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V2X Application Enabler (VAE) Services;

Stage 3

(Release 19)

** 

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# Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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

# 1 Scope

The present document specifies the stage 3 protocol and data model for Vs interface between the V2X application specific server and VAE server and VAE-E interface between VAE servers. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the VAE server. The Vs, VAE-E interfaces and the related stage 2 functional requirements are defined in 3GPP TS 23.286 [4].

The stage 2 application layer architecture, functional requirements, procedures and information flows necessary for enabling Vehicle-to-Everything (V2X) are specified in 3GPP TS 23.286 [4].

The common protocol and interface aspects for API definition are specified in clause 5.2 of 3GPP TS 29.122 [27].

# 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 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

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

[4] 3GPP TS 23.286: "Application layer support for Vehicle-to-Everything (V2X) services; Functional architecture and information flows".

[5] IETF RFC 9113: "HTTP/2".

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

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

[8] 3GPP TR 21.900: "Technical Specification Group working methods".

[11] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[12] IETF RFC 9112: " HTTP/1.1".

[13] IETF RFC 9110: "HTTP Semantics".

[14] Void.

[15] Void.

[16] IETF RFC 9111: "HTTP: Caching".

[17] Void.

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

[19] 3GPP TS 29.116: "Representational state transfer over xMB reference point between Content Provider and BM-SC".

[20] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

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

[22] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

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

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

[25] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".

[26] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[27] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[28] 3GPP TS 24.486: "Vehicle-to-Everything (V2X) Application Enabler (VAE) layer; Protocol aspects; stage 3".

[29] 3GPP TS 29.549: "Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3".

[30] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[31] 3GPP TS 33.536: "Security aspects of 3GPP support for advanced Vehicle-to-Everything (V2X) services".

[32] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

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

[34] 3GPP TS 29.522: "Network Exposure Function Northbound APIs; Stage 3".

[35] 3GPP TS 22.186: "Enhancement of 3GPP support for V2X scenarios; Stage 1".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

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

For the purpose of the present document, the terms and definitions specified in clause 3.1 of 3GPP TS 23.286 [4] also apply, including the ones referencing other specifications.

## 3.2 Symbols

Void

## 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].

CAPIF Common API Framework

NRM Network Resource Management

V2X Vehicle-to-Everything

VASS V2X Application Specific Server

VAE V2X Application Enabler

# 4 Overview

The Vs interface is between the VASS and the VAE Server. It specifies RESTful APIs that allow the VASS to access the services and capabilities provided by VAE Server.

The stage 2 level requirements and signalling flows for the Vs interface are defined in 3GPP TS 23.286 [4].

The Vs interface supports the following APIs:

- VAE\_MessageDelivery

- VAE\_FileDistribution

- VAE\_ApplicationRequirement

- VAE\_DynamicGroup

- VAE\_HDMapDynamicInfo

- VAE\_SessionOrientedService

- VAE\_V2VConfigRequirement

- VAE\_PC5ProvisioningRequirement

- VAE\_ServiceAndQoSControlInfo

- VAE\_VRUZoneManagement

- VAE\_V2PApplicationRequirement

The VAE-E interface is between VAE Servers. It specifies RESTful APIs that allow the VAE server to access the services and capabilities provided by other VAE Server.

The stage 2 level requirements and signalling flows for the VAE-E interface are defined in 3GPP TS 23.286 [4].

The VAE-E interface supports the following APIs:

- VAE\_ServiceContinuity

# 5 Services offered by the V2X Application Enabler

## 5.1 Introduction

The table 5.1-1 shows the services provided by the VAE server and corresponding Service Operations:

Table 5.1-1 List of services provided by the VAE Server

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | Operation  Semantics | Example Consumer(s) |
| VAE\_MessageDelivery | Deliver\_DL\_Message | Request/Response | VASS |
| Deliver\_UL\_Message | Subscribe/Notify | VASS |
| V2X\_MessageDelivery\_Subscribe | VASS |
| V2X\_MessageDelivery\_Unsubscribe | VASS |
| VAE\_FileDistribution | Distribute\_File | Request/ Response | VASS |
| VAE\_ApplicationRequirement | Reserve\_NetworkResource | Subscribe/Notify | VASS |
| Notify\_NetworkResource |
| VAE\_DynamicGroup | Configure\_DynamicGroup | Subscribe/Notify | VASS |
| VAE\_ServiceContinuity | Query\_ServiceContinuity | Request/Response | VAE Server |
| VAE\_HDMapDynamicInfo | Subscribe\_HDMapDynamicInfo | Subscribe/Notify | VASS |
| VAE\_SessionOrientedService | Establish\_Session | Subscribe/Notify | VASS |
| Notify\_Establish\_Session |
| Update\_Session |
| Notify\_Update\_Session |
| Terminate\_Session |
| Notify\_Terminate\_Session |
| VAE\_V2VConfigRequirement | Request\_V2VConfigRequirement | Request/Response | VASS |
| VAE\_PC5ProvisioningRequirement | Config\_PC5ProvisioningRequirement | Subscribe/Notify | VASS |
| Notify\_PC5ProvisioningRequirement |
| VAE\_ServiceAndQoSControlInfo | Subscribe\_ServiceAndQoSControlInfo | Subscribe/Notify | VASS |
| VAE\_VRUZoneManagement | Subscribe\_VRUZoneManagement | Subscribe/Notify | VASS |
| Notify\_VRUZoneManagement |
| VAE\_V2PApplicationRequirement | Request\_V2PApplicationRequirement | Request/Response | VASS |

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

Table 5.1-2: API Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Service Name** | **Clause** | **Description** | **OpenAPI Specification File** | **apiName** | **Annex** |
| VAE\_MessageDelivery | 6.1 | VAE Message Delivery Service | TS29486\_VAE\_MessageDelivery.yaml | vae-message-delivery | A.2 |
| VAE\_FileDistribution | 6.2 | VAE File Distribution Service | TS29486\_VAE\_FileDistribution.yaml | vae-file-distribution | A.3 |
| VAE\_ApplicationRequirement | 6.3 | VAE Application Requirement Provision Service | TS29486\_VAE\_ApplicationRequirement.yaml | vae-app-req | A.4 |
| VAE\_DynamicGroup | 6.4 | VAE Configure Dynamic Group Information Service | TS29486\_VAE\_DynamicGroup.yaml | vae-dynamic-group | A.5 |
| VAE\_ServiceContinuity | 6.5 | VAE Service Continuity Service | TS29486\_VAE\_ServiceContinuity.yaml | vae-service-continuity | A.6 |
| VAE\_HDMapDynamicInfo | 6.6 | VAE\_HDMapDynamicInfo Service | TS29486\_VAE\_HDMapDynamicInfo.yaml | vae-hdmap-dynamic-info | A.7 |
| VAE\_SessionOrientedService API | 6.7 | VAE\_SessionOrientedService | TS29486\_VAE\_SessionOrientedService.yaml | vae-session-oriented-service | A.8 |
| VAE\_V2VConfigRequirement | 6.8 | VAE\_SessionOrientedService | TS29486\_VAE\_V2VConfigRequirement.yaml | vae-v2v-config-req | A.9 |
| VAE\_PC5ProvisioningRequirement | 6.9 | VAE\_PC5ProvisioningRequirement | TS29486\_VAE\_PC5ProvisioningRequirement.yaml | vae-pc5-prov-req | A.10 |
| VAE\_ServiceAndQoSControlInfo | 6.10 | VAE Service And QoS Control Information | TS29486\_VAE\_ServiceAndQoSControlInfo.yaml | vae-sqci | A.11 |
| VAE\_VRUZoneManagement | 6.11 | VAE VRU Zone Management | TS29486\_VAE\_VRUZoneManagement.yaml | vae-vzm | A.12 |
| VAE\_V2PApplicationRequirement | 6.12 | V2P Application Requirement Service | TS29486\_VAE\_V2PApplicationRequirement.yaml | vae-v2p-app-req | A.13 |

## 5.2 VAE\_MessageDelivery Service

### 5.2.1 Service Description

The VAE\_MessageDelivery service enables a service consumer to communicate with the VAE Server to:

- send, receive or exchange V2X messages with V2X UE(s).

### 5.2.2 Service Operations

#### 5.2.2.1 Introduction

The service operations defined for the VAE\_MessageDelivery service are shown in table 5.2.2.1-1.

Table 5.2.2.1-1: VAE\_MessageDelivery Service Operations

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| V2X\_MessageDelivery\_Subscribe | This service operation enables a service consumer to request the creation of a Message Delivery Subscription. | e.g., VASS |
| V2X\_MessageDelivery\_Unsubscribe | This service operation enables a service consumer to request the deletion of an existing Message Delivery Subscription. | e.g., VASS |
| Deliver\_DL\_Message | This service operation enables a service consumer to deliver DL V2X message(s). | e.g., VASS |
| Deliver\_UL\_Message | This service operation enables a service consumer to receive UL V2X message(s). | VAE Server |
| VAE\_MessageDelivery\_NotifyReceptionReport | This service operation enables a service consumer to receive the reception report for a downlink message delivery. | VAE Server |

#### 5.2.2.2 V2X\_MessageDelivery\_Subscribe

##### 5.2.2.2.1 General

The V2X\_MessageDelivery\_Subscribe service operation is used by a service consumer to create a subscription for V2X messages delivery at the VAE Server.

The following procedures are supported by the "V2X\_MessageDelivery\_Subscribe" service operation:

- Message Delivery Subscribe.

##### 5.2.2.2.2 Message Delivery Subscribe



Figure 5.2.2.2.2-1: Message delivery subscribe

When the service consumer needs to receive message(s) from V2X UE(s) and/or send messages to V2X UE(s), the service consumer shall send an HTTP POST request, as per step 1of figure 5.2.2.2.2-1, to request to create an "Individual Message Delivery Subscription".

The service consumer shall include MessageDeliverySubscriptionData data structure in the content of the HTTP POST to request a creation of representation of the "Individual Message Delivery Subscription" resource. The "Individual Message Delivery Subscription" resource is created as described below.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE Server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new "Individual Message Delivery Subscription" resource, addressed by a URI as defined in clause 6.1.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with an HTTP "201 Created" status code, including an HTTP Location header field containing the URI for the created resource.

If errors occur when processing the HTTP POST request, the VAE Server shall apply error handling procedures as specified in clause 6.1.7.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server targeting the "Individual Message Delivery Subscription" resource.

#### 5.2.2.3 V2X\_MessageDelivery\_Unsubscribe

##### 5.2.2.3.1 General

The V2X\_MessageDelivery\_Unsubscribe service operation is used by a service consumer to remove an existing subscription for V2X messages delivery.

The following procedures are supported by the "V2X\_MessageDelivery\_Unsubscribe" service operation:

- Message Delivery Unsubscribe.

##### 5.2.2.3.2 Message Delivery Unsubscribe



Figure 5.2.2.3.2-1: Message Delivery Unsubscribe procedure

When the service consumer needs to remove an existing subscription for V2X messages delivery, the service consumer shall send an HTTP DELETE request, as per step 1of figure 5.2.2.3.2-1, to request to delete the corresponding "Individual Message Delivery Subscription" resource.

Upon reception of the HTTP DELETE request, if the VAE Server successfully processed and accepted the received HTTP DELETE request, the VAE Server shall:

- remove the corresponding subscription; and

- send an HTTP "204 No Content" status code.

If errors occur when processing the HTTP POST request, the VAE Server shall send an HTTP error response as specified in clause 6.1.7.

#### 5.2.2.4 Deliver\_DL\_Message

##### 5.2.2.4.1 General

The Deliver\_DL\_Message service operation is used to deliver downlink V2X messages to V2X UE(s).

The following procedures are supported by the "Deliver\_DL\_Message" service operation:

- Downlink Message Delivery.

- Termination of Downlink Message Delivery.

##### 5.2.2.4.2 Downlink Message Delivery

Figure 5.2.2.4.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a Downlink Message Delivery.



Figure 5.2.2.4.2.1-1: Procedure for Downlink Message Delivery

When the service consumer needs to send a message to V2X UE(s), the service consumer shall send an HTTP POST request, as per step 1of the figure 5.2.2.4.2-1, to request to create a new "Individual Downlink Message Delivery" resource.

The service consumer shall include the DownlinkMessageDeliveryData data structure in the content of the HTTP POST to request a creation of representation of the "Individual Downlink Message Delivery" resource. The "Individual Downlink Message Delivery" resource is created as described below.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new "Individual Downlink Message Delivery" resource, addressed by a URI as defined in clause 6.1.3.5.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with an HTTP "201 Created" status code, including an HTTP "Location" header field containing the URI for the created resource.

The service consumer shall use the URI received in the HTTP "Location" header in subsequent requests to the VAE Server targeting the "Individual Downlink Message Delivery" resource.

If errors occur when processing the HTTP POST request, the VAE Server shall apply error handling procedures as specified in clause 6.1.7.

After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in clause 6.5.2.4 or 6.5.2.5 of 3GPP TS 24.486 [28] to send the message to the VAE Client.

When the "enNB" feature is not supported and the VAE Server received the reception report from the VAE Client as defined in clause 6.5.2.2 of 3GPP TS 24.486 [28], the VAE Server shall relay the reception report to the service consumer using the procedure defined in clause 5.2.2.6.

When the "enNB" feature is supported and the VAE Server received the reception report from the VAE Client as defined in clause 6.5.2.2 of 3GPP TS 24.486 [28], the VAE Server shall relay the reception report to the service consumer using the procedure defined in clause 5.2.2.6, unless the "receptionRepReq" attribute was present and set to "false" within the DownlinkMessageDeliveryData data structure provided in the corresponding request body.

##### 5.2.2.4.3 Termination of Downlink Message Delivery

Figure 5.2.2.4.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the termination of a Downlink Message Delivery.



Figure 5.2.2.4.3-1: Termination of Downlink Message Delivery

When the service consumer needs to terminate downlink message delivery to V2X UE(s), the service consumer shall send an HTTP DELETE request, as per step 1of the figure 5.2.2.4.3-1, to request to delete the corresponding "Individual Downlink Message Delivery" resource.

Upon reception of the HTTP DELETE request from the service consumer, the VAE Server shall check if the "Individual Downlink Message Delivery" resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with an HTTP "204 No Content" status code.

When the message delivery duration expires, the VAE Server may remove the associated "Individual Downlink Message Delivery" resource locally (i.e., without waiting for the service consumer to initiate the above procedure).

If errors occur when processing the HTTP DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.1.7.

#### 5.2.2.5 Deliver\_UL\_Message

##### 5.2.2.5.1 General

The Deliver\_UL\_Message service operation is used to deliver an uplink message from a V2X UE to the service consumer.

The following procedures are supported by the "Deliver\_UL\_Message" service operation:

- Deliver Uplink Message.

##### 5.2.2.5.2 Deliver Uplink Message

Figure 5.2.2.5.2-1 depicts a scenario where a VAE Server sends a notification to the service consumer to deliver an uplink message from a V2X UE.



Figure 5.2.2.5.2-1: Deliver Uplink Message

If the VAE Server receives from the VAE Client an uplink message from a V2X UE for which the service consumer has subscribed to receive messages or from a V2X UE that belongs to a V2X group for which the service consumer has subscribed to receive messages as defined in clause 6.5.2.1 of 3GPP TS 24.486 [28], the VAE Server shall send an HTTP POST request targeting the "{notifUri}" as previously provided by the service consumer within the corresponding subscription, and the request body including the UplinkMessageDeliveryData data structure.

Upon reception of the HTTP POST request message, if the service consumer successfully processed and accepted the received uplink message, the service consumer shall return an HTTP "204 No Content" status code.

If errors occur when processing the HTTP POST request, the service consumer shall send an HTTP error response as specified in clause 6.1.7.

When the VAE Server receives the response from the service consumer, the VAE Server shall send the response to the VAE Client as defined in clause 6.5.2.4 of 3GPP TS 24.486 [28].

#### 5.2.2.6 VAE\_MessageDelivery\_NotifyReceptionReport

##### 5.2.2.6.1 General

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

- Downlink Message Delivery Reception Report.

