**3GPP TSG CT WG3 Meeting #137 *C3-245081***

**Hefei, CN, 14 - 18 October, 2024**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **0324** | **rev** | **-** | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Dynamic geofencing support in Location Management Service |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eLSAPP |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | This CR implements the agreed CR#0313 of TS 23.434 to suppport the dynamic geofencing in location management service. |
|  |  |
| ***Summary of change:*** | This CR introduces the dynamic geofencing support in Location Management Service |
|  |  |
| ***Consequences if not approved:*** | Stage 2 requirements are not implemented in Stage 3. |
|  |  |
| ***Clauses affected:*** | 5.2.5, 7.5.1.4.1, 7.5.1.4.2.14, 7.5.1.4.2.24 (new), 7.5.1.4.3.4, 7.5.1.6, A.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ... |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | * This CR provides a backwards compatible feature for the SS\_Events API.
 |
| ***()*** |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

\* \* \* First Change \* \* \* \*

### 5.2.5 SS\_LocationMonitoring API

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

Upon the receipt of "LM\_LOCATION\_DEVIATION\_MONITOR" event subscription request from the VAL server, in order to notify the location deviation events to the VAL server, the location management server shall:

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

2. periodically obtain the VAL UE location information using the SEAL location information procedures as per the SS\_LocationReporting and SS\_LocationAreaInfoRetrieval APIs as specified in clauses 5.2.1 and 5.2.4;

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

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

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

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

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

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

d. if the LM\_LocationDeviation\_Ext1 feature is supported and the location management server is not able to determine if the current location of VAL UE is within the dynamic area of interest information provided in "geofCond" within the MonitorLocationInterestFilter structure (as specified in steps 2a and 2b of clause 5.6.1.2.2.2) or not, then notify the VAL server with the "NOTIFY\_UNKNOWN" value in the event report.

and

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

\* \* \* Next change \* \* \* \*

##### 7.5.1.4.1 General

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| EventSubscription | 7.5.1.4.2.4 | Represents the subscription to a single SEAL event. |  |
| GeofencingCondition | 7.5.1.4.2.24 | Represents the geofencing conditions. | LM\_LocationDeviation\_Ext1 |
| PartialEventSubscFailRep | 7.5.1.4.2.23 | Represents the partial failure report during the subscription creation. | PartialFailureSupport |
| IdentityFilter | 7.5.1.4.2.7 | Represents a filter of VAL User / UE identities belonging to a VAL service. |  |
| LMInformation | 7.5.1.4.2.8 | The location information for a VAL User ID or a VAL UE ID. |  |
| LocationAreaMonReport | 7.5.1.4.2.20 | Represents the event report to notify the VAL UEs moving in or moving out from a given location. |  |
| LocationDevMonReport | 7.5.1.4.2.15 | Represents the event report to notify the VAL UE/User's location deviation from a given location. |  |
| LocationInfoCriteria | 7.5.1.4.2.18 | Represents the location information to be monitored.It includes the geographic location information or a reference UE along with the application defined proximity range from the reference UE. |  |
| LocDevNotification | 7.5.1.4.3.4 | Enumeration of location deviation notification reports. |  |
| MessageFilter | 7.5.1.4.2.9 | The message filter information applicable to member VAL UEs or Users of the VAL group in the group change notification. |  |
| MonitorEvents | 7.5.1.4.2.11 | Represents the details of the monitoring and analytics events. | NRM\_EventMonitor |
| MonitorEventsReport | 7.5.1.4.2.12 | Represents the monitoring and analytics events information related to VAL UE or User. | NRM\_EventMonitor |
| MonitorFilter | 7.5.1.4.2.10 | Represents the filter information VAL User or UEs and the related events to be monitored. | NRM\_EventMonitor |
| MonitorLocationInterestFilter | 7.5.1.4.2.14 | Filter information to subscribe for monitoring the VAL UE/User location in a given area of interest. |  |
| MonLocAreaInterestFltr | 7.5.1.4.2.17 | Filter information to subscribe for location area monitoring information for a given area of interest. |  |
| MonLocTriggerEvent | 7.5.1.4.3.5 | Identifies the triggering event in the location area monitor filtering. |  |
| MoveInOutUEDetails | 7.5.1.4.2.21 | Represents the list of UEs either moved into the location area or moved out of the location area. |  |
| ReferenceUEDetail | 7.5.1.4.2.19 | Represents the reference UE details |  |
| SEALEvent | 7.5.1.4.3.3 | Represents the type of SEAL events that can be subscribed. |  |
| SEALEventDetail | 7.5.1.4.2.5 | Represents the SEAL event detail. |  |
| SEALEventNotification | 7.5.1.4.2.3 | Represents an individual SEAL Event Subscription Notification. |  |
| SEALEventSubscription | 7.5.1.4.2.2 | Represents an individual SEAL Event Subscription resource. |  |
| SEALEventSubscriptionPatch | 7.5.1.4.2.22 | Represents the parameters to request the modification of a SEAL Event subscription resource. | SubscUpdate |
| TempGroupInfo | 7.5.1.4.2.16 | Represents the created temporary VAL group information. | GM\_TempGroup |
| VALGroupFilter | 7.5.1.4.2.6 | Represents a filter of VAL group identifiers belonging to a VAL service. |  |
| ValidityConditions | 7.5.1.4.2.13 | Represents the temporal and/or spatial conditions applied for the events to be monitored. | NRM\_EventMonitor |

