.
      schema:
        type: string
        required: true
    - name: map-id
      in: query
      description: >
        Contains the identifier of the spatial map.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMapId'
    - name: map-layer-list
      in: query
      description: >
        Contains a list of spatial map layers.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMapLayers'
    - name: aug-with
      in: query
      description: >
        Contains the information augmented with the spatial map layers.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/AugmentLayerList'
  responses:
    '200':
      description: >
        OK. The requested spatial map information is returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMapRetResp'
    '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'

/spatial-maps/{spatialMapId}:
  parameters:
    - name: spatialMapId
      in: path
      description: >
        Represents the identifier of the Individual Spatial Map.
      required: true
      schema:
        type: string
  get:
    summary: Retrieve an existing Individual Spatial Map Resource.
    operationId: GetIndSpatialMap
    tags:
      - Individual Spatial Map (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual Spatial Map resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SpatialMap'
      '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 Spatial Map resource.
    operationId: UpdateIndSpatialMap
    tags:
      - Individual Spatial Map (Document)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMap'

```

```
responses:
  '200':
    description: >
      OK. The Individual Spatial Map resource is successfully updated and
      a representation of the updated resource shall be returned in the response body.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialMap'
  '204':
    description: >
      No Content. The Individual Spatial Map 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: Modify an existing Individual Spatial Map resource.
  operationId: ModifyIndSpatialMap
  tags:
    - Individual Spatial Map (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialMapPatch'
  responses:
    '200':
      description: >
        OK. The Individual Spatial Map resource is successfully modified and
        a representation of the updated resource shall be returned in the response body.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMap'
    '204':
      description: >
        No Content. The Individual Spatial Map 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 Spatial Map resource.
 operationId: DeleteIndSpatialMap

tags:

- Individual Spatial Map (Document)

responses:

```

'204':
  description: >
    No Content. The Individual Spatial Map 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'

```

/subscriptions:

post:

summary: Create a new Spatial Maps Subscription.
 operationId: CreateSpatialMapsSubs

tags:

- Spatial Maps Subscriptions (Collection)

requestBody:

required: true

content:

```

application/json:
  schema:
    $ref: '#/components/schemas/SpatialMapsSub'

```

responses:

```

'201':
  description: >
    Created. The Spatial Maps Subscription is successfully created and a
    representation of the created Individual Spatial Maps Subscription
    resource shall be returned in the response body.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SpatialMapsSub'
  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:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
callbacks:
  SpatialMapsNotif:
    '{$request.body#/notifUri}':
      post:
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialMapsNotif'
  responses:
    '204':
      description: >
        No Content. The Spatial Maps Notification is successfully
        received and acknowledged.
    '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 the Spatial Maps Subscription.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual Spatial Maps Subscription resource.
    operationId: GetIndSpatialMapsSubs
    tags:
      - Individual Spatial Maps Subscription (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual Spatial Maps Subscription
          resource is returned.
        content:

```

```

    application/json:
      schema:
        $ref: '#/components/schemas/SpatialMapsSub'
  '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 Spatial Maps Subscription resource.
 operationId: UpdateIndSpatialMapsSubs

tags:

- Individual Spatial Maps Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialMapsSub'

responses:

'200':

description: >

OK. The Individual Spatial Maps Subscription resource is successfully updated and a representation of the updated resource shall be returned in the response body.

content:

application/json:

schema:

\$ref: '#/components/schemas/SpatialMapsSub'

'204':

description: >

No Content. The Individual Spatial Maps Subscription 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 Spatial Maps Subscription
resource.
  operationId: ModifyIndSpatialMapsSubs
  tags:
    - Individual Spatial Maps Subscription (Document)
  requestBody:
    required: true
    content:
      application/merge-patch+json:
        schema:
          $ref: '#/components/schemas/SpatialMapsSubPatch'
  responses:
    '200':
      description: >
        OK. The Individual Spatial Maps Subscription resource is successfully
        modified and a representation of the updated resource shall be returned in the
        response
        body.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SpatialMapsSub'
    '204':
      description: >
        No Content. The Individual Spatial Maps Subscription 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: Request the deletion of an existing Individual Spatial Maps Subscription resource.
  operationId: DeleteIndSpatialMapsSubs
  tags:
    - Individual Spatial Maps Subscription (Document)
  responses:
    '204':
      description: >
        The Individual Spatial Maps Subscription 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'