The following procedures are supported by the "VAE\_MessageDelivery\_NotifyReceptionReport" service operation:

- Downlink Message Delivery Reception Reporting.

##### 5.2.2.6.2 Downlink Message Delivery Reception Reporting

Figure 5.2.2.6.2-1 depicts a scenario where the VAE Server sends a request to notify a previously subscribed service consumer to receive the reception report for a downlink message delivery (see also clauses 9.4 of 3GPP°TS°23.286°[4]).



Figure 5.2.2.6.2-1: Procedure for Downlink Message Delivery Reception Reporting

1. In order to notify a previously subscribed service consumer on the reception report of a downlink message delivery, the VAE Server shall send an HTTP POST request message to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the delivery of the corresponding downlink message using the procedures defined in clause 5.2.2.4.2, and the request body including the Result data type.

2a. Upon success, the service consumer shall respond to the VAE Server 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 POST response body, as specified in clause 6.1.7.

## 5.3 VAE\_FileDistribution Service

### 5.3.1 Service Description

This API enables the service consumer to communicate with the VAE server to initiate file distribution to the V2X UEs.

### 5.3.2 Service Operations

#### 5.3.2.1 Introduction

The VAE\_FileDistribution service supports following service operations:

- Distribute\_File

#### 5.3.2.2 Distribute\_File

##### 5.3.2.2.1 General

The Distribute\_File service operation is used to distribute files to the V2X UEs.

The following procedures are supported by the "Distribute\_File" service operation:

- File Distribution.

- Termination of File Distribution.

##### 5.3.2.2.2 File Distribution

Figure 5.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a File Distribution.

Figure 5.3.2.2.2-1: File Distribution

When the service consumer needs to distribute the file to the V2X UEs, the service consumer shall send the POST method as step 1 of the figure 5.3.2.2.2-1 to request to create an "Individual File Distribution".

The service consumer shall include FileDistributionData data structure in the content of the HTTP POST to request a creation of representation of the "Individual File Distribution" resource. The "Individual File Distribution" resource is created as described below.

The service consumer within the FileDistributionData data structure shall include:

- The file lists within the "fileLists" attribute;

- The geographical area within the "geoArea" attribute;

- maximum bitrate for the V2X application within the "maxBitrate" attribute; and

- maximum delay for the V2X application within the "maxDelay" attribute;

and may include:

- the V2X Group ID within the "groupId" attribute;

- the serving class within the "serviceClass" attribute;

- the duration within the "duration" attribute;

- the local MBMS information within the "localMbmsInfo" attribute or the "localMbmsActInd" set to "true", if the "LocalMBMS" feature is supported; and

- the QoE metric information within the "qoeMetrics" attribture if the "QoEReporting" feature is supported.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual File Distribution", addressed by a URI as defined in clause 6.2.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource.

The VAE Server shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual File Distribution".

If errors occur when processing the HTTP POST or DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.2.7.

The VAE server makes use of the xMB procedures as defined 3GPP TS 29.116 [19] to create MBMS sessions whose type is set to "files" and to request the delivery of files over these sessions. Before provisioning files to the BM‑SC, the VAE server prepares the file for distribution, which may include partition of large files into smaller files or encryption.

The VAE server is responsible for translating the parameters related to the V2X application triggering the file delivery into corresponding xMB parameters. Table 5.3.2.2.2-1 describes the mapping between the VAE\_FileDistribution API attribute and the xMB API properties specified in 3GPP TS 29.116 [19].

Table 5.3.2.2.2-1: Mapping between VAE\_FileDistribution API and xMB API

|  |  |
| --- | --- |
| V2X parameter | Corresponding xMB API property |
| serviceClass | service-class |
| fileLists | file-list |
| geoArea | geographical-area |
| maxBitrate | max-bitrate |
| maxDelay | max-delay |
| localMbmsInfo or localMbmsActInd | local-mbms-delivery-information |
| qoeMetrics | qoe-reporting-configuration |

NOTE: The list of V2X parameters needed for file delivery is not exhaustive and can be updated based on the specific V2X application requirements.

##### 5.3.2.2.3 Termination of File Distribution

Figure 5.3.2.2.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of a File Distribution.



Figure 5.3.2.2.3-1: Termination of File Distribution

When the service consumer needs to terminate the File Distribution to the V2X UE, the service consumer shall send the DELETE method as step 1of the figure 5.3.2.2.3-1 to request to delete the "Individual File Distribution" resource.

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the Individual File Distribution resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message.

If errors occur when processing the DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.2.7.

When the message delivery duration expires, the VAE server may remove the associated Individual File Distribution resource locally.

## 5.4 VAE\_ApplicationRequirement Service

### 5.4.1 Service Description

This API enables the service consumer to communicate with the VAE server to provide V2X application requirement to the underlying 3GPP network.

### 5.4.2 Service Operations

#### 5.4.2.1 Introduction

The VAE\_ApplicationRequirement service supports following service operations:

- Reserve\_NetworkResource

- Notify\_NetworkResource

#### 5.4.2.2 Reserve\_NetworkResource

##### 5.4.2.2.1 General

The Reserve\_NetworkResource service operation is used to provide V2X application requirement to underlying 3GPP network.

The following procedures are supported by the "Reserve\_NetworkResource" service operation:

- Network Resource Reservation.

- Termination of Network Resource Reservation

##### 5.4.2.2.2 Network Resource Reservation

Figure 5.4.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of an Application Requirement.



Figure 5.4.2.2.2-1: Network Resource Reservation

When the service consumer needs to provide V2X application requirement to the underlying 3GPP network, the service consumer shall send the POST method as step 1 of the figure 5.4.2.2.2-1 to request to create an "Individual Application Requirement".

The service consumer shall include ApplicationRequirementData data structure in the content of the HTTP POST to request a creation of representation of the "Individual Application Requirement" resource. The "Individual Application Requirement" resource is created as described below.

The service consumer within the ApplicationRequirementData data structure shall include:

- Either the V2X Group ID within the "groupId" attribute or the V2X UE ID within the "ueId" attribute;

- notification URI within the "notifUri" attribute;

- The service Id within the "serviceId" attribute; and

- V2X application requirement within the "appRequirement" attribute;

and may include:

- The duration within the "duration" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual Application Requirement", addressed by a URI as defined in clause 6.3.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource. The VAE Server shall interact with the SEAL NRM server as specified in the 3GPP TS 29.549 [29] for the V2X application requirement received in step 1.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual Application Requirement".

If errors occur when processing the HTTP POST or DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.3.7.

##### 5.4.2.2.3 Termination of Network Resource Reservation

Figure 5.4.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of an Application Requirement.



Figure 5.4.2.2.3-1: Termination of Network Resource Reservation

When the service consumer needs to terminate network resource reservation, the service consumer shall send the DELETE method as step 1of the figure 5.4.2.2.3-1 to request to delete the "Individual Application Requirement" resource.

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the Individual Application Requirement resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message.

If errors occur when processing the HTTP DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.3.7.

When the message delivery duration expires, the VAE server may remove the associated Individual Application Requirement resource locally.

#### 5.4.2.3 Notify\_NetworkResource

##### 5.4.2.3.1 General

The Notify\_NetworkResource service operation is used to notify the result of network resource adaptation corresponding to the V2X application requirement.

The following procedures are supported by the "Notify\_NetworkResource" service operation:

- Notify Network Resource.

##### 5.4.2.3.2 Notify Network Resource

Figure 5.4.2.3.2-1 depicts a scenario where a VAE Server sends a notification request to the service consumer to report the result of network resource adaptation.



Figure 5.4.2.3.2-1: Notify Network Resource

If the VAE Server receives the result of network resource adaptation corresponding to the V2X application requirement from the SEAL NRM server as specified in the 3GPP TS 29.549 [29], the VAE Server shall send an HTTP POST request with "{notifUri}" as previously provided by the service consumer within the corresponding subscription as URI and AppReqNotification data structure as request body that shall include:

- resource URI of the individual Application Requirement related to the notification within the "resourceUri" attribute;

- the result of the network resource adaptation corresponding to the V2X application requirement within the "result" attribute.

Upon the reception of the HTTP POST message, if the service consumer successfully processed and accepted the received HTTP POST request, the service consumer shall send an "204 No Content" HTTP response for a succesfull processing.

If errors occur when processing the HTTP POST request, the VAE Server shall send an HTTP error response as specified in clause 6.3.7.

## 5.5 VAE\_DynamicGroup Service

### 5.5.1 Service Description

This API enables the service consumer to communicate with the VAE server to configure dynamic group information.

### 5.5.2 Service Operations

#### 5.5.2.1 Introduction

The VAE\_DynamicGroup service supports following service operations:

- Configure\_DynamicGroup

- Notify\_DynamicGroup

#### 5.5.2.2 Configure\_DynamicGroup

##### 5.5.2.2.1 General

The Configure\_DynamicGroup service operation is used to configures the dynamic group information at the VAE server.

The following procedures are supported by the "Configure\_DynamicGroup" service operation:

- Dynamic Group Configuration.

- Termination of Dynamic Group Configuration.

##### 5.5.2.2.2 Dynamic Group Configuration

Figure 5.5.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a Dynamic Group Configuration.



Figure 5.5.2.2.2-1: Dynamic Group Configuration

When the service consumer needs to configures the dynamic group information at the VAE server, the service consumer shall send the POST method as step 1 of the figure 5.5.2.2.2-1 to request to create an "Individual Group Configuration".

The service consumer shall include GroupConfigurationData data structure in the content of the HTTP POST to request a creation of representation of the "Individual Group Configuration" resource. The "Individual Group Configuration" resource is created as described below.

The service consumer within GroupConfigurationData data structure shall include:

- The dynamic Group ID within the "groupId" attribute;

- The group definition within the "definition" attribute;

- The group leader Id within the "leaderId" attribute; and

- The notification URI within the "notifUri" attribute.

and may include:

- The duration within the "duration" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual Group Configuration", addressed by a URI as defined in clause 6.4.3.2.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource. Then the VAE Server shall interact with the VAE Client to notify the dynamic group information as specified in the 3GPP TS 24.486 [28].

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual Group Configuration".

If errors occur when processing the HTTP POST or DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.4.7.

##### 5.5.2.2.3 Termination of Dynamic Group Configuration

Figure 5.5.2.2.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of a Dynamic Group Configuration.



Figure 5.5.2.2.3-1: Termination of Dynamic Group Configuration

When the service consumer needs to terminate the Dynamic Group Configuration at the VAE server, the service consumer shall send the DELETE method as step 1of the figure 5.5.2.2.3-1 to request to delete the "Individual Group Configuration" resource.

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the Individual Group Configuration resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message.

If errors occur when processing the HTTP DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.4.7.

When the message delivery duration expires, the VAE server may remove the associated Individual Group Configuration resource locally.

#### 5.5.2.3 Notify\_DynamicGroup

##### 5.5.2.3.1 General

The Notify\_DynamicGroup service operation is used to notify the dynamic group information (i.e. group member joins or leaves) at the VAE server.

The following procedures are supported by the "Notify\_DynamicGroup" service operation:

- Notify Dynamic Group.

##### 5.5.2.3.2 Notify Dynamic Group

Figure 5.4.2.3.2-1 depicts a scenario where a VAE Server sends a notification request to the service consumer to report dynamic group information.



Figure 5.5.2.3.2-1: Notify Dynamic Group

If the VAE Server receives the dynamic group information (i.e. group member joins or leaves) from the VAE Client as specified in the 3GPP TS 24.486 [28], the VAE Server shall send an HTTP POST request with "{notifUri}" as previously provided by the service consumer within the corresponding subscription as URI and DynamicGroupNotification data structure as request body that shall include:

- resource URI of the individual Application Requirement related to the notification within the "resourceUri" attribute;

- one or more joined group member within the "joinedUeIds" attribute if available; and

- one or more left group member within the "leftUeIds" attribute if available.

Upon the reception of the HTTP POST message, the service consumer shall send an "204 No Content" HTTP response for a succesfull processing.

If errors occur when processing the HTTP POST request, the service consumer shall send an HTTP error response as specified in clause 6.4.7.

## 5.6 VAE\_ServiceContinuity Service

### 5.6.1 Service Description

This service provided by the VAE server enables exposing information to facilitate the V2X service continuity.

### 5.6.2 Service Operations

#### 5.6.2.1 Introduction

The VAE\_ServiceContinuity service supports following service operations:

- Query\_ServiceContinuity

#### 5.6.2.2 Query\_ServiceContinuity

##### 5.6.2.2.1 General

The Query\_ServiceContinuity service operation is used to query the VAE server whether it can support the desired V2X service in the designated geographical area.

The following procedures are supported by the "Query\_ServiceContinuity" service operation:

- Query service continuity.

##### 5.6.2.2.2 Query service continuity

Figure 5.6.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to query service continuity information.



Figure 5.6.2.2.2-1: Query service continuity

When the service consumer (e.g. V2X server) needs to query service continuity information (e.g. receives the local service information request from the VAE Client as specified in the 3GPP TS 24.486 [28]), the service consumer shall send an HTTP GET request as step 1 of the figure 5.6.2.2.2-1 to the "Individual Geographical Area" resource with query parameter V2X service id in "service-id". When the VAE Server receives the HTTP GET request from the service consumer, the VAE Server shall perform the query.

On success, "200 OK" shall be returned as step 2 of the figure 5.6.2.2.2-1 to indicate that the VAE server can support the desired V2X service for the target "Individual Geographical Area" resource. The response body shall contain the "Individual Geographical Area" resource including the requested V2X service id.

If errors occur when processing the HTTP POST request, the VAE Server shall apply error handling procedures as specified in clause 6.5.7.

## 5.7 VAE\_HDMapDynamicInfo Service

### 5.7.1 Service Description

This API enables the service consumer to communicate with the VAE server to subscribe for the HD map dynamic information.

### 5.7.2 Service Operations

#### 5.7.2.1 Introduction

The VAE\_HDMapDynamicInfo service supports following service operations:

- Subscribe\_HDMapDynamicInfo

- Notify\_HDMapDynamicInfo

#### 5.7.2.2 Subscribe\_HDMapDynamicInfo

##### 5.7.2.2.1 General

The Subscribe\_HDMapDynamicInfo service operation is used to subscribe for the HD map dynamic information.

The following procedures are supported by the "Subscribe\_HDMapDynamicInfo" service operation:

- Subscribe HD Map Dynamic Information.

##### 5.7.2.2.2 Subscribe HD Map Dynamic Information

Figure 5.7.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of an HdMap Dynamic Info Subscription.



Figure 5.7.2.2.2-1: Subscribe HD Map Dynamic Information

When the service consumer needs to subscribe for the HD map dynamic information, the service consumer shall send the POST method as step 1 of the figure 5.7.2.2.2-1 to request to create an "Individual HdMap DynamicInfo Subscription".

The service consumer shall include HdMapDynamicInfoData data structure in the content of the HTTP POST to request a creation of representation of the "Individual HdMap DynamicInfo Subscription" resource. The "Individual HdMap DynamicInfo Subscription" resource is created as described below.

The service consumer within the HdMapDynamicInfoData data structure shall include:

- notification URI within the "notifUri" attribute;

- the V2X UE ID within the "ueId" attribute; and

- application defined proximity range information within the "range" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual HdMap DynamicInfo\_Subscription", addressed by a URI as defined in clause 6.6.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual HdMap DynamicInfo Subscription".

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the Individual HdMap DynamicInfo Subscription resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message.

If errors occur when processing the HTTP POST or DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.6.7.

#### 5.7.2.3 Notify\_HDMapDynamicInfo

##### 5.7.2.3.1 General

The Notify\_HDMapDynamicInfo service operation is used to notify the HD map dynamic information.

The following procedures are supported by the "Notify\_HDMapDynamicInfo" service operation:

- Notify HD Map Dynamic Information.

##### 5.7.2.3.2 Notify HD Map Dynamic Information

Figure 5.7.2.3.2-1 depicts a scenario where a VAE Server sends a notification request to the service consumer to report HD Map Dynamic Information.