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

Table 7.5.1.4.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AccessType | 3GPP TS 29.522 [28] | Used to represent the access type. | LM\_LocationDeviation\_Ext1 |
| AnalyticsEvent | 3GPP TS 29.522 [28] | Analytics event in NWDAF. | NRM\_EventMonitor |
| DateTime | 3GPP TS 29.122 [3] | Used to indicate a timestamp. |  |
| DurationSec | 3GPP TS 29.571 [21] | Used to indicate the notification interval in the location monitoring filter. |  |
| Float | 3GPP TS 29.571 [21] | Used to represent the fractional part of the proximity range in the reference UE details. |  |
| GeographicArea | 3GPP TS 29.572 [31] | Identifies the geographical information of the user(s). |  |
| LocationArea5G | 3GPP TS 29.122 [3] | User location area when the UE is attached to 5G. | NRM\_EventMonitor |
| LocationInfo | 3GPP TS 29.122 [3] | Location information |  |
| LocationQoS | 3GPP TS 29.572 [31] | Identifies QoS requested by VAL server. | LM\_LocationInfoChange\_Extension1 |
| MonitoringType | 3GPP TS 29.122 [3] | Monitoring event type in 3GPP system core network. | NRM\_EventMonitor |
| PlmnIdNid | 3GPP TS 29.571 [21] | Used to represent PLMN | LM\_LocationDeviation\_Ext1 |
| ProfileDoc | Clause 7.3.1.4.2.2 | Used to send VAL User or VAL UE profile information as part of event detail in the event notification. |  |
| ReportingInformation | 3GPP TS 29.523 [20] | Used to indicate the reporting requirement, only the following information are applicable for SEAL:- immRep- notifMethod- maxReportNbr- monDur- repPeriod |  |
| ScheduledCommunicationTime | 3GPP TS 29.122 [3] | Used to define the time frame for message filters.  |  |
| SupportedFeatures | 3GPP TS 29.571 [21] | Used to negotiate the applicability of optional features defined in table 7.5.1.6-1. |  |
| TestNotification | 3GPP TS 29.122 [3] | Following differences apply:- The SCEF is the SEAL server; and- The SCS/AS is the subscribing VAL server. |  |
| TimeWindow | 3GPP TS 29.122 [3] | Time window identified by a start time and a stop time. | NRM\_EventMonitor |
| Uinteger | 3GPP TS 29.571 [21] | Used to represent maximum number of messages in MesageFilter data type. |  |
| Uri | 3GPP TS 29.122 [3] | Used to indicate a notification URI. |  |
| VALGroupDocument | Clause 7.2.1.4.2.2 | Used to send VAL group document as part of event detail in the event notification. |  |
| ValSvcAreaId | Clause 7.1.3.4.3.2 | Used to represent the VAL service area identifier. | ValSrvArea |
| ValTargetUe | 7.3.1.4.2.3 | Used to identify a VAL user ID or a VAL UE ID. |  |
| WebsockNotifConfig | 3GPP TS 29.122 [3] | Following differences apply:- The SCEF is the CAPIF core function; and- The SCS/AS is the Subscribing functional entity. |  |