```

```

    $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:

#

STRUCTURED DATA TYPES

#

```

  SpatialMapCreateReq:
    description: >
      Represents the spatial map creation request.
    type: object
    properties:
      svcId:
        type: string
      areaInt:
        $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      mapInf:
        $ref: '#/components/schemas/SpatialMapCreateInfo'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - svcId
      - areaInt

```

```

  SpatialMapCreateInfo:
    description: >
      Represents the spatial map information to create.
    type: object
    properties:
      allwEnt:
        $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/AllowedRules'
      lyrInf:
        type: array
        items:
          $ref: '#/components/schemas/MapLayerInfo'
        minItems: 1
      augLyrInf:
        type: array
        items:
          $ref: '#/components/schemas/AugmentLayerInfo'
        minItems: 1
    anyOf:
      - required: [allwEnt]
      - required: [lyrInf]
      - required: [augLyrInf]

```

```

  AugmentLayerInfo:
    description: >
      Represents the augmented spatial map layer information.
    type: object
    properties:
      augWith:
        $ref: '#/components/schemas/AugmentLayer'
      augLyrDet:
        type: array
        items:
          type: string
        minItems: 1
    required:
      - augWith

```

```
SpatialMap:
  description: >
    Represents the spatial map resource representation.
  type: object
  properties:
    svcId:
      type: string
    smProf:
      $ref: '#/components/schemas/SpatialMapProfile'
    augLyrInf:
      $ref: '#/components/schemas/AugmentLayerInfo'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - smProf

SpatialMapProfile:
  description: >
    Represents the spatial map profile information.
  type: object
  properties:
    mapId:
      $ref: '#/components/schemas/SpatialMapId'
    mapCov:
      $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
    allwEnt:
      $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/AllowedRules'
    mapLyrList:
      $ref: '#/components/schemas/SpatialMapLayers'
    objList:
      type: array
      items:
        $ref: '#/components/schemas/MapObjectInfo'
      minItems: 1
  required:
    - mapId
    - mapCov
    - mapLyrList

SpatialMapLayers:
  description: >
    Represents the spatial map layers information.
  type: object
  properties:
    lyrList:
      type: array
      items:
        $ref: '#/components/schemas/SpatialMapLayerInfo'
      minItems: 1
  required:
    - lyrList

SpatialMapLayerInfo:
  description: >
    Represents the individual spatial map layer.
  type: object
  properties:
    mapLyrId:
      type: string
    mapLyrInf:
      $ref: '#/components/schemas/MapLayerInfo'
  required:
    - mapLyrId

MapLayerInfo:
  description: >
    Represents the layer specific information of an spatial map layer.
  type: object
  properties:
    area:
      $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
    mapAsc:
      type: string
  anyOf:
    - required: [area]
    - required: [mapAsc]

MapObjectInfo:
```

```
description: >
  Represents the spatial map object.
type: object
properties:
  objId:
    type: string
  objType:
    type: string
  objPos:
    $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Local3dPointUncertaintyEllipsoid'
  objInf:
    type: string
required:
- objId
- objType

SpatialMapPatch:
description: >
  Represents the partial spatial map resource representation.
type: object
properties:
  svcId:
    type: string
  smProf:
    $ref: '#/components/schemas/SpatialMapProfile'
  augLyrInf:
    type: array
    items:
      $ref: '#/components/schemas/AugmentLayerInfo'
    minItems: 1

SpatialMapRetResp:
description: >
  Represents the spatial map information returned in response.
type: object
properties:
  svcId:
    type: string
  mapInf:
    $ref: '#/components/schemas/SpatialMapProfile'
  augLyrInf:
    $ref: '#/components/schemas/AugmentLayerInfo'
required:
- mapInf

SpatialMapsSub:
description: >
  Represents the spatial map events subscription request.
type: object
properties:
  eventSubs:
    type: array
    items:
      $ref: '#/components/schemas/MapEventSub'
    minItems: 1
  svcId:
    type: string
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  report:
    $ref: '#/components/schemas/SpatialMapsNotif'
  reportReq:
    $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
  expTime:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
- eventSubs
- svcId
- notifUri