Figure 5.7.2.3.2-1: Notify HD Map Dynamic Information

When the VAE Server prepared the HD map dynamic informaiton including the aggregate information from different VAE Clients, the VAE Server shall send an HTTP POST request with "{notifUri}" as previously provided by the service consumer within the corresponding subscription as URI and HdMapDynamicInfoNotification data structure as request body that shall include:

- resource URI of the Individual HdMap DynamicInfo Subscription related to the notification within the "resourceUri" attribute;

- the HD map dynamic information corresponding within the "hdMapDynaInfo" attribute.

Upon the reception of the HTTP POST message, if the service consumer successfully processed and accepted the received HTTP POST request, the service consumer shall send an "204 No Content" HTTP response for a succesfull processing.

If errors occur when processing the HTTP POST request, the VAE Server shall send an HTTP error response as specified in clause 6.6.7.

## 5.8 VAE\_SessionOrientedService Service

### 5.8.1 Service Description

This API enables the service consumer to communicate with the VAE server to trigger establishment, update and termination of session-oriented service.

### 5.8.2 Service Operations

#### 5.8.2.1 Introduction

The VAE\_SessionOrientedService service supports following service operations:

- Establish\_Session

- Notify\_Establish\_Session

- Update\_Session

- Notify\_Update\_Session

- Terminate\_Session

- Notify\_Terminate\_Session

NOTE: Notify\_Terminate\_Session is implemented by including the result of the termination of session-oriented service received from the VAE client within the response to termination session as defined in clause 5.8.2.6.2.

#### 5.8.2.2 Establish\_Session

##### 5.8.2.2.1 General

The Establish\_Session service operation is used to trigger the establishment of the session-oriented service by the VAE server.

The following procedures are supported by the "Establish\_Session" service operation:

- Establish Session.

##### 5.8.2.2.2 Establish Session

Figure 5.8.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a Session Oriented Service Subscription.



Figure 5.8.2.2.2-1: Establish Session

When the service consumer needs to trigger the establishment of the session-oriented service by the VAE server, the service consumer shall send the POST method as step 1 of the figure 5.8.2.2.2-1 to request to create an "Individual Session Oriented Service Subscription".

The service consumer shall include SessionOrientedData data structure in the content of the HTTP POST to request a creation of representation of the "Individual Session Oriented Service Subscription" resource. The "Individual Session Oriented Service Subscription" resource is created as described below.

The service consumer within the SessionOrientedData data structure shall include:

- the notification URI within the "notifUri" attribute;

- the remote V2X UE ID within the "ueId" attribute;

- the V2X service ID within the "serviceId" attribute;

- the identity of the service consumer within the "appSerId" attribute; and

- the application QoS requirements for the session within the "appQosReq" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual Session Oriented Service Subscription", addressed by a URI as defined in clause 6.7.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual Session Oriented Service Subscription".

After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to establish a session-oriented service with VAE client.

If errors occur when processing the HTTP POST request, the VAE Server shall apply error handling procedures as specified in clause 6.7.7.

#### 5.8.2.3 Notify\_Establish\_Session

##### 5.8.2.3.1 General

The Notify\_Establish\_Session service operation is used to notify the establishment of the session-oriented service by the VAE server.

The following procedures are supported by the "Notify\_Establish\_Session" service operation:

- Notify Establish Session.

##### 5.8.2.3.2 Notify Establish Session

Figure 5.7.2.3.2-1 depicts a scenario where a VAE Server sends a notification request to the service consumer to report the result of session establishment.



Figure 5.8.2.3.2-1: Notify Establish Session

When the VAE Server response from the VAE client indicating the result of session establishment requested by the VAE server as defined in 3GPP TS 24.486 [28], the VAE Server shall send an HTTP POST request with "{notifUri}" as previously provided by the service consumer within the corresponding subscription as URI and Notification data structure as request body that shall include:

- resource URI of the Individual Session Oriented Service Subscription related to the notification within the "resourceUri" attribute;

- the value "ESTABLISHMENT" with the "action" attribute; and

- the result of session establishment within the "result" attribute.

Upon the reception of the HTTP POST message, if the service consumer successfully processed and accepted the received HTTP POST request, the service consumer shall send an "204 No Content" HTTP response for a succesfull processing.

If errors occur when processing the HTTP POST request, the VAE Server shall send an HTTP error response as specified in clause 6.7.7.

#### 5.8.2.4 Update\_Session

##### 5.8.2.4.1 General

The Update\_Session service operation is used to trigger the update to the session-oriented service by the VAE server.

The following procedures are supported by the "Update\_Session" service operation:

- Update Session.

##### 5.8.2.4.2 Update Session

Figure 5.8.2.4.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the update of a Session Oriented Service Subscription.



Figure 5.8.2.4.2-1: Update Session

When the service consumer needs to trigger the update to the session-oriented service by the VAE server, the service consumer shall send the PUT method as step 1 of the figure 5.8.2.4.2-1 to request to update the "Individual Session Oriented Service Subscription".

The service consumer shall include SessionOrientedData data structure in the content of the HTTP PUT to update the "Individual Session Oriented Service Subscription" resource. The remote V2X UE ID, the V2X service ID and the identity of the service consumer shall remain unchanged from previous values.

When the VAE Server receives the HTTP PUT request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall update the "Individual Session Oriented Service Subscription" and respond to the service consumer with a 200 OK or 204 No Content status code.

After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to update the session-oriented service with VAE client.

If errors occur when processing the HTTP PUT request, the VAE Server shall apply error handling procedures as specified in clause 6.7.7.

#### 5.8.2.5 Notify\_Establish\_Session

##### 5.8.2.5.1 General

The Notify\_Update\_Session service operation is used to notify the update to the session-oriented service by the VAE server.

The following procedures are supported by the "Notify\_Update\_Session" service operation:

- Notify Update Session.

##### 5.8.2.5.2 Notify Update Session

When the VAE Server response from the VAE client indicating the result of session update requested by the VAE server, the VAE Server invoke the procedure defined in clause 5.8.2.3 with the difference that the VAE Server includes the value "UPDATE" within the "action" attribute.

#### 5.8.2.6 Terminate\_Session

##### 5.8.2.6.1 General

The Terminate\_Session service operation is used to trigger the termination of the session-oriented service by the VAE server.

The following procedures are supported by the "Terminate\_Session" service operation:

- Terminate Session.

##### 5.8.2.6.2 Terminate Session

Figure 5.8.2.6.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of a Session Oriented Service Subscription.



Figure 5.8.2.6.2-1: Terminate Session

When the service consumer needs to trigger the termination of the session-oriented service by the VAE server, the service consumer shall send the DELETE method as step 1 of the figure 5.8.2.6.2-1 to request to delete the "Individual Session Oriented Service Subscription".

When the VAE Server receives the HTTP DELETE request from the service consumer, the VAE server shall authorize the request from the service consumer. If the authorization is successful, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to delete the session-oriented service with VAE client. If the VAE server receives the successful response from the VAE client, the VAE Server shall delete the "Individual Session Oriented Service Subscription" and respond to the service consumer with a 204 No Content status code.

If errors occur when processing the DELTE request, the VAE Server shall apply error handling procedures as specified in clause 6.7.7.

## 5.9 VAE\_V2VConfigRequirement Service

### 5.9.1 Service Description

This API enables the service consumer to provide a V2V configuration requirement to the VAE server to manage the UE-to-UE broadcast/groupcast communication.

### 5.9.2 Service Operations

#### 5.9.2.1 Introduction

The VAE\_V2VConfigRequirement service supports following service operations:

- Request\_V2VConfigRequirement operation

#### 5.9.2.2 Request\_V2VConfigRequirement

##### 5.9.2.2.1 General

The Request\_V2VConfigRequirement service operation is used to provide a V2V configuration requirement request to the VAE server to manage the UE-to-UE broadcast/groupcast communication by the service consumer.

The following procedures are supported by the "Request\_V2VConfigRequirement" service operation:

- Request V2V Configuration Requirement.

##### 5.9.2.2.2 Request V2V Configuration Requirement

Figure 5.9.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a V2V Configuration.



Figure 5.9.2.2.2-1: Request\_V2VConfigRequirement

When the service consumer needs to provide a V2V configuration requirement, the service consumer shall send the POST method as step 1 of the figure 5.9.2.2.2-1 to request to create an "Individual V2V Configuration".

The service consumer shall include V2vConfigurationData data structure in the content of the HTTP POST to request a creation of representation of the "Individual V2V Configuration" resource. The "Individual V2V Configuration" resource is created as described below.

The service consumer within the V2vConfigurationData data structure shall include:

- either the V2X group ID within the "groupId" attribute or the V2X service ID within the "serviceId" attribute;

and may include:

- candidate Relay V2X-UE ID list within the "canUeIds" attribute; and

- application QoS requirements for the session within the "appQosReq" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual V2V Configuration" resource, addressed by a URI as defined in clause 6.8.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual Session Oriented Service Subscription".

After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to provide the V2V configuration information to the VAE client. The VAE server may also provide the list of V2X-UEs to serve as application layer relays based on the candidate list of relay V2X-UEs received form the service consumer.

The service consumer may include the V2vConfigurationData data structure in the content of the HTTP PUT to update the "Individual V2V Configuration" resource. The V2X group ID and the V2X service ID shall remain unchanged from previous values. When the VAE Server receives the HTTP PUT request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall update the "Individual V2V Configuration" and respond to the service consumer with a 200 OK or 204 No Content status code. After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to provide the updated information to the VAE client.

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the "Individual V2V Configuration" resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message. After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to delete the V2V configuration information from the VAE client.

If errors occur when processing the HTTP POST, HTTP PUT or HTTP DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.8.7.

## 5.10 VAE\_PC5ProvisioningRequirement Service

### 5.10.1 Service Description

This API enables the service consumer to communicate with the VAE server to request from VAE server the PC5 provisioning service in multi-operator V2X scenarios.

### 5.10.2 Service Operations

#### 5.10.2.1 Introduction

The VAE\_PC5ProvisioningRequirement service supports following service operations:

- Config\_PC5ProvisioningRequirement

- Notify\_PC5ProvisioningRequirement

#### 5.10.2.2 Config\_PC5ProvisioningRequirement

##### 5.10.2.2.1 General

The Config\_PC5ProvisioningRequirement service operation is used by the service consumer to provide a V2X PC5 provisioning requirement to the VAE server.

The following procedures are supported by the "Config\_PC5ProvisioningRequirement" service operation:

- Config\_PC5ProvisioningRequirement.

##### 5.10.2.2.2 Config\_PC5ProvisioningRequirement

Figure 5.10.2.2.2-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the creation of a PC5 Provisioning Requirement Subscription.



Figure 5.10.2.2.2-1: Config\_PC5ProvisioningRequirement

When the service consumer needs to provide a V2X PC5 provisioning requirement to the VAE server, the service consumer shall send the POST method as step 1 of the figure 5.10.2.2.2-1 to request to create an "Individual PC5 Provisioning Requirement Subscription".

The service consumer shall include ProvisioningRequirement data structure in the content of the HTTP POST to request a creation of representation of the "Individual PC5 Provisioning Requirement Subscription" resource. The "Individual PC5 Provisioning Requirement Subscription" resource is created as described below.

The service consumer within the ProvisioningRequirement data structure shall include:

- notification URI within the "notifUri" attribute;

- either the remote V2X UE ID within the "ueId" attribute or the V2X group ID within the "groupId" attribute;

- the V2X service ID within the "serviceId" attribute;

- application QoS requirements for the session within the "appQosReq" attribute;

and may include:

- the PLMN ID list within the "plmnList" attribute.

When the VAE Server receives the HTTP POST request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall create a new resource, which represents "Individual PC5 Provisioning Requirement Subscription", addressed by a URI as defined in clause 6.9.3.3.2 and contains a VAE Server created resource identifier. The VAE Server shall respond to the service consumer with a 201 Created message, including Location header field containing the URI for the created resource.

The service consumer shall use the URI received in the Location header in subsequent requests to the VAE Server to refer to the "Individual PC5 Provisioning Requirement Subscription".

After the VAE Server responded to the service consumer, the VAE Server may invoke the procedure defined in 3GPP TS 24.486 [28] to send a PC5 provisioning status request to VAE client(within the multi-operator V2X service) to receive up-to-date information on the per PLMN provisioning policies/ parameters.

The service consumer may include the ProvisioningRequirement data structure in the content of the HTTP PUT to update the "Individual PC5 Provisioning Requirement Subscription" resource. The remote V2X UE ID, the V2X service ID and the V2X service ID shall remain unchanged from previous values When the VAE Server receives the HTTP PUT request from the service consumer, the VAE server shall make an authorization based on the information received from the service consumer. If the authorization is successful, the VAE Server shall update the "Individual PC5 Provisioning Requirement Subscription" and respond to the service consumer with a 200 OK or 204 No Content status code. After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to provide the updated information to the VAE client.

Upon receipt of the HTTP DELETE message from the service consumer, the VAE Server shall check if the "Individual PC5 Provisioning Requirement Subscription" resource identified by the URI already exists. If the resource exists, the VAE Server shall delete the resource and respond to the service consumer with a 204 No Content success message. After the VAE Server responded to the service consumer, the VAE Server shall invoke the procedure defined in 3GPP TS 24.486 [28] to delete the PC5 provisioning status request from the VAE client.

If errors occur when processing the HTTP POST, HTTP PUT or HTTP DELETE request, the VAE Server shall apply error handling procedures as specified in clause 6.9.7.

#### 5.10.2.3 Notify\_PC5ProvisioningRequirement

##### 5.10.2.3.1 General

The Notify\_PC5ProvisioningRequirement service operation is used to notify the result of multi operation PC5 provisioning requirement to the V2X UEs by the VAE server.

The following procedures are supported by the "Config\_PC5ProvisioningRequirement" service operation:

- Notify\_PC5ProvisioningRequirement.

##### 5.10.2.3.2 Notify\_PC5ProvisioningRequirement

Figure 5.10.2.3.2-1 depicts a scenario where a VAE Server sends a notification request to the service consumer to report the result of multi operation PC5 provisioning requirements.



Figure 5.10.2.3.2-1: Notify\_PC5ProvisioningRequirement

After the VAE Server determines the updated PC5 provisioning policies/parameters to be jointly used across the V2X-UEs within the multi-operator V2X service, the VAE Server shall send an HTTP POST request with "{notifUri}" as previously provided by the service consumer within the corresponding subscription as URI and Notification data structure as request body that shall include:

- resource URI of the Individual PC5 Provisioning Requirement Subscription related to the notification within the "resourceUri" attribute;

- the result of V2X PC5 provisioning requirement within the "result" attribute.

Upon the reception of the HTTP POST message, if the service consumer successfully processed and accepted the received HTTP POST request, the service consumer shall send an "204 No Content" HTTP response for a succesfull processing.

If errors occur when processing the HTTP POST request, the VAE Server shall send an HTTP error response as specified in clause 6.9.7.

## 5.11 VAE\_ServiceAndQoSControlInfo Service

### 5.11.1 Service Description

The VAE\_ServiceAndQoSControlInfo service exposed by the VAE Server enables a service consumer to:

- create/update/delete a Service Adaptation And QoS Control Subscription; and

- receive Service Requirements And QoS Adaptation Notifications.

### 5.11.2 Service Operations

#### 5.11.2.1 Introduction

The service operations defined for the VAE\_ServiceAndQoSControlInfo service are shown in table 5.11.2.1-1.

Table 5.11.2.1-1: VAE\_ServiceAndQoSControlInfo Service Operations

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| Subscribe\_ServiceAndQoSControlInfo | This service operation enables a service consumer to create/update/delete a Service Adaptation And QoS Control Subscription. | e.g., VASS |
| Notify\_ServiceAndQoSControlInfo | This service operation enables a service consumer to receive Service Requirements And QoS Adaptation Notifications. | VAE Server |

#### 5.11.2.2 Subscribe\_ServiceAndQoSControlInfo

##### 5.11.2.2.1 General

This service operation is used by a service consumer to request the creation/update/deletion of a Service Adaptation And QoS Control Subscription at the VAE Server.