\* \* \* Next change \* \* \* \*

###### 7.5.1.4.2.14 MonitorLocationInterestFilter

Table 7.5.1.4.2.14-1: Definition of type MonitorLocationInterestFilter

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| tgtUes | array(ValTargetUe) | M | 1..N | List of VAL User(s) or UE ID(s) for which location monitoring is requested for the given location information. |  |
| locInt | LocationInfo | C | 0..1 | Location information where the VAL server wishes to monitor the target VAL UE(s) location deviation.(NOTE) |  |
| valSvcId | ValSvcAreaId | C | 0..1 | Identifier of the VAL service area where the VAL server wishes to monitor the target VAL UE(s) location deviation.(NOTE) | ValSrvArea |
| notInt | DurationSec | M | 1 | Periodic time interval in which the LM server needs to notify the VAL UE's location information. |  |
| events | array(LocDevNotification) | O | 0..1 | Indicates the required location monitoring events. | LM\_LocationDeviation\_Ext1 |
| geofCond | GeofencingCondition | O | 0..1 | Indicates the geofencing conditions, | LM\_LocationDeviation\_Ext1 |
| NOTE: If the "ValSrvArea" feature is supported, then one of "locInt" or "valSvcId" attributes shall be provided; otherwise the "locInt" attribute shall be provided. |

\* \* \* Next change \* \* \* \*

###### 7.5.1.4.2.24 GeofencingCondition

Table 7.5.1.4.2.24-1: Definition of type GeofencingCondition

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| plmn | PlmnIdNid | O | 0..1 | Represents the operator identifier. |  |
| roamingInd | boolean | O | 0..1 | Represents the roaming status.- "true" indicates that roaming status is roaming.- "false" indicates that roaming status is non-roaming. The default value is "false” when this attribute is omitted.  |  |
| accessType | AccessType | O | 0..1 | Represents the access type. |  |
| locInfo | array(LocationInfo) | O | 1..N | Represents the spatial conditions. |  |
| schedules | array(ScheduledCommunicationTime) | O | 1..N | Indicates the requested monitoring schedule, e.g., day(s) of the week and/or time period(s). |  |

\* \* \* Next change \* \* \* \*

###### 7.5.1.4.3.4 Enumeration: LocDevNotification

Table 7.5.1.4.3.4-1: Enumeration LocDevNotification

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| NOTIFY\_MISMATCH\_LOCATION | This value indicates that the location information of the VAL UE(s) from the SEAL LM client and the core network are not matching. |  |
| NOTIFY\_ABSENCE | This value indicates that the current location information of the VAL UE(s) is deviating from the VAL server's area of interest. |  |
| NOTIFY\_PRESENCE | This value indicates that the current location information of the VAL UE(s) is within the VAL server's area of interest. |  |
| NOTIFY\_UNKNOWN | This value indicates that the LM server cannot determine whether the target VAL UE current location is within the VAL server's dynamic area of interest information or not. | LM\_LocationDeviation\_Ext1 |