MapEventSub:
description: >
  Represents the spatial map event subscription details.
type: object
properties:
  event:
```

```
    $ref: '#/components/schemas/MapEvent'
  mapId:
    $ref: '#/components/schemas/TargetSpatialMaps'
  evntFiltr:
    $ref: '#/components/schemas/EventFilter'
  required:
    - event
    - mapId

TargetSpatialMaps:
  description: >
    Represents the target spatial maps for events.
  type: object
  properties:
    mapIds:
      type: array
      items:
        $ref: '#/components/schemas/SpatialMapId'
      minItems: 1
    area:
      $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
    locInfo:
      $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
    pose:
      $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/Pose'
  anyOf:
    - required: [mapIds]
    - required: [locInfo]
    - required: [area]
    - required: [pose]

EventFilter:
  description: >
    Represents the event filters for spatial map events subscription.
  type: object
  properties:
    objList:
      type: array
      items:
        type: string
      minItems: 1
    layers:
      type: array
      items:
        type: string
      minItems: 1
  anyOf:
    - required: [objList]
    - required: [layers]

SpatialMapsSubPatch:
  description: >
    Represents the spatial map event subscription modification.
  type: object
  properties:
    eventSubs:
      type: array
      items:
        $ref: '#/components/schemas/MapEventSub'
      minItems: 1
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    reportReq:
      $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

SpatialMapsNotif:
  description: >
    Represents the spatial maps event notification.
  type: object
  properties:
    subId:
      type: string
    reports:
      type: array
      items:
        $ref: '#/components/schemas/MapsReport'
```

```

        minItems: 1
      required:
      - subId
      - reports

MapsReport:
  description: >
    Represents the spatial map event report details.
  type: object
  properties:
    mapIds:
      type: array
      items:
        $ref: '#/components/schemas/SpatialMapId'
      minItems: 1
    event:
      $ref: '#/components/schemas/MapEvent'
    objDet:
      type: array
      items:
        $ref: '#/components/schemas/MapObjectChangeReport'
      minItems: 1
    lyrDet:
      $ref: '#/components/schemas/SpatialMapLayers'
  required:
  - mapIds
  - event

MapObjectChangeReport:
  description: >
    Represents the map object change details.
  type: object
  properties:
    objInf:
      $ref: '#/components/schemas/MapObjectInfo'
    objChgEvt:
      $ref: '#/components/schemas/MapObjectChangeEvent'
  required:
  - objInf

SpatialMapTempResp:
  description: >
    Represents the SM server has accepted the request and processing it. The assigned
    Spatial Map Identifier shall be returned.
  type: object
  properties:
    mapId:
      $ref: '#/components/schemas/SpatialMapId'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
  - mapId

AugmentLayerList:
  description: >
    Represents the list of augment layer values.
  type: object
  properties:
    augLyrs:
      type: array
      items:
        $ref: '#/components/schemas/AugmentLayer'
      minItems: 1
  required:
  - augLyrs

# SIMPLE DATA TYPES
#
SpatialMapId:
  $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
#
# ENUMERATIONS
#
AugmentLayer:
  anyOf:
  - type: string
  enum:
  - VAL_USERS

```

```

- SPATIAL_ANCHORS
- 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 entity.
  Possible values are:
  - VAL_SERVER: Indicates that the spatial map layer augment information is VAL users.
  - VAL_CLIENT: Indicates that the spatial map layer augment information is Spatial
    Anchors.

MapEvent:
anyOf:
- type: string
enum:
- CHANGE_OF_OBJECTS
- LAYERS_MODIFICATION
- SPATIAL_MAP_READY
- 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 entity.
  Possible values are:
  - CHANGE_OF_OBJECTS: Indicates that the spatial map event is change of objects.
  - LAYERS_MODIFICATION: Indicates that the spatial map event is modification of spatial
    map layers.
  - SPATIAL_MAP_READY: Indicates that the spatial map event is spatial map ready.