The following procedures are supported by the "Subscribe\_ServiceAndQoSControlInfo" service operation:

- Service Adaptation And QoS Control Subscription Creation.

- Service Adaptation And QoS Control Subscription Update.

- Service Adaptation And QoS Control Subscription Deletion.

##### 5.11.2.2.2 Service Adaptation And QoS Control Subscription Creation

Figure 5.11.2.2.2-1 depicts a scenario where a a service consumer sends a request to the VAE Server to request the creation of a Service Adaptation And QoS Control Subscription (see also clause 9.20 of 3GPP°TS°23.286°[4]).

 Figure 5.11.2.2.2-1: Procedure for Service Adaptation And QoS Control Subscription Creation

1. In order to subscribe to Service Adaptation And QoS Control reporting, the service consumer shall send an HTTP POST request to the VAE Server targeting the URI of the "Service Adaptation And QoS Control Subscriptions" collection resource, with the request body including the ServAdaptQoSCtrlSubsc data structure.

2a. Upon success, the VAE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual Service Adaptation And QoS Control Subscription" resource within the ServAdaptQoSCtrlSubsc 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 6.10.7.

##### 5.11.2.2.3 Service Adaptation And QoS Control Subscription Update

Figure 5.11.2.2.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the update of an existing Service Adaptation And QoS Control Subscription (see also clause 9.20 of 3GPP°TS°23.286°[4]).



Figure 5.11.2.2.3-1: Procedure for Service Adaptation And QoS Control Subscription Update

1. In order to update an existing Service Adaptation And QoS Control subscription, the service consumer shall send an HTTP PUT/PATCH request to the VAE Server, targeting the URI of the corresponding "Individual Service Adaptation And QoS Control Subscription" resource, with the request body including either:

- the updated representation of the resource within the ServAdaptQoSCtrlSubsc data structure, in case the HTTP PUT method is used; or

- the requested modifications to the resource within the ServAdaptQoSCtrlSubscPatch 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 VAE Server shall update the targeted "Individual Service Adaptation And QoS Control Subscription" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Service Adaptation And QoS Control Subscription" resource within the ServAdaptQoSCtrlSubsc 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 6.10.7.

##### 5.11.2.2.4 Service Adaptation And QoS Control Subscription Deletion

Figure 5.11.2.2.4-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of an existing Service Adaptation And QoS Control Subscription (see also clause 9.20 of 3GPP°TS°23.286°[4]).



Figure 5.11.2.2.4-1: Procedure for Service Adaptation And QoS Control Subscription Deletion

1. In order to request the deletion of an existing Service Adaptation And QoS Control subscription, the service consumer shall send an HTTP DELETE request to the VAE Server targeting the corresponding "Individual Service Adaptation And QoS Control 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 VAE 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 6.10.7.

#### 5.11.2.3 Notify\_ServiceAndQoSControlInfo

##### 5.11.2.3.1 General

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

- Service Requirements And QoS Adaptation event(s).

The following procedures are supported by the "Notify\_ServiceAndQoSControlInfo" service operation:

- Service Requirements And QoS Adaptation Notification.

- QoS Change Notification.

##### 5.11.2.3.2 Service Requirements And QoS Adaptation Notification

Figure 5.11.2.3.2-1 depicts a scenario where the VAE Server sends a request to notify a previously subscribed service consumer on Service Requirements And QoS Adaptation event(s) (see also clause 9.20 of 3GPP°TS°23.286°[4]).



Figure 5.11.2.3.2-1: Procedure for Service Requirements And QoS Adaptation Notification

1. In order to notify a previously subscribed service consumer on Service Requirements And QoS Adaptation event(s), the VAE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}/req-qos-adapt", where the "notifUri" variable shall be set to the value received from the service consumer during the creation/update of the corresponding Service Adaptation And QoS Control Subscription using the procedures defined in clause 5.11.2.2, and the request body including the AdaptNotif data structure.

2a. Upon success, the service consumer shall respond with either:

- an HTTP "200 OK" status code with the response body containing acknowledgment related information within the AdaptNotifResp 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 POST response body, as specified in clause 6.10.7.

##### 5.11.2.3.3 QoS Change Notification

Figure 5.11.2.3.3-1 depicts a scenario where the VAE Server sends a request to notify a previously subscribed service consumer on QoS Change related event(s) (see also clause 9.20 of 3GPP°TS°23.286°[4]).



Figure 5.11.2.3.3-1: Procedure for Service Requirements And QoS Adaptation Notification

1. In order to notify a previously subscribed service consumer on QoS Change related event(s), the VAE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}/qos-change", where the "notifUri" variable shall be set to the value received from the service consumer during the creation/update of the corresponding Service Adaptation And QoS Control Subscription using the procedures defined in clause 5.11.2.2, and the request body including the QoSChangeNotif data structure.

2a. Upon success, the service consumer 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 POST response body, as specified in clause 6.10.7.

## 5.12 VAE\_VRUZoneManagement Service

### 5.12.1 Service Description

The VAE\_VRUZoneManagement service exposed by the VAE Server enables a service consumer to:

- create/update/delete a VRU Zone Management Subscription; and

- receive VRU Zone Management Enter/Leave notifications.

### 5.12.2 Service Operations

#### 5.12.2.1 Introduction

The service operations defined for the VAE\_VRUZoneManagement service are shown in table 5.12.2.1-1.

Table 5.12.2.1-1: VAE\_VRUZoneManagement Service Operations

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| Subscribe\_VRUZoneManagement | This service operation enables a service consumer to create/update/delete a VRU Zone Management Subscription. | e.g., VASS |
| Notify\_VRUZoneManagement | This service operation enables a service consumer to receive VRU Zone Management Enter/Leave notifications. | VAE Server |

#### 5.12.2.2 Subscribe\_VRUZoneManagement

##### 5.12.2.2.1 General

This service operation is used by a service consumer to request the creation/update/deletion of a VRU Zone Management Subscription at the VAE Server.

The following procedures are supported by the "Subscribe\_VRUZoneManagement" service operation:

- VRU Zone Management Subscription Creation.

- VRU Zone Management Subscription Update.

- VRU Zone Management Subscription Deletion.

##### 5.12.2.2.2 VRU Zone Management Subscription Creation

Figure 5.12.2.2.2-1 depicts a scenario where a a service consumer sends a request to the VAE Server to request the creation of a VRU Zone Management Subscription (see also clause 9.21 of 3GPP°TS°23.286°[4]).

 Figure 5.12.2.2.2-1: Procedure for VRU Zone Management Subscription Creation

1. In order to subscribe to VRU Zone Management event(s) reporting, the service consumer shall send an HTTP POST request to the VAE Server targeting the URI of the "VRU Zone Management Subscriptions" collection resource, with the request body including the VRUZoneMngtSubsc data structure.

2a. Upon success, the VAE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual VRU Zone Management Subscription" resource within the VRUZoneMngtSubsc 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 6.11.7.

##### 5.12.2.2.3 VRU Zone Management Subscription Update

Figure 5.12.2.2.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the update of an existing VRU Zone Management Subscription (see also clause 9.21 of 3GPP°TS°23.286°[4]).



Figure 5.12.2.2.3-1: Procedure for VRU Zone Management Subscription Update

1. In order to update an existing VRU Zone Management subscription, the service consumer shall send an HTTP PUT/PATCH request to the VAE Server, targeting the URI of the corresponding "Individual VRU Zone Management Subscription" resource, with the request body including either:

- the updated representation of the resource within the VRUZoneMngtSubsc data structure, in case the HTTP PUT method is used; or

- the requested modifications to the resource within the VRUZoneMngtSubscPatch 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 VAE Server shall update the targeted "Individual VRU Zone Management Subscription" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual VRU Zone Management Subscription" resource within the VRUZoneMngtSubsc 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 6.11.7.

##### 5.12.2.2.4 VRU Zone Management Subscription Deletion

Figure 5.12.2.2.4-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of an existing VRU Zone Management Subscription (see also clause 9.21 of 3GPP°TS°23.286°[4]).



Figure 5.12.2.2.4-1: Procedure for VRU Zone Management Subscription Deletion

1. In order to request the deletion of an existing VRU Zone Management subscription, the service consumer shall send an HTTP DELETE request to the VAE Server targeting the corresponding "Individual VRU Zone Management 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 VAE 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 6.11.7.

#### 5.12.2.3 Notify\_VRUZoneManagement

##### 5.12.2.3.1 General

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

- VRU Zone Management Enter/Leave event(s).

The following procedures are supported by the "Notify\_VRUZoneManagement" service operation:

- VRU Zone Management Enter/Leave Notification.

##### 5.12.2.3.2 VRU Zone Management Enter/Leave Notification

Figure 5.12.2.3.2-1 depicts a scenario where the VAE Server sends a request to notify a previously subscribed service consumer on VRU Zone Management Enter/Leave event(s) (see also clause 9.21 of 3GPP°TS°23.286°[4]).



Figure 5.12.2.3.2-1: Procedure for VRU Zone Management Enter/Leave Notification

1. In order to notify a previously subscribed service consumer on VRU Zone Management Enter/Leave event(s), the VAE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable shall be set to the value received from the service consumer during the creation/update of the corresponding VRU Zone Management Subscription using the procedures defined in clause 5.12.2.2, and the request body including the EnterLeaveNotif data structure.

2a. Upon success, the service consumer 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 POST response body, as specified in clause 6.11.7.

## 5.13 VAE\_V2PApplicationRequirement Service

### 5.13.1 Service Description

The VAE\_V2PApplicationRequirement service exposed by the VAE Server enables a service consumer to:

- create/update/delete a V2P Application Requirements Provisioning.

### 5.13.2 Service Operations

#### 5.13.2.1 Introduction

The service operations defined for the VAE\_V2PApplicationRequirement service are shown in table 5.13.2.1-1.

Table 5.13.2.1-1: VAE\_V2PApplicationRequirement Service Operations

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| Request\_V2PapplicationRequirement | This service operation enables a service consumer to request the creation/update/deletion of a V2P Application Requirements Provisioning for enabling V2P applications. | e.g., VASS |

#### 5.13.2.2 Request\_V2PApplicationRequirement

##### 5.13.2.2.1 General

This service operation is used by a service consumer request the creation/update/deletion of a V2P Application Requirements Provisioning at the VAE Server.

The following procedures are supported by the "Request\_V2PApplicationRequirement" service operation:

- V2P Application Requirements Provisioning Creation.

- V2P Application Requirements Provisioning Update.

- V2P Application Requirements Provisioning Deletion.

##### 5.13.2.2.2 V2P Application Requirement Creation

Figure 5.13.2.2.2-1 depicts a scenario where a a service consumer sends a request to the VAE Server to request the creation of a V2P Application Requirements Provisioning (see also clause 9.22 of 3GPP°TS°23.286°[4]).

Figure 5.13.2.2.2-1: Procedure for V2P Application Requirement Creation

1. In order to request the creation of a V2P Application Requirements Provisioning, the service consumer shall send an HTTP POST request to the VAE Server targeting the URI of the "V2P Application Requirements Provisionings" collection resource, with the request body including the V2pAppReqData data structure.

2a. Upon success, the VAE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual V2P Application Requirements Provisioning" resource within the V2pAppReqData 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 6.12.7.

##### 5.13.2.2.3 V2P Application Requirements Provisioning Update

Figure 5.13.2.2.3-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the update of an existing V2P Application Requirements Provisioning (see also clause 9.22 of 3GPP°TS°23.286°[4]).



Figure 5.13.2.2.3-1: Procedure for V2P Application Requirements Provisioning Update

1. In order to update an existing V2P Application Requirements Provisioning, the service consumer shall send an HTTP PUT/PATCH request to the VAE Server, targeting the URI of the corresponding "Individual V2P Application Requirements Provisioning" resource, with the request body including either:

- the updated representation of the resource within the V2pAppReqData data structure, in case the HTTP PUT method is used; or

- the requested modifications to the resource within the V2pAppReqDataPatch 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 VAE Server shall update the targeted "Individual V2P Application Requirements Provisioning" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual V2P Application Requirements Provisioning" resource within the V2pAppReqData 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 6.12.7.

##### 5.13.2.2.4 V2P Application Requirements Provisioning Deletion

Figure 5.13.2.2.4-1 depicts a scenario where a service consumer sends a request to the VAE Server to request the deletion of an existing V2P Application Requirements Provisioning (see also clause 9.22 of 3GPP°TS°23.286°[4]).



Figure 5.13.2.2.4-1: Procedure for V2P Application Requirements Provisioning Deletion

1. In order to request the deletion of an existing V2P Application Requirements Provisioning, the service consumer shall send an HTTP DELETE request to the VAE Server targeting the corresponding "Individual V2P Application Requirements Provisioning" 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 VAE 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 6.12.7.

# 6 API Definitions

## 6.1 VAE\_MessageDelivery API

### 6.1.1 Introduction

The VAE\_MessageDelivery service shall use the VAE\_MessageDelivery API.

The API URI of the VAE\_MessageDelivery Service API shall be:

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

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [22], i.e.:

All resource URIs of this API shall have the following root:

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

with the following components:

- The {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

- The <apiName>shall be "vae-message-delivery".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

NOTE: When 3GPP TS 29.122 [22] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1, the VAE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

### 6.1.2 Usage of HTTP

The provisions of clause 5.2.2 and 5.2.8 of 3GPP TS 29.122 [22] shall apply for the VAE\_MessageDelivery API.

### 6.1.3 Resources

#### 6.1.3.1 Overview

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

Figure 6.1.3.1-1 depicts the resource URIs structure for the VAE\_MessageDelivery API.



Figure 6.1.3.1-1: Resource URI structure of the VAE\_MessageDelivery API

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Message Delivery Subscriptions | /subscriptions | POST | Create a new Message Delivery Subscription. |
| Individual Message Delivery Subscription | /subscriptions/{subscriptionId} | GET | Retrieve an existing "Individual Message Delivery Subscription" resource. |
| PUT | Update an existing "Individual Message Delivery Subscription" resource. |
| PATCH | Modify an existing "Individual Message Delivery Subscription" resource. |
| DELETE | Delete an existing "Individual Message Delivery Subscription" resource. |
| Downlink Message Deliveries | /subscriptions/{subscriptionId}/message-deliveries | POST | Create a new Downlink Message Delivery. |
| Individual Downlink Message Delivery | /subscriptions/{subscriptionId}/message-deliveries/{dlDeliveryId} | GET | Retrieve an existing "Individual Downlink Message Delivery" resource. |
| DELETE | Delete an existing "Individual Downlink Message Delivery" resource. |

#### 6.1.3.2 Resource: Message Delivery Subscriptions

##### 6.1.3.2.1 Description

This resource represents the collection of the "Individual Message Delivery Subscription" resources managed by the VAE Server.

##### 6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-message-delivery/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 6.1.1. |

##### 6.1.3.2.3 Resource Standard Methods

###### 6.1.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Message Delivery Subscription at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

Table 6.1.3.2.3.1-1: 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 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.1-3.

Table 6.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| MessageDeliverySubscriptionData | M | 1 | Represents the parameters to request the creation of a Message Delivery Subscription. |

Table 6.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| MessageDeliverySubscriptionData | O | 0..1 | 201 Created | Successful case. The Message Delivery Subscription is successfully created and a representation of the created "Individual Message Delivery 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 [22] shall also apply. | | | | |

Table 6.1.3.2.3.1-4: 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}/vae-message-delivery/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.1.3.2.4 Resource Custom Operations

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

#### 6.1.3.3 Resource: Individual Message Delivery Subscription

##### 6.1.3.3.1 Description

The "Individual Message Delivery Subscription" resource represents a Message Delivery Subscription managed by the VAE Server.

##### 6.1.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-message-delivery/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.1.1 |
| subscriptionId | string | Represents the unique identifier of the "Individual Message Delivery Subscription" resource. |

##### 6.1.3.3.3 Resource Standard Methods

###### 6.1.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Message Delivery Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.3.3.1-1.