\* \* \* Next change \* \* \* \*

#### 7.5.1.6 Feature Negotiation

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

Table 7.5.1.6-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | Testing of notification connection is supported according to clause 6.6. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.6. This feature requires that the Notification\_test\_event feature is also supported. |
| 3 | LM\_LocationInfoChange | This feature supports the location information change event. |
| 4 | GM\_GroupInfoChange | This feature supports the group information change event. |
| 5 | CM\_UserProfileChange | This feature supports the user profile change event. |
| 6 | GM\_GroupCreate | This feature supports the group creation event. |
| 7 | GM\_MessageFilter | This feature supports the message filter information in group information change event. |
| 8 | NRM\_EventMonitor | This feature supports the monitoring of events related to VAL UEs or Users. |
| 9 | LM\_LocationDeviation | This feature supports the monitoring of VAL UE / User's deviation from a given area of interest. |
| 10 | GM\_TempGroup | This feature supports the functionality of temporary VAL group formation within a VAL system. |
| 11 | LM\_LocationAreaMonitor | This feature supports the monitoring of VAL UEs which are moving in or moving out from a given area of interest. |
| 12 | SubscUpdate | Indicates the support for updating an SEAL event subscription resource. |
| 13 | LM\_SuppLoc | This feature indicates the support of supplementary location information. This feature requires the support of the LM\_LocationInfoChange feature. |
| 14 | enNB1 | This feature indicates the support of enhancements to this application layer API in Rel-18. |
| 15 | PartialFailureSupport | Indicates the support of the partial failure cases during a SEAL event subscription creation/update. |
| 16 | ValSrvArea | This feature indicates the support of VAL service area ID functionality as part of the phase-3 of the enhancements to the SEAL framework.The following functionalities are supported:- Support the usage of the VAL service area identifier to identify a VAL service area. |
| 17 | LM\_LocationInfoChange\_Extension1 | This feature indicates the support of the enhancement to location information change event as part of the 5G-enabled fused location service capability exposure.The following functionalities are supported:- Support location information requests with expected location QoS requirements.This feature requires the support of the LM\_LocationInfoChange feature. |
| 18 | GM\_GroupDeletion | This feature indicates the support of group deletion event notifications as part of the enhancements to this application layer API. |
| 19 | LM\_LocationDeviation\_Ext1 | This feature indicates the support of the enhancement to location deviation monitoring as part of the enhanced application layer support for location services.The following functionalities are supported:- Support of geofencing conditions.- Support new "NOTIFY\_UNKNOWN" event.This feature requires the support of the LM\_LocationDeviation feature. |

\* \* \* Next change \* \* \* \*

# A.6 SS\_Events API

openapi: 3.0.0

info:

 title: SS\_Events

 description: |

 API for SEAL Events management.

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 version: "1.3.0-alpha.1"

externalDocs:

 description: >

 3GPP TS 29.549 V19.0.0 Service Enabler Architecture Layer for Verticals (SEAL);

 Application Programming Interface (API) specification; Stage 3.

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

security:

 - {}

 - oAuth2ClientCredentials: []

servers:

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

 variables:

 apiRoot:

 default: https://example.com

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

paths:

 /subscriptions:

 post:

 description: Creates a new individual SEAL Event Subscription.

 operationId: CreateSealEventSubsc

 tags:

 - SEAL Events Subscriptions (Collection)

 requestBody:

 required: true

 content:

 application/json:

 schema:

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

 callbacks:

 notificationDestination:

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

 post:

 requestBody: # contents of the callback message

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '204':

 description: No Content (successful notification)

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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

 '429':

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

 '500':

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

 '503':

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

 default:

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

 responses:

 '201':

 description: SEAL Events subscription resource created successfully.

 content:

 application/json:

 schema:

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

 headers:

 Location:

 description: Contains the URI of the newly created resource.

 required: true

 schema:

 type: string

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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

 '429':

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

 '500':

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

 '503':

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

 default:

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

 /subscriptions/{subscriptionId}:

 delete:

 description: Deletes an individual SEAL Event Subscription.

 operationId: DeleteIndSealEventSubsc

 tags:

 - Individual SEAL Events Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

 description: Identifier of an individual Events Subscription

 required: true

 schema:

 type: string

 responses:

 '204':

 description: >

 The individual SEAL Events Subscription matching the subscriptionId is deleted.