MapObjectChangeEvent:
anyOf:
- type: string
enum:
- ADDED
- REMOVED
- CHANGED_POSITION
- CHANGED_DIRECTION
- ANY_OTHER
- 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 entity.
  Possible values are:
  - ADDED: Indicates that the spatial map object is added.
  - REMOVED: Indicates that the spatial map object is removed.
  - CHANGED_POSITION: Indicates that the spatial map object is changed position.
  - CHANGED_DIRECTION: Indicates that the spatial map object is changed direction.
  - ANY_OTHER: Indicates that the spatial map object is any other.
# Data types describing alternative data types or combinations of data types:
#
```

A.6 SS_SmDiscovery API

openapi: 3.0.0

info:

title: SM Server Spatial Maps and SMAS Discovery Service

version: 1.0.1

description: |

Spatial Maps and SMAS Discovery Service.

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externalDocs:

description: >

3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);

Metaverse Enablement Services; Stage 3.

url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/

```

servers:
  - url: "{apiRoot}/ssm-disc/v1"
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.

security:
  - {}
  - oAuth2ClientCredentials: []

paths:
  /spatial-maps:
    get:
      summary: Discover spatial maps or SMAS information from the SM Server.
      operationId: DiscSpatialMapsSmas
      tags:
        - Spatial Maps (Collection)
      parameters:
        - name: app-svc-id
          in: query
          description: >
            Contains the identifier of VAL application service.
          schema:
            type: string
        - name: map-disc-fltr
          in: query
          description: >
            Contains the set of characteristics related to the spatial maps.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialMapsDiscFilter'
        - name: loc-info
          in: query
          description: >
            Contains the three-dimensional area information, location information and direction.
          content:
            application/json:
              schema:
                $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/LocationInfo'
        - name: pose
          in: query
          description: >
            Contains the pose information.
          content:
            application/json:
              schema:
                $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/Pose'
        - name: supp-feats
          in: query
          description: >
            Contains the list of supported feature(s) among the ones defined in clause 6.2.2.8.
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: >
            OK. The requested spatial map or SMAS information is returned.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SpatialMapsDiscResp'
        '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:
```

```

#
# STRUCTURED DATA TYPES
#

```

```

SpatialMapsDiscFilter:
  description: >
    Represents the discovery filter information for spatial maps.
  type: object
  properties:
    mapLyrList:
      $ref: 'TS29437_SS_SmManagement.yaml#/components/schemas/SpatialMapLayers'

```

```

SpatialMapsDiscResp:
  description: >
    Represents the spatial maps discovery response.
  type: object
  properties:
    svcId:
      type: string
    mapsDisc:
      type: array
      items:
        $ref: '#/components/schemas/SpatialMapDiscovered'
      minItems: 0
    smasList:
      type: array
      items:
        $ref: 'TS29437_SS_SmSmasRegistration.yaml#/components/schemas/SMASProfile'
      minItems: 0
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  anyOf:
    - required: [mapsDisc]
    - required: [smasList]

```

```

SpatialMapDiscovered:
  description: >
    Represents the discovered spatial maps.
  type: object
  properties:
    mapId:
      $ref: 'TS29437_SS_SmManagement.yaml#/components/schemas/SpatialMapId'
  required:
    - mapId

```

```

# SIMPLE DATA TYPES
#

```

```

#
# ENUMERATIONS
#

```

```

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

```

A.7 SS_SmLocalization API

openapi: 3.0.0

info:

title: SM Server Spatial Map Localization
version: 1.0.1
description: |
API for SM Server Spatial Map Localization.
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All rights reserved.

externalDocs:

description: >
3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
Metaverse Enablement Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/

servers:

- url: '{apiRoot}/ssm-loc/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/localization:
get:
summary: Retrieve Spatial Map localization information.
operationId: GetSpatialMapLocalization
tags:
- Spatial Localization
parameters:
- name: area-int
in: query
description: Contains the three-dimensional area or localization information.
content:
application/json:
schema:
\$ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
- name: map-id
in: query
description: >
Contains the spatial map identifier.
required: true
content:
application/json:
schema:
\$ref: 'TS29437_SS_SmManagement.yaml#/components/schemas/SpatialMapId'
- name: target-id
in: query
description: Contains the identifier of the user or object to localize.
content:
application/json:
schema:
\$ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
- name: target-ids
in: query
description: >
Contains the list of the identifier(s) of the user(s) or object(s) to localize.
content:
application/json:
schema:
type: array
items:
\$ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
minItems: 1
- name: supp-feats
in: query
description: >
Contains the list of supported feature(s) among the ones defined in clause 6.1.2.8.
content:
application/json:

```

        schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
responses:
  '200':
    description: >
      OK. The requested SM data source information shall be returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SpatialMapLocalizeResp'
  '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:

#
# STRUCTURED DATA TYPES
#

SpatialMapLocalizeResp:
  description: Represents the spatial map localization response.
  type: object
  properties:
    results:
      type: array
      items:
        $ref: '#/components/schemas/SpatialMapLocDetails'
      minItems: 0
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - results

SpatialMapLocDetails:
  description: Represents the localization details of the spatial map.
  type: object
  properties:
    targetId:
      $ref: 'TS29549_SS_UserProfileRetrieval.yaml#/components/schemas/ValTargetUe'
    position:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/RelativeCartesianLocation'
    pose:
      $ref: 'TS29437_SS_SAnManagement.yaml#/components/schemas/Pose'

# SIMPLE DATA TYPES
#
#

```

```
# ENUMERATIONS
#
#
# Data types describing alternative data types or combinations of data types:
#
```

A.8 SS_SmDataSourceDiscovery API

openapi: 3.0.0

info:

```
  title: SM Server SM Data Source Discovery
  version: 1.0.1
  description: |
    API for SM Server SM Data Source Discovery.
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    All rights reserved.
```

externalDocs:

```
  description: >
    3GPP TS 29.437 V19.1.0; Service Enabler Architecture Layer for Verticals (SEAL);
    Metaverse Enablement Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/
```

servers:

```
- url: '{apiRoot}/ssm-dsdisc/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- oAuth2ClientCredentials: []
```

paths:

```
  /datasource-profiles:
    get:
      summary: Retrieve Spatial Map data source profiles information.
      operationId: GetSpatialMapDataSourceDiscovery
      tags:
        - Spatial Maps Data Source Profiles (Collection)
      parameters:
        - name: area-int
          in: query
          description: Contains the three-dimensional area or localization information.
          content:
            application/json:
              schema:
                $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
        - name: end-point
          in: query
          description: >
            Contains the end point information where the Spatial Map data source sends the SM data.
          content:
            application/json:
              schema:
                $ref: 'TS29558_Eecs_EASRegistration.yaml#/components/schemas/EndPoint'
        - name: ds-disc-fltr
          in: query
          description: Contains the set of characteristics related to Spatial Map data sources.
          content:
            application/json:
              schema:
                $ref: 'TS29558_CommonData.yaml#/components/schemas/SMSDataSourceDiscFilter'
        - name: supp-feats
          in: query
          description: >
            Contains the list of supported feature(s) among the ones defined in clause 6.2.4.8.
          content:
            application/json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
```

```

description: >
  OK. The requested SM data source information shall be returned.
content:
  application/json:
    schema:
      $ref: '#/components/schemas/SMDDataSourceDiscResp'
'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:
```

```

#
# STRUCTURED DATA TYPES
#

```

```

SMDDataSourceDiscFilter:
  description: Represents the SM data source discovery filters.
  type: object
  properties:
    smInfoDets:
      type: array
      items:
        $ref:
'TS24550_SS_SmDataSourceRegistration.yaml#/components/schemas/SpatialMapInfoDetails'
      minItems: 1
      required:
        - smInfoDets

SMDDataSourceDiscResp:
  description: >
    Represents the SM data source discovery response.
  type: object
  properties:
    results:
      type: array
      items:
        $ref: 'TS24550_SS_SmDataSourceRegistration.yaml#/components/schemas/DataSourceProfile'
      minItems: 0
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - results

```

```

# SIMPLE DATA TYPES
#
#

```

```
# ENUMERATIONS
#
```

```
# Data types describing alternative data types or combinations of data types:
#
```

A.9 SS_SmSmasRegistration API

openapi: 3.0.0

info:

```
  title: SMAS Registration Service
  version: 1.0.0
  description: |
    SM Server SMAS Registration Service.
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    All rights reserved.
```

externalDocs:

```
  description: >
    3GPP TS 29.437 V19.0.0; Service Enabler Architecture Layer for Verticals (SEAL);
    Metaverse Enablement Services; Stage 3.
  url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.437/
```

servers:

```
- url: '{apiRoot}/ssm-smasr/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- oAuth2ClientCredentials: []
```

paths:

```
/registrations:
  post:
    summary: Request the creation of a SMAS Registration.
    operationId: CreateSMASReg
    tags:
      - SMAS Registrations (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SMASReg'
    responses:
      '201':
        description: >
          Created. The SMAS Registration is successfully created and a representation of
          the created Individual SMAS Registration resource shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SMASReg'
        headers:
          Location:
            description: >
              Contains the URI of the created Individual SMAS Registration 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'
```

/registrations/{regId}:
parameters:
- name: regId
in: path
description: >
Represents the identifier of the Individual SMAS Registration resource.
required: true
schema:
type: string

get:
summary: Retrieve an existing Individual SMAS Registration resource.
operationId: GetIndSMASReg
tags:
- Individual SMAS Registration (Document)
responses:
'200':
description: >
OK. The requested Individual SMAS Registration resource shall be returned.
content:
application/json:
schema:
\$ref: '#/components/schemas/SMASReg'
'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 SMAS Registration resource.
operationId: UpdateIndSMASReg
tags:
- Individual SMAS Registration (Document)
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/SMASReg'
responses:
'200':
description: >
OK. The Individual SMAS Registration resource is successfully updated and a
representation of the updated resource shall be returned in the response body.
content:
application/json:
schema:
\$ref: '#/components/schemas/SMASReg'

```

'204':
  description: >
    No Content. The Individual SMAS Registration 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 SMAS Registration resource.
 operationId: ModifyIndSMASReg

tags:

- Individual SMAS Registration (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

\$ref: '#/components/schemas/SMASRegPatch'

responses:

```

'200':
  description: >
    OK. The Individual SMAS Registration resource is successfully modified and a
    representation of the updated resource shall be returned in the response body.
  content:
    application/json:
      schema:

```

\$ref: '#/components/schemas/SMASReg'

```

'204':
  description: >
    No Content. The Individual SMAS Registration 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: Request the deletion of an existing Individual SMAS Registration resource.
operationId: DeleteIndSMASReg
tags:
  - Individual SMAS Registration (Document)
responses:
  '204':
    description: >
      No Content. The Individual SMAS Registration 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'

```

components:

```

  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

```

schemas:

```

#
# STRUCTURED DATA TYPES
#

```

```

SMASReg:
  description: Represents an SMAS Registration.
  type: object
  properties:
    profile:
      $ref: '#/components/schemas/SMASProfile'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - profile

```

```

SMASRegPatch:
  description: >
    Represents the requested modifications to an SMAS Registration.
  type: object
  properties:
    profile:
      $ref: '#/components/schemas/SMASProfile'
    expTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTimeRm'

```

```

SMASProfile:
  description: Represents the SMAS Profile.
  type: object
  properties:
    smasInfo:

```

```
    $ref: '#/components/schemas/SMASInfo'
  spatMapInfoList:
    type: array
    items:
      $ref: '#/components/schemas/SpatialMapInfo'
    minItems: 1
  required:
    - smasInfo
    - spatMapInfoList
```

```
SMASInfo:
  description: Represents the SMAS information.
  type: object
  properties:
    endpoint:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    availPeriod:
      $ref: 'TS29549_SS_Events.yaml#/components/schemas/TimeReqs'
    availLoc:
      $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  anyOf:
    - required: [endpoint]
    - required: [availPeriod]
    - required: [availLoc]
```

```
SpatialMapInfo:
  description: Represents the the spatial map related information.
  type: object
  properties:
    mapId:
      $ref: 'TS29437_SS_SmManagement.yaml#/components/schemas/SpatialMapId'
    covArea:
      $ref: 'TS29558_Eecs_EESRegistration.yaml#/components/schemas/ServiceArea'
  required:
    - mapId
    - covArea
```

```
# SIMPLE DATA TYPES
```

```
#
```

```
#
```

```
# ENUMERATIONS
```

```
#
```

```
#
```

```
# Data types describing alternative data types or combinations of data types:
```

```
#
```

Annex B (informative): Withdrawn API versions

B.1 General

This Annex lists withdrawn API versions of the APIs defined in the present specification. 3GPP TS 29.501 [5] clause 4.3.1.6 describes the withdrawal of API versions.