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 |
| 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 |
| MessageDeliverySubscriptionData | M | 1 | 200 OK | Successful case. The requested "Individual Message Delivery 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] 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 VAE 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 VAE Server. |

###### 6.1.3.3.3.1A PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Message Delivery Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.3.3.1A-1.

Table 6.1.3.3.3.1A-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 6.1.3.3.3.1A-2 and the response data structures and response codes specified in table 6.1.3.3.3.1A-3.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| MessageDeliverySubscriptionData | M | 1 | Represents the updated representation of the "Individual Message Delivery Subscription" resource. |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| MessageDeliverySubscriptionData | M | 1 | 200 OK | Successful case. The "Individual Message Delivery 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 Message Delivery 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.3.3.3.1A-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 VAE Server. |

Table 6.1.3.3.3.1A-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 VAE Server. |

###### 6.1.3.3.3.1B PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Message Delivery Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.3.3.1B-1.

Table 6.1.3.3.3.1B-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 6.1.3.3.3.1B-2 and the response data structures and response codes specified in table 6.1.3.3.3.1B-3.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| MsgDelSubscDataPatch | M | 1 | Represents the parameters to request the modification of the "Individual Message Delivery Subscription" resource. |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| MsgDelSubscDataPatch | M | 1 | 200 OK | Successful case. The "Individual Message Delivery 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 Message Delivery 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.3.3.3.1B-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 VAE Server. |

Table 6.1.3.3.3.1B-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 VAE Server. |

###### 6.1.3.3.3.2 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Message Delivery Subscription" resource at the VAE Server.

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

Table 6.1.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 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 DELETE Request Body on this resource

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The "Individual Message Delivery 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] 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 VAE 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 VAE Server. |

##### 6.1.3.3.4 Resource Custom Operations

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

#### 6.1.3.4 Resource: Downlink Message Deliveries

##### 6.1.3.4.1 Description

This resource represents the collection of the "Individual Downlink Message Delivery" resources managed by the VAE Server.

##### 6.1.3.4.2 Resource Definition

Resource URI: **{apiRoot}/vae-message-delivery/<apiVersion>/subscriptions/{subscriptionId}/message-deliveries**

This resource shall support the resource URI variables defined in table 6.1.3.4.2-1.

Table 6.1.3.4.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.1.1. |
| subscriptionId | string | Represents the unique identifier of the "Individual Message Delivery Subscription" resource. |

##### 6.1.3.4.3 Resource Standard Methods

###### 6.1.3.4.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Downlink Message Delivery at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.4.3.1-1.

Table 6.1.3.4.3.1-1: 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 6.1.3.4.3.1-2 and the response data structures and response codes specified in table 6.1.3.4.3.1-3.

Table 6.1.3.4.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DownlinkMessageDeliveryData | M | 1 | Represents the parameters to request the creation of a Downlink Message Delivery. |

Table 6.1.3.4.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| DownlinkMessageDeliveryData | O | 0..1 | 201 Created | Successful case. The Downlink Message Delivery is successfully created and a representation of the created "Individual Downlink Message Delivery" 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 [22] shall also apply. | | | | |

Table 6.1.3.4.3.1-4: 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}/vae-message-delivery/<apiVersion>/subscriptions/{subscriptionId}/message-deliveries/{dlDeliveryId} |

##### 6.1.3.4.4 Resource Custom Operations

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

#### 6.1.3.5 Resource: Individual Downlink Message Delivery

##### 6.1.3.5.1 Description

The "Individual Downlink Message Delivery" resource represents a Downlink Message Delivery managed by the VAE Server.

##### 6.1.3.5.2 Resource definition

Resource URI: **{apiRoot}/vae-message-delivery/<apiVersion>/subscriptions/{subscriptionId}/message-deliveries/{dlDeliveryId}**

This resource shall support the resource URI variables defined in table 6.1.3.5.2-1.

Table 6.1.3.5.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.1.1 |
| subscriptionId | string | Represents the unique identifier of the "Individual Message Delivery Subscription" resource. |
| dlDeliveryId | string | Represents the unique identifier of the "Individual Downlink Message Delivery" resource. |

##### 6.1.3.5.3 Resource Standard Methods

###### 6.1.3.5.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Downlink Message Delivery" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.5.3.1-1.

Table 6.1.3.5.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 5.1.3.5.3.1-2 and the response data structures and response codes specified in table 5.1.3.5.3.1-3.

Table 6.1.3.5.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.1.3.5.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| DownlinkMessageDeliveryData | M | 1 | 200 OK | Successful case. The requested "Individual Downlink Message Delivery" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.3.5.3.1-4: 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 VAE Server. |

Table 6.1.3.5.3.1-5: 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 VAE Server. |

###### 6.1.3.5.3.2 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Downlink Message Delivery" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.1.3.5.3.2-1.

Table 6.1.3.5.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 6.1.3.5.3.2-2 and the response data structures and response codes specified in table 6.1.3.5.3.2-3.

Table 6.1.3.5.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.1.3.5.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The "Individual Downlink Message Delivery" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.3.5.3.2-4: 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 VAE Server. |

Table 6.1.3.5.3.2-5: 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 VAE Server. |

##### 6.1.3.5.4 Resource Custom Operations

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

### 6.1.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_MessageDelivery.

### 6.1.5 Notifications

#### 6.1.5.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [22].

Table 6.1.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| Uplink Message Delivery | {notifUri} | POST | Enables to perform uplink message delivery to the service consumer. |
| Reception Report of Downlink Message Delivery | {notifUri} | POST | Enables to report the result of a downlink message delivery to the service consumer. |

#### 6.1.5.2 Void

#### 6.1.5.3 Void

#### 6.1.5.4 Void

#### 6.1.5.5 Void

#### 6.1.5.6 Uplink Message Delivery

##### 6.1.5.6.1 Description

The Uplink Message Delivery notification is used by the VAE Server to deliver an uplink message to the service consumer.

##### 6.1.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.5.6.2-1 and the response data structure and response codes specified in table 6.1.5.6.2-2.

Table 6.1.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| UplinkMessageDeliveryData | M | 1 | Contains the uplink message data. |

Table 6.1.5.6.2-2: 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 Uplink Message Delivery notification is successfully received and acknowledged, and no content is returned in the response body. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection.  The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.1.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

#### 6.1.5.7 Reception Report of Downlink Message Delivery

##### 6.1.5.7.1 Description

The Reception Report of Downlink Message Delivery notification is used by the VAE Server to report the result of the downlink message delivery to the service consumer.

##### 6.1.5.7.2 Operation Definition

This operation shall support the request data structures specified in table 6.1.5.7.2-1 and the response data structure and response codes specified in table 6.1.5.7.2-2.

Table 6.1.5.7.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| Result | M | 1 | Contains the result of downlink message delivery. |

Table 6.1.5.7.2-2: 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 Reception Report of Downlink Message Delivery notification is successfully received and acknowledged, and no content is returned in the response body. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection.  The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.1.5.7.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.1.5.7.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.1.6 Data Model

#### 6.1.6.1 General

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

Table 6.1.6.1-1 specifies the data types defined for the VAE\_MessageDelivery API.

Table 6.1.6.1-1: VAE\_MessageDelivery specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| AppServerId | 6.1.6.3.2 | Represents the identifier of the service consumer. |  |
| DownlinkMessageDeliveryData | 6.1.6.2.2 | Represents the Downlink V2X Message Delivery data. |  |
| GeoId | 6.1.6.3.2 | Represents the geographical area identifier. |  |
| MessageDeliverySubscriptionData | 6.1.6.2.3 | Represents the V2X Message Delivery Subscription data. |  |
| MsgDelSubscDataPatch | 6.1.6.2.5 | Represents the requested modifications to a V2X Message Delivery Subscription. |  |
| Result | 6.1.6.3.3 | Represents the result of message delivery. |  |
| UplinkMessageDeliveryData | 6.1.6.2.4 | Represents the Uplink V2X Message Delivery data. |  |
| V2xGroupId | 6.1.6.3.2 | Represents the V2X group ID. |  |
| V2xServiceID | 6.1.6.3.2 | Represents the V2X service ID. |  |
| V2xUeId | 6.1.6.3.2 | Represents the V2X UE ID. |  |
| V2xMessagePayload | 6.1.6.3.2 | Represents V2X message payload data. |  |

Table 6.1.6.1-2 specifies data types re-used by the VAE\_MessageDelivery service-based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_MessageDelivery service based interface.

Table 6.1.6.1-2: VAE\_MessageDelivery re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Bytes | 3GPP TS 29.571 [11] | Represents a string with format "byte" as defined in OpenAPI Specification [6], i.e, base64-encoded characters. |  |
| DateTime | 3GPP TS 29.571 [11] | Represents a date and a time. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Represents the list of supported features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uri | 3GPP TS 29.571 [11] | Represents a URI. |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Represents configuration information to be used for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.1.6.2 Structured data types

##### 6.1.6.2.1 Introduction

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

##### 6.1.6.2.2 Type: DownlinkMessageDeliveryData

Table 6.1.6.2.2-1: Definition of type DownlinkMessageDeliveryData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueId | V2xUeId | C | 0..1 | Contains the identifier of the V2X UE to which the downlink V2X message is addressed.  (NOTE) |  |
| groupId | V2xGroupId | C | 0..1 | Contains the identifier of the V2X group to which the downlink V2X message is addressed.  (NOTE) |  |
| serviceId | V2xServiceId | C | 0..1 | Contains the identifier of the V2X service to which the downlink V2X message is related.  When the "V2XService" feature is supported, this attribute shall be present. | V2XService |
| geoId | GeoId | O | 0..1 | Contains the geographical area identifier. |  |
| payload | V2xMessagePayload | M | 1 | Constains the downlink V2X message payload data. |  |
| duration | DateTime | O | 0..1 | Contains the absolute time at which the related "Individual Downlink Message Delivery" resource is considered to expire.  When omitted in the request, it indicates the resource is requested to be valid forever by the service consumer.  When omitted in the response, it indicates the resource is set to valid forever by the VAE server. |  |
| receptionRepReq | boolean | O | 0..1 | Contains the indication on whether a reception report is requested for this downlink V2X message delivery.  - "true" indicates that a reception report is requested.  - "false" indicates that a reception report is not requested.  - The default value is "true" when this attribute is omitted. | enNB |
| notifUri | Uri | C | 0..1 | Contains the notification URI.  This attribute shall be present only in the case of a Standalone Downlink Message Delivery request and the downlink message delivery reception report is requested (i.e., the "receptionRepReq" attribute is either absent or present and set to "true"). |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.1.8.  This attribute shall be present only when feature negotiation is required. |  |
| NOTE: Either the "ueId" attribute or the "groupId" attribute shall be included. | | | | | |

##### 6.1.6.2.3 Type: MessageDeliverySubscriptionData

Table 6.1.6.2.3-1: Definition of type MessageDeliverySubscriptionData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| appSerId | AppServerId | M | 1 | Contains the identifier of the service consumer. |  |
| serviceId | V2xServiceId | M | 1 | Contains the identifier of the V2X service to which the V2X Message Delivery Subscription is related. |  |
| geoId | GeoId | O | 0..1 | Contains the geographical area identifier. |  |
| notifUri | Uri | M | 1 | Contains the notification URI. |  |
| requestTestNotification | boolean | O | 0..1 | Contains the test notification indication.  - Set to true by the service consumer to request the VAE Server to send a test notification.  - Set to "false" or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Contains the configuration parameters to set up notification delivery over Websocket as defined in clause 6.1.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.1.8.  This attribute shall be present only when feature negotiation is required. |  |

##### 6.1.6.2.4 Type: UplinkMessageDeliveryData

Table 6.1.6.2.4-1: Definition of type UplinkMessageDeliveryData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | Contains the URI of the "Individual Message Delivery Subscription" resource to which the uplink message delivery is related.  (NOTE) |  |
| ueId | V2xUeId | M | 1 | Contains the identifier of the sending V2X UE. |  |
| serviceId | V2xServiceId | C | 0..1 | Contains the identifier of the V2X service to which the uplink V2X message is related.  When the "V2XService" feature is supported, this attribute shall be present. | V2XService |
| geoId | GeoId | O | 0..1 | Contains the geographical area identifier. |  |
| payload | V2xMessagePayload | M | 1 | Contains the uplink V2X message payload data. |  |
| NOTE: In this release of the specification, this attribute shall contain either the complete resource URI or only the "<apiSpecificResourceUriPart>" component (see clause 6.1.1) of the resource URI to identify the "Individual Message Delivery Subscription" resource to which the uplink message delivery is related. | | | | | |

##### 6.1.6.2.5 Type: MsgDelSubscDataPatch

Table 6.1.6.2.5-1: Definition of type MsgDelSubscDataPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| serviceId | V2xServiceId | O | 0..1 | Contains the identifier of the V2X service to which the V2X message(s) belongs. |  |
| geoId | GeoId | O | 0..1 | Contains the updated geographical area identifier. |  |
| notifUri | Uri | O | 0..1 | Contains the updated notification URI. |  |

Editor’s Note: The list of attributes (i.e., attributes of the resource representation that can be modified) to be present within this data type is FFS.

#### 6.1.6.3 Simple data types and enumerations

##### 6.1.6.3.1 Introduction

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

##### 6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.1.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
| AppServerId | string | Represents the identifier of the service consumer. |  |
| GeoId | string | Represents the identifier of a geographical area. |  |
| V2xGroupId | string | Represents the identifier of a V2X group. |  |
| V2xServiceId | string | Represents the identifier of a V2X service. |  |
| V2xUeId | string | Represents the identifier of a V2X UE. |  |
| V2xMessagePayload | Bytes | Represents a V2X message payload data. |  |

##### 6.2.6.3.3 Enumeration: Result

The enumeration Result represents the result of message delivery. It shall comply with the provisions defined in table 6.2.6.3.3-1.

Table 6.2.6.3.3-1: Enumeration Result

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| SUCCESS | Indicates that the downlink message delivery was successful. |  |
| FAIL | Indicates that the downlink message delivery failed. |  |

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

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

#### 6.2.6.5 Binary data

##### 6.2.6.5.1 Binary Data Types

Table 6.2.6.5.1-1: Binary Data Types

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

### 6.1.7 Error Handling

#### 6.1.7.1 General

For the VAE\_MessageDelivery API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [22]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [22] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [22].

In addition, the requirements in the following clauses are applicable for the VAE\_MessageDelivery API.

#### 6.1.7.2 Protocol Errors

No specific protocol errors for the VAE\_MessageDelivery API are specified.

#### 6.1.7.3 Application Errors

The application errors defined for the VAE\_MessageDelivery service are listed in Table 6.1.7.3-1.

Table 6.1.7.3-1: Application errors

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

### 6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the VAE\_MessageDelivery API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [22].

Table 6.1.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.1.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.1.5.4. This feature requires that the Notification\_test\_event feature is also supported. |
| 3 | V2XService | Indicates the support of provisioning the V2X service ID within the uplink/downlink message delivery procedures. |
| 4 | enNB | This feature indicates the support of the Rel-19 generic enhancements to this application layer API.  The following functionalities are supported:  - Support the provisioning of the reception report indication within the downlink message delivery request. |

### 6.1.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [22] shall apply for the VAE\_V2PApplicationRequirement API.

## 6.2 VAE\_FileDistribution Service API

### 6.2.1 Introduction

The VAE\_FileDistribution shall use the VAE\_FileDistribution API.

The API URI of the VAE\_FileDistribution shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-file-distribution".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.2.3.

### 6.2.2 Usage of HTTP

#### 6.2.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 7234 [16]) over TLS is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. TLS shall be used as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 911 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_FileDistribution is contained in Annex A.3.

#### 6.2.2.2 HTTP standard headers

##### 6.2.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.2.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.2.2.3 HTTP custom headers

##### 6.2.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.2.3 Resources

#### 6.2.3.1 Overview

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

Figure 6.2.3.1-1 depicts the resource URIs structure for the VAE\_FileDistribution API.