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '429':

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

 '500':

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

 '503':

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

 default:

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

 patch:

 description: Modify an existing SEAL Event Subscription.

 operationId: ModifyIndSealEventSubsc

 tags:

 - Individual SEAL Events Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

 description: Identifier of an individual Events Subscription

 required: true

 schema:

 type: string

 requestBody:

 required: true

 content:

 application/merge-patch+json:

 schema:

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

 responses:

 '200':

 description: >

 The definition SEAL event subscription is modified successfully and

 a representation of the updated service API is returned in the request body.

 content:

 application/json:

 schema:

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

 '204':

 description: No Content. The SEAL Event Subscription is modified successfully.

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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

 '429':

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

 '500':

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

 '503':

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

 default:

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

 put:

 description: Replace an existing SEAl event subscription.

 operationId: UpdateIndSealEventSubsc

 tags:

 - Individual SEAL Events Subscription (Document)

 parameters:

 - name: subscriptionId

 in: path

 description: Identifier of an individual Events Subscription

 required: true

 schema:

 type: string

 requestBody:

 description: Individual SEAL events subscription to be replaced.

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: SEAL Event subscription updated successfully.

 content:

 application/json:

 schema:

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

 '204':

 description: No Content. Individual SEAL event subscription was updated successfully.

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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

 '429':

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

 '500':

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

 '503':

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

 default:

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

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{tokenUrl}'

 scopes: {}

 schemas:

 SEALEventSubscription:

 description: Represents an individual SEAL Event Subscription resource.

 type: object

 properties:

 subscriberId:

 type: string

 description: String identifying the subscriber of the event.

 eventSubs:

 type: array

 items:

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

 minItems: 1

 description: Subscribed events.

 eventReq:

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

 notificationDestination:

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

 requestTestNotification:

 type: boolean

 description: >

 Set to true by Subscriber to request the SEAL server to send a test notification.

 Set to false or omitted otherwise.

 websockNotifConfig:

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

 eventDetails:

 type: array

 items:

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

 minItems: 1

 suppFeat:

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

 required:

 - subscriberId

 - eventSubs

 - eventReq

 - notificationDestination

 SEALEventSubscriptionPatch:

 description: Represents the partial update of individual SEAL Event Subscription resource.

 type: object

 properties:

 eventSubs:

 type: array

 items:

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

 minItems: 1

 description: Subscribed events.

 eventReq:

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

 notificationDestination:

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

 SEALEventNotification:

 description: Represents notification information of a SEAL Event.

 type: object

 properties:

 subscriptionId:

 type: string

 description: Identifier of the subscription resource.

 eventDetails:

 type: array

 items:

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

 minItems: 1

 description: Detailed notifications of individual events.

 required:

 - subscriptionId

 - eventDetails

 EventSubscription:

 description: Represents the subscription to a single SEAL event.

 type: object

 properties:

 eventId:

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

 valGroups:

 type: array

 items:

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

 minItems: 1

 description: >

 Each element of the array represents the VAL group identifier(s) of a VAL service

 that the subscriber wants to know in the interested event.

 identities:

 type: array

 items:

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

 minItems: 1

 description: >

 Each element of the array represents the VAL User / UE IDs of a VAL service

 that the event subscriber wants to know in the interested event.

 monFltr:

 type: array

 items:

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

 minItems: 1

 description: >

 List of event monitoring details that the subscriber wishes to mmonitor the VAL UEs,

 VAL group and/or VAL service.

 areaInt:

 type: array

 items:

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

 minItems: 1

 description: >

 Represents the list of VAL User / UE IDs and the area of interest information

 which the subscriber wishes to monitor the location deviation of VAL User / UEs.

 locAreaMon:

 type: array

 items:

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

 minItems: 1

 description: >

 Each element represents the location area monitoring details to monitor the

 VA UEs moving in and out of the provided location area.

 partialFailRep:

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

 required:

 - eventId

 SEALEventDetail:

 description: Represents the SEAL event details.