Annex C (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2025-02	CT3#139					Based on the skeleton for the new Metaverse Enablement Services TS (C3-250652). Incorporates agreed pCRs C3-250511, C3-250512, C3-250649, C3-250650.	0.1.0
2025-04	CT3#140	C3-251620				Incorporates agreed pCRs C3-251507, C3-251508, C3-251510, C3-251511, C3-251513, C3-251514, C3-251515.	0.2.0
2025-05	CT3#141	C3-252388				Incorporates agreed pCRs C3-252408, C3-252409, C3-252410, C3-252411, C3-252412, C3-252413.	0.3.0
2025-06	CT#108	CP-251138				Presentation to TSG CT for information.	1.0.0
2025-08	CT3#142	C3-253652				Incorporates agreed pCRs C3-253413, C3-253420, C3-253533, C3-253534, C3-253594, C3-253595, C3-253596, C3-253597, C3-253598, C3-253694, C3-253695, C3-253696	1.1.0
2025-10	CT3#143	C3-254472				Incorporates agreed pCRs C3-254115, C3-254410, C3-254411, C3-254413, C3-254417, C3-254418, C3-254420, C3-254421, C3-254536, C3-254537, C3-254542, C3-254543, C3-254544, C3-254570, C3-254571, C3-254590	1.2.0
2025-11	CT3#144	C3-255660				Incorporates agreed pCRs C3-255068, C3-255090, C3-255091, C3-255334, C3-255431, C3-255432, C3-255433, C3-255434, C3-255435.	1.3.0
2025-12	CT#110	CP-253018				Presentation to TSG CT for approval.	2.0.0
2025-12	CT#110	CP-253018				Approved by TSG CT.	19.0.0
2026-03	CT#111	CP-260070	2	1	F	Spatial Anchor data model correction	19.1.0
2026-03	CT#111	CP-260070	3	2	F	Spatial Anchor usage report correction	19.1.0
2026-03	CT#111	CP-260070	4	2	F	SS_SmManagement API correction	19.1.0
2026-03	CT#111	CP-260070	5	1	F	SS_SmDiscovery API correction	19.1.0
2026-03	CT#111	CP-260070	6	1	F	SS_SmLocalization API correction	19.1.0
2026-03	CT#111	CP-260070	9		F	Corrections to the apiName in resource URIs for the SS_SAnManagement API	19.1.0
2026-03	CT#111	CP-260070	10		F	Corrections to the resource ID variable name in resource URIs for the SS_SAnManagement API	19.1.0
2026-03	CT#111	CP-260070	11	1	F	Corrections to the data model of the SS_SAnManagement API	19.1.0
2026-03	CT#111	CP-260070	12	1	F	Corrections to the SS_SAnDiscovery API	19.1.0
2026-03	CT#111	CP-260070	13	1	F	Corrections to the SS_SAnUsage API	19.1.0
2026-03	CT#111	CP-260070	14	1	F	Corrections to the data model of the SS_SAnUsage API	19.1.0
2026-03	CT#111	CP-260070	15	1	F	Corrections to the definition of the stage 2 SS_SAnUsage_Request service operation	19.1.0
2026-03	CT#111	CP-260070	16	1	F	Corrections to the SS_SmManagement API	19.1.0
2026-03	CT#111	CP-260070	17	1	F	Corrections to the SS_SmManagement API	19.1.0
2026-03	CT#111	CP-260070	18	2	F	Corrections to the SS_SmDiscovery API	19.1.0
2026-03	CT#111	CP-260070	19	1	F	Corrections to the SS_SmLocalization API	19.1.0
2026-03	CT#111	CP-260070	20	1	F	Corrections to the SS_SmDataSourceDiscovery API	19.1.0
2026-03	CT#111	CP-260081	21		F	Update of info and externalDocs fields	19.1.0
2026-03	CT#111	-	-	-	-	Fixes corrupt TS29437_SS_SmManagement.yaml file	19.1.1

History

Version	Date	Status
V19.0.0	February 2026	Publication
V19.1.1	March 2026	Publication