Figure 6.2.3.1-1: Resource URI structure of the VAE\_FileDistribution API

Table 6.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| File Distributions | /file-distributions | POST | Create a new Individual File Distribution resource for a V2X group ID. |
| Individual File Distribution | /file-distributions/{distributionId} | GET | Read an Individual File Distribution resource. |
| DELETE | Delete an Individual File Distribution resource. |

#### 6.2.3.2 Resource: File Distributions

##### 6.2.3.2.1 Description

This resource represents the collection of the individual File Distribution resources created in the VAE Server.

##### 6.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-file-distribution/<apiVersion>/file-distributions**

This resource shall support the resource URI variables defined in table 6.2.3.2.2-1.

Table 6.2.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.2.1 |

##### 6.2.3.2.3 Resource Standard Methods

###### 6.2.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.2.3.2.3.1-1.

Table 6.2.3.2.3.1-1: 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 6.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.3.2.3.1-3.

Table 6.2.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| FileDistributionData | M | 1 | Parameters to create an individual File Distribution resource. |

Table 6.2.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| FileDistributionData | O | 0..1 | 201 Created | An individual File Distribution resource for the V2X group ID is created successfully. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.2.3.2.3.1-4: 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}/vae-file-distribution/<apiVersion>/file-distributions/{distributionId} |

##### 6.2.3.2.4 Resource Custom Operations

None.

#### 6.2.3.3 Resource: Individual File Distribution

##### 6.2.3.3.1 Description

The individual File Distribution resource represents an individual File Distribution created in the VAE Server and associated with the V2X group ID.

##### 6.2.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-file-distribution/<apiVersion>/file-distributions/{distributionId}**

This resource shall support the resource URI variables defined in table 6.2.3.3-1.

Table 6.2.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.2.1 |
| distributionId | string | Unique identifier of the individual File Distribution resource for the V2X group ID. |

##### 6.2.3.3.3 Resource Standard Methods

###### 6.2.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.3.3.1-1.

Table 6.2.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.2.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.3.3.3.1-3.

Table 6.2.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.2.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| FileDistributionData | M | 1 | 200 OK | An individual File Distribution resource for the V2X group ID is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.2.3.3.3.1-4: 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 VAE Server. |

Table 6.2.3.3.3.1-5: 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 VAE Server. |

###### 6.2.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 6.2.3.3.3.2-1.

Table 6.2.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 6.2.3.3.3.2-2 and the response data structures and response codes specified in table 6.2.3.3.3.2-3.

Table 6.2.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.2.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual File Distribution resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] also apply. | | | | |

Table 6.2.3.3.3.2-4: 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 VAE Server. |

Table 6.2.3.3.3.2-5: 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 VAE Server. |

#### 6.2.3.4 Resource Custom Operations

None.

### 6.2.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_FileDistribution.

### 6.2.5 Notifications

N/A

### 6.2.6 Data Model

#### 6.2.6.1 General

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

Table 6.2.6.1-1 specifies the data types defined for the VAE\_FileDistribution API.

Table 6.2.6.1-1: VAE\_FileDistribution specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| FileDistributionData | 6.2.6.2.2 | Represents an individual File Distribution resource for a V2X group ID. |  |
| Filelist | 6.2.6.2.3 | Represents a file list. |  |
| FileStatus | 6.2.6.3.3 | Represents a file status. |  |
| LocalMbmsInfo | 6.2.6.2.4 | Represents the local MBMS information. | LocalMBMS |
| QoeMetric | 6.2.6.2.5 | Represents the QoE metrics information. | QoEReporting |

Table 6.1.6.1-2 specifies data types re-used by the VAE\_FileDistribution service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_FileDistribution service based interface.

Table 6.2.6.1-2: VAE\_FileDistribution re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| BitRate | 3GPP TS 29.571 [11] |  |  |
| DateTime | 3GPP TS 29.571 [11] |  |  |
| DurationSec | 3GPP TS 29.571 [11] |  |  |
| GeographicArea | 3GPP TS 29.572 [20] |  |  |
| SupportedFeatures | 3GPP TS 29.571 [11] |  |  |
| Uinteger | 3GPP TS 29.571 [11] |  |  |
| V2xGroupId | 6.1.6.3.2 |  |  |

#### 6.2.6.2 Structured data types

##### 6.2.6.2.1 Introduction

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

##### 6.2.6.2.2 Type: FileDistributionData

Table 6.2.6.2.2-1: Definition of type FileDistributionData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| groupId | V2xGroupId | O | 0..1 | Indicates a group ID for which the V2X message is addressed. |  |
| fileLists | array(FileList) | M | 1..N | File lists. |  |
| serviceClass | string | O | 0..1 | Information about the V2X application (e.g., software update, HD map download). |  |
| geoArea | GeographicArea | M | 1 | Target geographical area for the V2X Ues |  |
| maxBitrate | BitRate | M | 1 | Maximum bitrate for the V2X application. |  |
| maxDelay | Uinteger | M | 1 | Unsigned integer identifying a maximum delay in units of milliseconds for the V2X application. |  |
| duration | DateTime | O | 0..1 | Identifies the absolute time at which the related Individual File Distribution Data resource is considered to expire. When omitted in the request, it indicates the resource is requested to be valid forever by the service consumer. When omitted in the response, it indicates the resource is set to valid forever by the VAE server. |  |
| localMbmsInfo | LocalMbmsInfo | O | 0..1 | Contains the local MBMS inforamtion. The information only can be provided by the service consumer in the trust domain. | LocalMBMS |
| localMbmsActInd | boolean |  | 0..1 | When this attribute is included and set to true, it indicates that the local MBMS is activated.  The default value "false" shall apply, if the attribute is not present. | LocalMBMS |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer and VAE server. It shall be included in the request and response of the Creation of Individual File Distribution Data resource. |  |
| qoeMetrics | array(QoeMetric) | O | 1..N | Contains the QoE metrics the service consumer is interested in receiving about the V2X application. | QoEReporting |

##### 6.2.6.2.3 Type: FileList

Table 6.2.6.2.4-1: Definition of type FileList

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| fileUri | Uri | M | 1 |  |  |
| fileDisplayUri | Uri | M | 1 |  |  |
| fileEarFetchTime | DateTime | M | 1 |  |  |
| fileLatFetchTime | DateTime | M | 1 |  |  |
| fileSize | Uinteger | O | 0..1 |  |  |
| fileStatus | FileStatus | M | 1 |  |  |
| completionTime | DateTime | M | 1 |  |  |
| keepUpdateInterval | DurationSec | M | 1 |  |  |
| uniAvailability | Boolean | O | 0..1 |  |  |
| fileRepetition | Uinteger | O | 0..1 |  |  |

##### 6.2.6.2.4 Type: LocalMbmsInfo

Table 6.2.6.2.4-1: Definition of type LocalMbmsInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mbmsEnbIpv4MulAddr | Ipv4Addr | O | 0..1 | Contains the M1 (transport) plane IPv4 destination multicast address used by MBMS-GW for IP multicast encapsulation of application IP multicast datagrams. |  |
| mbmsEnbIpv6MulAddr | Ipv6Prefix | O | 0..1 | Contains the M1 (transport) plane IPv6 prefix of destination multicast address used by MBMS-GW for IP multicast encapsulation of application IP multicast datagrams. |  |
| mbmsGwIpv4SsmAddr | Ipv4Addr | O | 0..1 | Contains the value of MBMS-GW's IPv4 address for Source Specific Multicasting. |  |
| mbmsGwIpv6SsmAddr | Ipv6Addr | O | 0..1 | Contains the value of MBMS-GW's IPv6 address for Source Specific Multicasting. |  |
| cteid | string | O | 0..1 | Indicates the common tunnel endpoint identifier of MBMS GW for user plane. |  |
| bmscIpv4Addr | Ipv4Addr | O | 0..1 | Indicates the destination IPv4 address of the BM‑SC for the reception of user plane data via the MB2-U or xMB‑U interface. |  |
| bmscIpv6Addr | Ipv6Addr | O | 0..1 | Indicates the destination IPv6 address of the BM‑SC for the reception of user plane data via the MB2-U or xMB‑U interface. |  |
| bmscPort | Uinteger | O | 0..1 | Indicates the destination UDP port of the BM‑SC for the reception of user plane data via the MB2-U or xMB‑U interface. |  |

#### 6.2.6.3 Simple data types and enumerations

##### 6.2.6.3.1 Introduction

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

##### 6.2.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.2.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

##### 6.2.6.3.3 Enumeration: FileStatus

Table 6.2.6.3.3-1: Enumeration FileStatus

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| PENDING | The file is pending. |  |
| FETCHED | The file is fetched |  |
| PREPARED | The file is prepared |  |
| TRANSMITTING | The file is transmitting |  |
| SENT | The file is sent. |  |

##### 6.2.6.3.4 Enumeration: Result

Table 6.2.6.3.4-1: Enumeration Result

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| SUCCESS | Indicates that the downlink message delivery is successful. |  |
| FAIL | Indicates that the downlink message delivery is failed. |  |

##### 6.2.6.3.5 Enumeration: QoeMetric

Table 6.2.6.3.5-1: Enumeration QoeMetric

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| CORR\_DUR\_METRIC | Indicates that the QoE metric is the corruption duration metric. |  |
| REBUFF\_DUR\_METRIC | Indicates that the QoE metric is the rebuffering duration metric. |  |
| INITBUFF\_DUR\_METRIC | Indicates that the QoE metric is the initial buffering duration metric. |  |
| LOSS\_RTP\_PACKETS | Indicates that the QoE metric is the successive loss of RTP packets. |  |
| FRAME\_RATE\_DEV | Indicates that the QoE metric is the frame rate deviation. |  |
| JITTER\_DURATION | Indicates that the QoE metric is the jitter duration. |  |
| CON\_ACC\_SW\_TIME | Indicates that the QoE metric is the content access/switch time. |  |
| NET\_RESOURCE | Indicates that the QoE metric is the network resource. |  |
| AVG\_CODEC\_BIT\_RATE | Indicates that the QoE metric is average codec bitrate. |  |
| CODEC\_INFO | Indicates that the QoE metric is the codec information. |  |
| LOSS\_OBJECT | Indicates that the QoE metric is the Loss of Objects. |  |
| SYM\_COUNT\_FOR\_FAILED\_BLOCK | Indicates that the QoE metric is the distribution of symbol count underrun for Failed Blocks. |  |

### 6.2.7 Error Handling

#### 6.2.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_FileDistribution Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_FileDistribution Service API.

#### 6.2.7.2 Protocol Errors

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

#### 6.2.7.3 Application Errors

The application errors defined for the VAE\_FileDistribution service are listed in table 6.2.7.3-1.

Table 6.2.7.3-1: Application errors

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

### 6.2.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the VAE\_FileDistribution API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.1.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | LocalMBMS | Indicate the support of local MBMS transmission. |
| 2 | QoEReporting | Indicate the support of QoE metrics provisioning. |

## 6.3 VAE\_ApplicationRequirement API

### 6.3.1 Introduction

The VAE\_ApplicationRequirement Service shall use the VAE\_ApplicationRequirement API.

The API URI of the VAE\_ApplicationRequirement API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-app-req".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.3.3.

### 6.3.2 Usage of HTTP

#### 6.3.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. TLS shall be used as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_ApplicationRequirement is contained in Annex A.4.

#### 6.3.2.2 HTTP standard headers

##### 6.3.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.3.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.3.2.3 HTTP custom headers

##### 6.3.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.3.3 Resources

#### 6.3.3.1 Overview

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

Figure 6.3.3.1-1 depicts the resource URIs structure for the VAE\_ApplicationRequirement API.



Figure 6.3.3.1-1: Resource URI structure of the VAE\_ApplicationRequirement API

Table 6.3.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.3.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Application Requirements | /application-requirements | POST | Create a new Individual Application Requirement resource for a V2X UE or V2X group ID. |
| Individual Application Requirement | /application-requirements /{requirementId} | GET | Read an Individual Application Requirement resource. |
| DELETE | Delete an Individual Application Requirement resource. |

#### 6.3.3.2 Resource: Application Requirements

##### 6.3.3.2.1 Description

This resource represents the collection of the individual Application Requirement resources created in the VAE Server.

##### 6.3.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-app-req/<apiVersion>/application-requirements**

This resource shall support the resource URI variables defined in table 6.3.3.2.2-1.

Table 6.3.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.3.1 |

##### 6.3.3.2.3 Resource Standard Methods

###### 6.3.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.3.3.2.3.1-1.

Table 6.3.3.2.3.1-1: 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 6.3.3.2.3.1-2 and the response data structures and response codes specified in table 6.3.3.2.3.1-3.

Table 6.3.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ApplicationRequirementData | M | 1 | Parameters to create an individual Application Requirement resource. |

Table 6.3.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ApplicationRequirementData | O | 0..1 | 201 Created | An individual Application Requirement resource for the V2X UE ID or the V2X group ID is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.3.3.2.3.1-4: 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}/vae-app-req/<apiVersion>/application-requirements/{requirementId} |

##### 6.3.3.2.4 Resource Custom Operations

None.

#### 6.3.3.3 Resource: Individual Application Requirement

##### 6.3.3.3.1 Description

The individual Application Requirement resource represents an individual Application Requirement created in the VAE Server and associated with the V2X UE ID or V2X group ID.

##### 6.3.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-app-req/<apiVersion>/application-requirements/{requirementId}**

This resource shall support the resource URI variables defined in table 6.2.3.3-1.

Table 6.3.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.3.1 |
| requirementId | string | Unique identifier of the individual Application Requirement resource for the V2X UE ID or the V2X group ID. |

##### 6.3.3.3.3 Resource Standard Methods

###### 6.3.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.3.3.3.3.1-1.

Table 6.3.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.3.3.3.3.1-2 and the response data structures and response codes specified in table 6.3.3.3.3.1-3.

Table 6.3.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.3.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| ApplicationRequirementData | M | 1 | 200 OK | An individual Application Requirement resource for the V2X UE ID or V2X group ID is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.3.3.3.3.1-4: 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 VAE Server. |

Table 6.3.3.3.3.1-5: 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 VAE Server. |

###### 6.3.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 6.3.3.3.3.2-1.

Table 6.3.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 6.3.3.3.3.2-2 and the response data structures and response codes specified in table 6.3.3.3.3.2-3.

Table 6.3.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.3.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual Application Requirement resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.3.3.3.3.2-4: 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 VAE Server. |

Table 6.3.3.3.3.2-5: 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 VAE Server. |

#### 6.3.3.4 Resource Custom Operations

None.

### 6.3.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_ApplicationRequirement.

### 6.3.5 Notifications

#### 6.3.5.1 General

The VAE server and service consumer shall support the delivery of Notifications using a separate HTTP connection towards an address as assigned the service consumer described in clause 6.3.5.2.

A VAE server and service consumer may support testing a notification connection as described in clause 6.3.5.3. A VAE server and service consumer may support the delivery of Notification using Websocket (IETF RFC 6455 [21]) as described in clause 6.1.5.4.

#### 6.3.5.2 Notification Delivery using a separate HTTP connection

The descriptions in clause 5.2.5.2 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer;

- description of SCEF applies to the VAE server; and

- "notificationDestination" attribute is replaced by the "notifUri" attribute.

#### 6.3.5.3 Notification Test Event

The descriptions in clause 5.2.5.3 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.3.5.4 Notification Delivery using Websocket

The descriptions in clause 5.2.5.4 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.3.5.5 Methods

Table 6.3.5.5-1: Methods

|  |  |  |
| --- | --- | --- |
| Callback URI | HTTP method or custom operation | Description (service operation) |
| {notifUri} | POST | Notify the result of the network resource adaptation corresponding to the V2X application requirement. |

#### 6.3.5.6 Notify Network Resource

##### 6.3.5.6.1 Description

This notification is used by the VAE Server to notify the result of the network resource adaptation corresponding to the V2X application requirement.

##### 6.3.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.3.5.6.2-1 and the response data structure and response codes specified in table 6.3.5.6.2-2.