 type: object

 properties:

 eventId:

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

 lmInfos:

 type: array

 items:

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

 minItems: 1

 valGroupDocuments:

 type: array

 items:

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

 minItems: 1

 description: >

 The VAL groups documents with modified membership and configuration information.

 profileDocs:

 type: array

 items:

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

 minItems: 1

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

 msgFltrs:

 type: array

 items:

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

 minItems: 1

 description: >

 The message filter information for various member VAL User or UEs of the VAL group.

 monRep:

 type: array

 items:

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

 minItems: 1

 description: The events reports with details of the events related to the VAL UE(s).

 locAdhr:

 type: array

 items:

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

 minItems: 1

 description: >

 The location deviation information for the interested VAL User ID or UE IDs

 in a given location.

 tempGroupInfo:

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

 locAreaMonRep:

 type: array

 items:

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

 minItems: 1

 description: The location area monitoring of the given area of interest.

 valGroupIds:

 type: array

 items:

 type: string

 minItems: 1

 description: Contains the identifier(s) of the deleted VAL Group(s).

 required:

 - eventId

 VALGroupFilter:

 description: Represents a filter of VAL group identifiers belonging to a VAL service.

 type: object

 properties:

 valSvcId:

 type: string

 description: Identity of the VAL service

 valGrpIds:

 type: array

 items:

 type: string

 minItems: 1

 description: >

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

 required:

 - valGrpIds

 IdentityFilter:

 description: Represents a filter of VAL User / UE identities belonging to a VAL service.

 type: object

 properties:

 valSvcId:

 type: string

 description: Identity of the VAL service

 valTgtUes:

 type: array

 items:

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

 minItems: 1

 description: >

 VAL User IDs or VAL UE IDs that the event subscriber wants to know

 in the interested event.

 suppLoc:

 type: boolean

 description: Set to true by Subscriber to request the supplementary location information.

 locQoS:

 $ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/LocationQoS'

 LMInformation:

 description: Represents the location information for a VAL User ID or a VAL UE ID.

 type: object

 properties:

 valTgtUe:

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

 locInfo:

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

 timeStamp:

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

 valSvcId:

 type: string

 description: Identity of the VAL service

 required:

 - locInfo

 - valTgtUe

 MessageFilter:

 description: Represents the message filters applicable to a VAL User ID or VAL UE ID.

 type: object

 properties:

 reqUe:

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

 tgtUe:

 type: array

 items:

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

 minItems: 1

 description: List of VAL User or UE IDs whose message to be sent.

 maxMsgs:

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

 scheds:

 type: array

 items:

 $ref: 'TS29122\_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'

 minItems: 1

 description: Time frame associated with total number of messages.

 msgTypes:

 type: array

 items:

 type: string

 minItems: 1

 description: List of message types to be sent to VAL UE.

 required:

 - reqUe

 MonitorFilter:

 description: Represents the event monitoring filters applicable to a VAL User ID or VAL UE ID.

 type: object

 properties:

 idnts:

 type: array

 items:

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

 minItems: 1

 description: List of VAL User or UE IDs whose events monitoring is requested.

 valSvcId:

 type: string

 description: Identity of the VAL service.

 valGrpId:

 type: string

 description: Identity of the group of the target UEs.

 profId:

 type: string

 description: The monitoring profile ID identifying a list of monitoring, analytics events.

 valCnds:

 type: array

 items:

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

 minItems: 1

 description: The temporal,spatial conditions for the events to be considered valid.

 evntDets:

 type: array

 items:

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

 minItems: 1

 description: List of monitoring, analytics events to be monitored.

 MonitorEvents:

 description: List of event types to be monitored in the context of events monitoring service.

 type: object

 properties:

 cnEvnts:

 type: array

 items:

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

 minItems: 1

 description: List of monitoring events related to VAL UE.

 anlEvnts:

 type: array

 items:

 $ref: 'TS29522\_AnalyticsExposure.yaml#/components/schemas/AnalyticsEvent'

 minItems: 1

 description: List of analytics events related to VAL UE.

 MonitorEventsReport:

 description: List of monitoring and/or analytics events related to VAL UE.

 type: object

 properties:

 tgtUe:

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

 evnts:

 type: array

 items:

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

 minItems: 1

 description: List of monitoring and analytics events related to VAL UE.

 required:

 - tgtUe

 - evnts

 ValidityConditions:

 description: List of monitoring and/or analytics events related to VAL UE.

 type: object

 properties:

 locArea:

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

 tmWdws:

 type: array

 items:

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

 minItems: 1

 description: Time window validity conditions.

 MonitorLocationInterestFilter:

 description: Represents the location monitoring filter information.

 type: object

 properties:

 tgtUes:

 type: array

 items:

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

 minItems: 1

 description: List of VAL Users or UE IDs for which location monitoring is requested.

 locInt:

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

 valSvcId:

 $ref: 'TS29549\_SS\_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'

 notInt:

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

 events:

 type: array

 items:

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

 minItems: 1

 description: Indicates the required location monitoring events.

 geofCond:

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

 required:

 - tgtUes

 - notInt

 oneOf:

 - required: [locInt]

 - required: [valSvcId]

 LocationDevMonReport:

 description: Location deviation monitoring report.

 type: object

 properties:

 tgtUes:

 type: array

 items:

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

 minItems: 1

 description: List of VAL Users or UE IDs for which report is related to.

 locInfo:

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

 notifType:

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

 required:

 - tgtUes

 - locInfo

 - notifType

 TempGroupInfo:

 description: Represents the created temporary VAL group information.

 type: object

 properties:

 valGrpIds:

 type: array

 items:

 type: string

 minItems: 1

 tempValGrpId:

 type: string

 valServIds:

 type: array

 items:

 type: string

 minItems: 1

 required:

 - valGrpIds

 - tempValGrpId

 MonLocAreaInterestFltr:

 description: Filter information indicate the area of interest and triggering events.

 type: object

 properties:

 locInfoCri:

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

 trigEvnts:

 type: array

 items:

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

 minItems: 1

 description: Triggering events when to send information.

 required:

 - locInfoCri

 LocationInfoCriteria:

 description: >

 Geographic location and reference UE details, where the UEs moving in and out

 to be monitored.

 type: object

 properties:

 geoArea:

 $ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/GeographicArea'

 refUe:

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

 valSvcAreaId:

 $ref: 'TS29549\_SS\_VALServiceAreaConfiguration.yaml#/components/schemas/ValSvcAreaId'

 oneOf:

 - required: [geoArea]

 - required: [refUe]

 ReferenceUEDetail:

 description: Reference UE details, where the UEs moving in and out to be monitored.

 type: object

 properties:

 valTgtUe:

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

 proxRange:

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

 proxRangeFrac:

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

 required:

 - valTgtUe

 - proxRange

 LocationAreaMonReport:

 description: Event report to notify the VAL UEs moving in or out from a given location.

 type: object

 properties:

 curPreUEs:

 type: array

 items:

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

 minItems: 1

 description: List of identities of all VAL UEs present in the given location area.

 moveInOutUEs:

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

 trigEvnt:

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

 MoveInOutUEDetails:

 description: List of UEs moved in and out.

 type: object

 properties:

 moveInUEs:

 type: array

 items:

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

 minItems: 1

 description: >

 List of identities of VAL UEs who moved in to given location area

 since previous notification.

 moveOutUEs:

 type: array

 items:

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

 minItems: 1

 description: >

 List of identities of VAL UEs who moved out of the given location area

 since previous notification.