Table 6.3.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| AppReqNotification | M | 1 | Notify the result of the network resource adaptation corresponding to the V2X application requirement. |

Table 6.3.5.6.2-2: 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 notification is successfully received and processed. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.3.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.3.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.3.6 Data Model

#### 6.3.6.1 General

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

Table 6.3.6.1-1 specifies the data types defined for the VAE\_ApplicationRequirement API.

Table 6.3.6.1-1: VAE\_ApplicationRequirement specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| ApplicationRequirement | 6.3.6.2.3 | Represents the requirements for application change. |  |
| ApplicationRequirementData | 6.3.6.2.2 | Represents an individual Application Requirement resource for a V2X UE ID or a V2X group ID. |  |
| AppReqNotification | 6.3.6.2.4 | Represents a notificaton of the result of the network resource adaptation corresponding to the V2X application requirement. |  |
| ReservationResult | 6.3.6.3.4 | Represents the result of the network resource adaptation corresponding to the V2X application requirement. |  |
| ServiceLevel | 6.3.6.3.3 | Indicates a service level for application service. |  |

Table 6.3.6.1-2 specifies data types re-used by the VAE\_ApplicationRequirement service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_ApplicationRequirement service based interface.

Table 6.3.6.1-2: VAE\_ApplicationRequirement re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| DateTime | 3GPP TS 29.571 [11] | Used to indicate a duration. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| V2xGroupId | 6.1.6.3.2 | Used to indicate an identifier of a V2X group. |  |
| V2xServiceID | 6.1.6.3.2 | The V2X service ID to which the V2X message belongs to |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Pepresents configuration for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.3.6.2 Structured data types

##### 6.3.6.2.1 Introduction

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

##### 6.3.6.2.2 Type: ApplicationRequirementData

Table 6.3.6.2.2-1: Definition of type ApplicationRequirementData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueId | V2xUeId | C | 0..1 | Indicates a UE ID for which the V2X message is addressed.  (NOTE) |  |
| groupId | V2xGroupId | C | 0..1 | Indicates a group ID for which the V2X message is addressed.  (NOTE) |  |
| serviceId | V2xServiceId | M | 1 | The V2X service ID for which application requirement corresponds to. |  |
| appRequirement | ApplicationRequirement | M | 1 | The requirement for application change. E.g. service levels for application service. |  |
| notifUri | Uri | M | 1 | Identifies the recipient of V2X application requirement notification sent by the VAE server. |  |
| duration | DateTime | O | 0..1 | Identifies the absolute time at which the related Individual Application Requirement resource is considered to expire. When omitted in the request, it indicates the resource is requested to be valid forever by the service consumer. When omitted in the response, it indicates the resource is set to valid forever by the VAE server |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer. It shall be included in the first interaction. |  |
| NOTE: Either the "ueId" attribute or "groupId" attribute shall be included. | | | | | |

##### 6.3.6.2.3 Type: ApplicationRequirement

Table 6.3.6.2.3-1: Definition of type ApplicationRequirement

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| serviceLevel | ServiceLevel | O | 0..1 | Indicates a service level for application service. |  |

##### 6.3.6.2.4 Type: AppReqNotification

Table 6.3.6.2.4-1: Definition of type AppReqNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | The resource URI of the individual Application Requirement related to the notification. |  |
| result | ReservationResult | M | 1 | The result of the network resource adaptation corresponding to the V2X application requirement. |  |

#### 6.3.6.3 Simple data types and enumerations

##### 6.3.6.3.1 Introduction

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

##### 6.3.6.3.2 Simple data types

The simple data types defined in table 6.3.6.3.2-1 shall be supported.

Table 6.3.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

##### 6.3.6.3.3 Enumeration: ServiceLevel

Table 6.3.6.3.3-1: Enumeration ServiceLevel

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| HIGH | Service level is high. |  |
| MEDIUM | Service level is medium. |  |
| LOW | Service level is low. |  |

##### 6.3.6.3.4 Enumeration: ReservationResult

Table 6.3.6.3.4-1: Enumeration ReservationResult

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| SUCCESSFUL | The resource reservation is successful. |  |
| FAILURE | The resource reservation is failure. |  |

### 6.3.7 Error Handling

#### 6.3.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_ApplicationRequirement Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_ApplicationRequirement Service API.

#### 6.3.7.2 Protocol Errors

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

#### 6.3.7.3 Application Errors

The application errors defined for the VAE\_ApplicationRequirement service are listed in table 6.3.7.3-1.

Table 6.3.7.3-1: Application errors

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

### 6.3.8 Feature negotiation

The optional features in table 6.3.8-1 are defined for the VAE\_ApplicationRequirement API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.3.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.3.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.3.5.4. This feature requires that the Notification\_test\_event feature is also supported. |

## 6.4 VAE\_DynamicGroup API

### 6.4.1 Introduction

The VAE\_DynamicGroup service shall use the VAE\_DynamicGroup API.

The API URI of the VAE\_DynamicGroup API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-dynamic-group".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.4.3.

### 6.4.2 Usage of HTTP

#### 6.4.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. TLS shall be used as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_DynamicGroup is contained in Annex A.5.

#### 6.4.2.2 HTTP standard headers

##### 6.4.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.4.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.4.2.3 HTTP custom headers

##### 6.4.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.4.3 Resources

#### 6.4.3.1 Overview

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

Figure 6.4.3.1-1 depicts the resource URIs structure for the VAE\_DynamicGroup API.



Figure 6.4.3.1-1: Resource URI structure of the VAE\_DynamicGroup API

Table 6.4.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.4.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Group Configurations | /group-configurations | POST | Create a new Individual Group Configuration resource for a V2X group ID. |
| Individual Group Configuration | /group-configurations/{configId} | GET | Read an Individual Group Configuration resource. |
| DELETE | Delete an Individual Group Configuration resource. |

#### 6.4.3.2 Resource: Group Configurations

##### 6.4.3.2.1 Description

This resource represents the collection of the individual Application Requirement resources created in the VAE Server.

##### 6.4.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-dynamic-group/<apiVersion>/group**-**configuration**s

This resource shall support the resource URI variables defined in table 6.4.3.2.2-1.

Table 6.4.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.4.1 |

##### 6.4.3.2.3 Resource Standard Methods

###### 6.4.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.4.3.2.3.1-1.

Table 6.4.3.2.3.1-1: 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 6.4.3.2.3.1-2 and the response data structures and response codes specified in table 6.4.3.2.3.1-3.

Table 6.4.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| GroupConfigurationData | M | 1 | Parameters to create an individual Group Configuration resource. |

Table 6.4.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| GroupConfigurationData | O | 0..1 | 201 Created | An individual Group Configuration resource for the V2X group ID is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.4.3.2.3.1-4: 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}/vae-dynamic-group/<apiVersion>/group-configurations/{configId} |

##### 6.4.3.2.4 Resource Custom Operations

None.

#### 6.4.3.3 Resource: Individual Group Configuration

##### 6.4.3.3.1 Description

The individual Group Configuration resource represents an individual Group Configuration created in the VAE Server and associated with the V2X group ID.

##### 6.4.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-dynamic-group/<apiVersion>/group**-**configuration**s**/{configId}**

This resource shall support the resource URI variables defined in table 6.2.3.3-1.

Table 6.4.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.4.1. |
| configId | string | Unique identifier of the individual group configuration resource for the V2X group ID. |

##### 6.4.3.3.3 Resource Standard Methods

###### 6.4.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.4.3.3.3.1-1.

Table 6.4.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.4.3.3.3.1-2 and the response data structures and response codes specified in table 6.4.3.3.3.1-3.

Table 6.4.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.4.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| GroupConfigurationData | M | 1 | 200 OK | An individual Group Configuration resource for the V2X group ID is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.4.3.3.3.1-4: 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 VAE Server. |

Table 6.4.3.3.3.1-5: 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 VAE Server. |

###### 6.4.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 6.4.3.3.3.2-1.

Table 6.4.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 6.4.3.3.3.2-2 and the response data structures and response codes specified in table 6.4.3.3.3.2-3.

Table 6.4.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.4.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful case. The "Individual Group Configuration" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.4.3.3.3.2-4: 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 VAE Server. |

Table 6.4.3.3.3.2-5: 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 VAE Server. |

#### 6.4.3.4 Resource Custom Operations

None.

### 6.4.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_DynamicGroup API.

### 6.4.5 Notifications

#### 6.4.5.1 General

The VAE server and service consumer shall support the on-network dynamic group notifications using a separate HTTP connection towards an address as assigned the service consumer described in clause 6.4.5.2.

A VAE server and service consumer may support testing a notification connection as described in clause 6.4.5.3. A VAE server and service consumer may support the delivery of Notification using Websocket (IETF RFC 6455 [21]) as described in clause 6.4.5.4.

#### 6.4.5.2 Notification Delivery using a separate HTTP connection

The descriptions in clause 5.2.5.2 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer;

- description of SCEF applies to the VAE server; and

- "notificationDestination" attribute is replaced by the "notifUri" attribute.

#### 6.4.5.3 Notification Test Event

The descriptions in clause 5.2.5.3 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.4.5.4 Notification Delivery using Websocket

The descriptions in clause 5.2.5.4 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.4.5.5 Methods

Table 6.4.5.5-1: Methods

|  |  |  |
| --- | --- | --- |
| Callback URI | HTTP method or custom operation | Description (service operation) |
| {notifUri} | POST | Notify the dynamic group information (i.e. group member joins or leaves). |

#### 6.4.5.6 Notify Dynamic Group

##### 6.4.5.6.1 Description

This notification is used by the VAE Server to notify the dynamic group information (i.e. group member joins or leaves).

##### 6.4.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.4.5.6.2-1 and the response data structure and response codes specified in table 6.4.5.6.2-2.

Table 6.4.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DynamicGroupNotification | M | 1 | Notify the dynamic group information (i.e. group member joins or leaves). |

Table 6.4.5.6.2-2: 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 notification is successfully received and processed. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.4.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.4.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.4.6 Data Model

#### 6.4.6.1 General

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

Table 6.4.6.1-1 specifies the data types defined for the VAE\_DynamicGroup API.

Table 6.4.6.1-1: VAE\_DynamicGroup specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| DynamicGroupNotification | 6.3.6.2.3 | Represents a notification on the dynamic group information (i.e. group member joins or leaves). |  |
| GroupConfigurationData | 6.3.6.2.2 | Represents an individual Group Configuration resource for a V2X group ID. |  |

Table 6.4.6.1-2 specifies data types re-used by the VAE\_DynamicGroup service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_DynamicGroup service based interface.

Table 6.4.6.1-2: VAE\_DynamicGroup re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| DateTime | 3GPP TS 29.571 [11] | String with format "date-time" as defined in OpenAPI Specification [6]. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| V2xGroupId | 6.1.6.3.2 | Used to indicate an identifier of a V2X group. |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Pepresents configuration for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.4.6.2 Structured data types

##### 6.4.6.2.1 Introduction

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

##### 6.4.6.2.2 Type: GroupConfigurationData

Table 6.4.6.2.2-1: Definition of type GroupConfigurationData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| groupId | V2xGroupId | M | 1 | Indicates a group ID to be used for the V2X group. |  |
| definition | string | M | 1 | Information about the V2X group. |  |
| leaderId | V2xUeId | M | 1 | Indicates a UE ID to be used for user controlled group join. |  |
| duration | DateTime | O | 0..1 | Identifies the absolute time at which the related Individual Group Configuration resource is considered to expire. When omitted in the request, it indicates the resource is requested to be valid forever by the service consumer. When omitted in the response, it indicates the resource is set to valid forever by the VAE server |  |
| notifUri | Uri | M | 1 | Identifies the recipient of V2X dynamic group notification sent by the VAE server. |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the service consumer to request the VAE server to send a test notification as defined in clause 6.1.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.1.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer and VAE server. It shall be included in the request and response of the Creation of Individual Group Configuration resource. |  |

##### 6.4.6.2.3 Type: DynamicGroupNotification

Table 6.4.6.2.2-1: Definition of type DynamicGroupNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | The resource URI of the individual Group Configuration related to the notification. |  |
| joinedUeIds | array(V2xUeId) | O | 1..N | The joined group member(s). |  |
| leftUeIds | array(V2xUeId) | O | 1..N | The left group member(s). |  |

#### 6.4.6.3 Simple data types and enumerations

##### 6.4.6.3.1 Introduction

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

##### 6.4.6.3.2 Simple data types

The simple data types defined in table 6.4.6.3.2-1 shall be supported.

Table 6.4.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 6.4.7 Error Handling

#### 6.4.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_DynamicGroup Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_DynamicGroup Service API.

#### 6.4.7.2 Protocol Errors

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

#### 6.4.7.3 Application Errors

The application errors defined for the VAE\_DynamicGroup service are listed in Table 6.4.7.3-1.

Table 6.4.7.3-1: Application errors

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

### 6.4.8 Feature negotiation

The optional features in table 6.4.8-1 are defined for the VAE\_DynamicGroup API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.4.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.4.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.4.5.4. This feature requires that the Notification\_test\_event feature is also supported. |

## 6.5 VAE\_ServiceContinuity Service API

### 6.5.1 Introduction

The VAE\_ServiceContinuity shall use the VAE\_ServiceContinuity API.

The API URI of the VAE\_ServiceContinuity API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-service-continuity".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.5.3.

### 6.5.2 Usage of HTTP

#### 6.5.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. TLS shall be used as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_ServiceContinuity is contained in Annex A.6.

#### 6.5.2.2 HTTP standard headers

##### 6.5.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.5.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.5.2.3 HTTP custom headers

##### 6.5.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.5.3 Resources

#### 6.5.3.1 Overview

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

Figure 6.5.3.1-1 depicts the resource URIs structure for the VAE\_ServiceContinuity API.



Figure 6.5.3.1-1: Resource URI structure of the VAE\_ServiceContinuity API

Table 6.5.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.5.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Individual Geographical Area | /geo-areas/{geoId} | GET | Query the Individual Geographical Area resource. |

#### 6.5.3.2 Resource: Individual Geographical Area

##### 6.5.3.2.1 Description

This resource represents the individual geographical area resource in the VAE Server.

##### 6.5.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-service-continuity/<apiVersion>/geo-areas/{geoId}**

This resource shall support the resource URI variables defined in table 6.5.3.2.2-1.

Table 6.5.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.5.1 |
| geoId | string | Geographical area id. |

##### 6.5.3.2.3 Resource Standard Methods

###### 6.5.3.2.3.1 GET

This method shall support the URI query parameters specified in table 6.5.3.2.3.1-1.

Table 6.5.3.2.3.1-1: URI query parameters supported by the GET method on this resource

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description | Applicability |
| service-id | V2xServiceId | M | 1 | V2X service id |  |
| supp-feat | SupportedFeatures | O | 0..1 | To filter irrelevant responses related to unsupported features. |  |

This method shall support the request data structures specified in table 6.5.3.2.3.1-2 and the response data structures and response codes specified in table 6.5.3.2.3.1-3.

Table 6.5.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.5.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2xServiceInfo | M | 1 | 200 OK | An individual geographical area resource including the designated V2X service id is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.5.3.2.3.1-4: 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 VAE Server. |

Table 6.5.3.2.3.1-5: 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 VAE Server. |

##### 6.5.3.2.4 Resource Custom Operations

None.

### 6.5.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_ServiceContinuity.

### 6.5.5 Notifications

Notifications are not applicable for the current Release.

### 6.5.6 Data Model

#### 6.5.6.1 General

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

Table 6.5.6.1-1 specifies the data types defined for the VAE\_ServiceContinuity API.

Table 6.5.6.1-1: VAE\_ServiceContinuity specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| V2xServiceInfo | 6.5.6.2.2 | Represents an individual geographical area resource including the designated V2X service identifier. |  |

Table 6.5.6.1-2 specifies data types re-used by the VAE\_ServiceContinuity service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_ServiceContinuity service based interface.