 PartialEventSubscFailRep:

 description: Represents the partial failure report during the subscription creation or update.

 type: object

 properties:

 valTgtUes:

 type: array

 items:

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

 minItems: 1

 description: >

 List of VAL user(s) / VAL UE(s) whose identifier(s) is not found.

 valGrpIds:

 type: array

 items:

 type: string

 minItems: 1

 description: >

 List of VAL group(s) whose identifier(s) is not found.

 oneOf:

 - required: [valTgtUes]

 - required: [valGrpIds]

 GeofencingCondition:

 description: Represents the geofencing conditions.

 type: object

 properties:

 plmn:

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

 roaming:

 type: boolean

 description: Represents the roaming status.

 accessType:

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

 locInfo:

 type: array

 items:

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

 minItems: 1

 description: >

 Represents the spatial conditions.

 schedules:

 type: array

 items:

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

 minItems: 1

 description: >

 Indicates the requested monitoring schedule,

 e.g., day(s) of the week and/or time period(s).

# Simple data types and Enumerations

 SEALEvent:

 anyOf:

 - type: string

 enum:

 - LM\_LOCATION\_INFO\_CHANGE

 - GM\_GROUP\_INFO\_CHANGE

 - CM\_USER\_PROFILE\_CHANGE

 - GM\_GROUP\_CREATE

 - NRM\_MONITOR\_UE\_USER\_EVENTS

 - LM\_LOCATION\_DEVIATION\_MONITOR

 - GM\_TEMP\_GROUP\_FORMATION

 - LM\_LOCATION\_AREA\_MONITOR

 - GM\_GROUP\_DELETION

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: |

 Represents the type of SEAL events that can be subscribed.

 Possible values are:

 - LM\_LOCATION\_INFO\_CHANGE: Events related to the location information of VAL Users or

 VAL UEs from the Location Management Server.

 - GM\_GROUP\_INFO\_CHANGE: Events related to the modification of VAL group membership

 and configuration information from the Group Management Server.

 - CM\_USER\_PROFILE\_CHANGE: Events related to update of user profile information from

 the Configuration Management Server.

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

 Mananagement Server.

 - NRM\_MONITOR\_UE\_USER\_EVENTS: Monitoring and analytic events related to VAL UEs,

 users or VAL group, from the Network Resource Management Server.

 - LM\_LOCATION\_DEVIATION\_MONITOR: Events from Location Management server,

 related to the deviation of the VAL User(s) / UE(s) location from an area of interest.

 - GM\_TEMP\_GROUP\_FORMATION: Events related to the formation of new temporary VAL groups

 from the Group Management Server.

 - LM\_LOCATION\_AREA\_MONITOR: Events from Location Management server, related to the list

 of UEs moving in or moving out of the specific location.

 - GM\_GROUP\_DELETION: Events related to deletion of existing VAL Group(s) from the GM Server.

 LocDevNotification:

 anyOf:

 - type: string

 enum:

 - NOTIFY\_MISMATCH\_LOCATION

 - NOTIFY\_ABSENCE

 - NOTIFY\_PRESENCE

 - NOTIFY\_UNKNOWN

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: |

 Possible values are:

 Enumeration of location deviation notification reports.

 - NOTIFY\_MISMATCH\_LOCATION: This value indicates that the location information of

 the VAL UE(s) from the SEAL LM client and the core network are not matching.

 - NOTIFY\_ABSENCE: This value indicates that the current location information of

 the VAL UE(s)is deviating from the VAL server's area of interest.

 - NOTIFY\_PRESENCE: This value indicates that the current location information of

 the VAL UE(s) is within the VAL server's area of interest.

 - NOTIFY\_UNKNOWN: This value indicates that the LM server cannot determine

 whether the target VAL UE current location is within the VAL server's

 dynamic area of interest information or not.

 MonLocTriggerEvent:

 anyOf:

 - type: string

 enum:

 - DISTANCE\_TRAVELLED

 - type: string

 description: >

 This string provides forward-compatibility with future

 extensions to the enumeration but is not used to encode

 content defined in the present version of this API.

 description: |

 Identifies the triggering event in the location area monitor filtering.

 Possible values are:

 - DISTANCE\_TRAVELLED: This value indicates the trigger event for the location area

 monitoring based on the distance travelled by the reference UE.

\* \* \* End of changes \* \* \* \*