Table 6.5.6.1-2: VAE\_ServiceContinuity re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| V2xServiceId | 6.1.6.3.2 | Defines a V2X service ID. |  |

#### 6.5.6.2 Structured data types

##### 6.5.6.2.1 Introduction

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

##### 6.5.6.2.2 Type: V2xServiceInfo

Table 6.5.6.2.2-1: Definition of type V2xServiceInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| serviceIds | array(V2xServiceId) | M | 1..N | Indicates a list of supported V2X service identifiers. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer and VAE server. It shall be included if the query request includes supported features. |  |

#### 6.5.6.3 Simple data types and enumerations

##### 6.5.6.3.1 Introduction

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

##### 6.5.6.3.2 Simple data types

The simple data types defined in table 6.5.6.3.2-1 shall be supported.

Table 6.5.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 6.5.7 Error Handling

#### 6.5.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_ServiceContinuity Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_ServiceContinuity Service API.

#### 6.5.7.2 Protocol Errors

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

#### 6.5.7.3 Application Errors

The application errors defined for the VAE\_ServiceContinuity service are listed in Table 6.5.7.3-1.

Table 6.5.7.3-1: Application errors

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

### 6.5.8 Feature negotiation

The optional features in table 6.5.8-1 are defined for the VAE\_ServiceContinuity API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.5.8-1: Supported Features

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

## 6.6 VAE\_HDMapDynamicInfo API

### 6.6.1 Introduction

The VAE\_HDMapDynamicInfo Service shall use the VAE\_HDMapDynamicInfo API.

The API URI of the VAE\_HDMapDynamicInfo API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-hdmap-dynamic-info".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.6.3.

### 6.6.2 Usage of HTTP

#### 6.6.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. TLS shall be used as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_HDMapDynamicInfo is contained in Annex A.4.

#### 6.6.2.2 HTTP standard headers

##### 6.6.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.6.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.6.2.3 HTTP custom headers

##### 6.6.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.6.3 Resources

#### 6.6.3.1 Overview

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

Figure 6.6.3.1-1 depicts the resource URIs structure for the VAE\_HDMapDynamicInfo API.



Figure 6.6.3.1-1: Resource URI structure of the VAE\_HDMapDynamicInfo API

Table 6.6.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.6.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| HdMap DynamicInfo Subscription | /subscriptions | POST | Create a new Individual HdMap DynamicInfo Subscription resource for a V2X UE. |
| Individual HdMap DynamicInfo Subscription | /subscriptions/{subscriptionId} | GET | Read an HdMap DynamicInfo Subscription resource. |
| DELETE | Delete an HdMap DynamicInfo Subscription. |

#### 6.6.3.2 Resource: Subscriptions

##### 6.6.3.2.1 Description

This resource represents the collection of the individual HdMap DynamicInfo Subscription resources created in the VAE Server.

##### 6.6.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-hdmap-dynamic-info/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.6.3.2.2-1.

Table 6.6.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.6.1 |

##### 6.6.3.2.3 Resource Standard Methods

###### 6.6.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.6.3.2.3.1-1.

Table 6.6.3.2.3.1-1: 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 6.6.3.2.3.1-2 and the response data structures and response codes specified in table 6.6.3.2.3.1-3.

Table 6.6.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| HdMapDynamicInfoData | M | 1 | Parameters to create an individual HdMap DynamicInfo Subscription resource. |

Table 6.6.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| HdMapDynamicInfoData | O | 0..1 | 201 Created | An individual HdMap DynamicInfo Subscription resource for the V2X UE ID is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.6.3.2.3.1-4: 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}/vae-hdmap-dynamic-info/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.6.3.2.4 Resource Custom Operations

None.

#### 6.6.3.3 Resource: Individual HdMap DynamicInfo Subscription

##### 6.6.3.3.1 Description

The individual HdMap DynamicInfo Subscription resource represents an individual Application Requirement created in the VAE Server and associated with the V2X UE ID.

##### 6.6.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-hdmap-dynamic-info/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.6.3.3-1.

Table 6.6.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.6.1 |
| subscriptionId | string | Unique identifier of the individual HdMap DynamicInfo Subscription resource for the V2X UE ID. |

##### 6.6.3.3.3 Resource Standard Methods

###### 6.6.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.6.3.3.3.1-1.

Table 6.6.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.6.3.3.3.1-2 and the response data structures and response codes specified in table 6.6.3.3.3.1-3.

Table 6.6.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.6.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| HdMapDynamicInfoData | M | 1 | 200 OK | An individual HdMap DynamicInfo Subscription resource for the V2X UE ID is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.6.3.3.3.1-4: 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 VAE Server. |

Table 6.6.3.3.3.1-5: 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 VAE Server. |

###### 6.6.3.3.3.2 DELETE

This method shall support the URI query parameters specified in table 6.6.3.3.3.2-1.

Table 6.6.3.3.3.2-1: URI query parameters supported by the DELETE method on this resource

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

This method shall support the request data structures specified in table 6.6.3.3.3.2-2 and the response data structures and response codes specified in table 6.6.3.3.3.2-3.

Table 6.6.3.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.6.3.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual HdMap DynamicInfo Subscription resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.6.3.3.3.2-4: 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 VAE Server. |

Table 6.6.3.3.3.2-5: 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 VAE Server. |

#### 6.6.3.4 Resource Custom Operations

None.

### 6.6.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_HDMapDynamicInfo.

### 6.6.5 Notifications

#### 6.6.5.1 General

The VAE server and service consumer shall support the delivery of Notifications using a separate HTTP connection towards an address as assigned the service consumer described in clause 6.6.5.2.

A VAE server and service consumer may support testing a notification connection as described in clause 6.6.5.3. A VAE server and service consumer may support the delivery of Notification using Websocket (IETF RFC 6455 [21]) as described in clause 6.6.5.4.

#### 6.6.5.2 Notification Delivery using a separate HTTP connection

The descriptions in clause 5.2.5.2 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer;

- description of SCEF applies to the VAE server; and

- "notificationDestination" attribute is replaced by the "notifUri" attribute.

#### 6.6.5.3 Notification Test Event

The descriptions in clause 5.2.5.3 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.6.5.4 Notification Delivery using Websocket

The descriptions in clause 5.2.5.4 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.6.5.5 Methods

Table 6.6.5.5-1: Methods

|  |  |  |
| --- | --- | --- |
| Callback URI | HTTP method or custom operation | Description (service operation) |
| {notifUri} | POST | Notify the HD map dynamic information corresponding to the subscription. |

#### 6.6.5.6 Notify HD Map Dynamic Information

##### 6.6.5.6.1 Description

This notification is used by the VAE Server to notify the HD Map Dynamic Information corresponding to the subscription.

##### 6.6.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.6.5.6.2-1 and the response data structure and response codes specified in table 6.6.5.6.2-2.

Table 6.6.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| HdMapDynamicInfoNotification | M | 1 | Notify the HD Map dynamic information corresponding to the subscription. |

Table 6.6.5.6.2-2: 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 notification is successfully received and processed. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.6.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.6.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.6.6 Data Model

#### 6.6.6.1 General

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

Table 6.6.6.1-1 specifies the data types defined for the VAE\_HDMapDynamicInfo API.

Table 6.6.6.1-1: VAE\_HDMapDynamicInfo specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| HdMapDynamicInfoData | 6.6.6.2.2 | Represents an individual HdMap DynamicInfo Subscription resource for a V2X UE ID. |  |
| HdMapDynamicInfoNotification | 6.6.6.2.3 | Represents a notificaton of HD map dynamic info corresponding to the subscription. |  |
| NearbyUeInfo | 6.6.6.2.4 | Represents the informaiotn of nearby UEs. |  |

Table 6.6.6.1-2 specifies data types re-used by the VAE\_HDMapDynamicInfo service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_HDMapDynamicInfo service based interface.

Table 6.6.6.1-2: VAE\_HDMapDynamicInfo re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| Uinteger | 3GPP TS 29.571 [11] | Used to identify a range or distance in meters. |  |
| UserLocation | 3GPP TS 29.571 [11] | Used to indicate a V2X user location. |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Pepresents configuration for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.6.6.2 Structured data types

##### 6.6.6.2.1 Introduction

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

##### 6.6.6.2.2 Type: HdMapDynamicInfoData

Table 6.6.6.2.2-1: Definition of type HdMapDynamicInfoData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueId | V2xUeId | M | 1 | V2X UE ID of the host vehicle |  |
| notifUri | Uri | M | 1 | Identifies the recipient of HD Map dynamice info notification sent by the VAE server. |  |
| range | Uinteger | M | 1 | Identifies the range in units of meters. |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer. It shall be included in the first interaction. |  |

##### 6.6.6.2.3 Type: HdMapDynamicInfoNotification

Table 6.6.6.2.3-1: Definition of type HdMapDynamicInfoNotification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | The resource URI of the individual HdMap DynamicInfo Subscription related to the notification. |  |
| nearbyUeInfo | array(NearbyUeInfo) | M | 1..N | Contains the informaiotn of nearby UEs. |  |

##### 6.6.6.2.4 Type: NearbyUeInfo

Table 6.6.6.2.4-1: Definition of type NearbyUeInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| nearbyUeId | V2xUeId | M | 1 | The identifier of nearby V2X UE |  |
| location | UserLocation | M | 1 | Location information of the nearby V2X UE within the application defined proximity range |  |
| distance | Uinteger | M | 1 | Distance information of the nearby V2X UE in the units of meters. |  |

#### 6.6.6.3 Simple data types and enumerations

##### 6.6.6.3.1 Introduction

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

##### 6.6.6.3.2 Simple data types

The simple data types defined in table 6.6.6.3.2-1 shall be supported.

Table 6.6.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 6.6.7 Error Handling

#### 6.6.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_HDMapDynamicInfo Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_HDMapDynamicInfo Service API.

#### 6.6.7.2 Protocol Errors

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

#### 6.6.7.3 Application Errors

The application errors defined for the VAE\_HDMapDynamicInfo service are listed in table 6.6.7.3-1.

Table 6.6.7.3-1: Application errors

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

### 6.6.8 Feature negotiation

The optional features in table 6.6.8-1 are defined for the VAE\_HDMapDynamicInfo API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.6.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.6.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.6.5.4. This feature requires that the Notification\_test\_event feature is also supported. |

## 6.7 VAE\_SessionOrientedService API

### 6.7.1 Introduction

The VAE\_SessionOrientedService Service shall use the VAE\_SessionOrientedService API.

The API URI of the VAE\_SessionOrientedService API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-session-oriented-service".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.7.3.

### 6.7.2 Usage of HTTP

#### 6.7.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS (IETF RFC 5246 [18]) is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_SessionOrientedService is contained in Annex A.8.

#### 6.7.2.2 HTTP standard headers

##### 6.7.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.7.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.7.2.3 HTTP custom headers

##### 6.7.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.7.3 Resources

#### 6.7.3.1 Overview

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

Figure 6.7.3.1-1 depicts the resource URIs structure for the VAE\_SessionOrientedService API.



Figure 6.7.3.1-1: Resource URI structure of the VAE\_SessionOrientedService API

Table 6.7.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.7.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Session Oriented Service Subscriptions | /subscriptions | POST | Create a new Individual Session Oriented Service Subscription. |
| Individual Session Oriented Service Subscription | /subscriptions/{subscriptionId} | GET | Read an Individual Session Oriented Service Subscription. |
| PUT | Update an Individual Session Oriented Service Subscription. |
| DELETE | Delete an Individual Session Oriented Service Subscription |

#### 6.7.3.2 Resource: Session Oriented Service Subscriptions

##### 6.7.3.2.1 Description

This resource represents the collection of the Individual Session Oriented Service Subscription resources created in the VAE Server.

##### 6.7.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-session-oriented-service/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.7.3.2.2-1.

Table 6.7.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.7.1 |

##### 6.7.3.2.3 Resource Standard Methods

###### 6.7.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.7.3.2.3.1-1.

Table 6.7.3.2.3.1-1: 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 6.7.3.2.3.1-2 and the response data structures and response codes specified in table 6.7.3.2.3.1-3.

Table 6.7.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| SessionOrientedData | M | 1 | Parameters to create an Individual Session Oriented Service Subscription resource. |

Table 6.7.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| SessionOrientedData | O | 0..1 | 201 Created | An individual Session Oriented Service Subscription resource is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.7.3.2.3.1-4: 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}/vae-session-oriented-service/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.7.3.2.4 Resource Custom Operations

None.

#### 6.7.3.3 Resource: Individual Session Oriented Service Subscription

##### 6.7.3.3.1 Description

The Individual Session Oriented Service Subscription resource represents Individual Session Oriented Service Subscription created in the VAE Server.

##### 6.7.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-session-oriented-service/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.7.3.3.2-1.

Table 6.7.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.7.1 |
| subscriptionId | string | Unique identifier of the Individual Session Oriented Service Subscription resource. |

##### 6.7.3.3.3 Resource Standard Methods

###### 6.7.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.7.3.3.3.1-1.

Table 6.7.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.7.3.3.3.1-2 and the response data structures and response codes specified in table 6.7.3.3.3.1-3.

Table 6.7.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.7.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| SessionOrientedData | M | 1 | 200 OK | An Individual Session Oriented Service Subscription resource is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.7.3.3.3.1-4: 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 VAE Server. |

Table 6.7.3.3.3.1-5: 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 VAE Server. |

###### 6.7.3.3.3.2 PUT

This method shall support the URI query parameters specified in table 6.7.3.3.3.2-1.

Table 6.7.3.3.3.2-1: 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 6.7.3.3.3.2-2 and the response data structures and response codes specified in table 6.7.3.3.3.2-3.

Table 6.7.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| SessionOrientedData | M | 1 | Parameters to update an Individual Session Oriented Service Subscription resource. |

Table 6.7.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| SessionOrientedData | M | 1 | 200 OK | The Individual Session Oriented Service Subscription resource was successfully updated. |
| n/a |  |  | 204 No Content | The Individual Session Oriented Service Subscription resource was successfully updated. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.7.3.3.3.2-4: 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 VAE Server. |

Table 6.7.3.3.3.2-5: 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 VAE Server. |

###### 6.7.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 6.7.3.3.3.3-1.

Table 6.7.3.3.3.3-1: 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 6.7.3.3.3.3-2 and the response data structures and response codes specified in table 6.7.3.3.3.3-3.

Table 6.7.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.7.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual Session Oriented Service Subscription resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.7.3.3.3.3-4: 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 VAE Server. |

Table 6.7.3.3.3.3-5: 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 VAE Server. |

#### 6.7.3.4 Resource Custom Operations

None.

### 6.7.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_SessionOrientedService.

### 6.7.5 Notifications

#### 6.7.5.1 General

The VAE server and service consumer shall support the delivery of Notifications using a separate HTTP connection towards an address as assigned the service consumer described in clause 6.7.5.2.

A VAE server and service consumer may support testing a notification connection as described in clause 6.7.5.3. A VAE server and service consumer may support the delivery of Notification using Websocket (IETF RFC 6455 [21]) as described in clause 6.7.5.4.

#### 6.7.5.2 Notification Delivery using a separate HTTP connection

The descriptions in clause 5.2.5.2 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer;

- description of SCEF applies to the VAE server; and

- "notificationDestination" attribute is replaced by the "notifUri" attribute.

#### 6.7.5.3 Notification Test Event

The descriptions in clause 5.2.5.3 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.7.5.4 Notification Delivery using Websocket

The descriptions in clause 5.2.5.4 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.7.5.5 Methods

Table 6.7.5.5-1: Methods

|  |  |  |
| --- | --- | --- |
| Callback URI | HTTP method or custom operation | Description (service operation) |
| {notifUri} | POST | Notify the result of the establishment or update of the session-oriented service corresponding to the subscription. |

#### 6.7.5.6 Notify Session Establishment or Update

##### 6.7.5.6.1 Description

This notification is used by the VAE Server to notify the result of establishment or update of the session-oriented service by the VAE server.

##### 6.7.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.7.5.6.2-1 and the response data structure and response codes specified in table 6.7.5.6.2-2.

Table 6.7.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| Notification | M | 1 | Notify the result of establishment or update of the session-oriented service to the subscription. |

Table 6.7.5.6.2-2: 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 notification is successfully received and processed. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.7.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.7.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.7.6 Data Model

#### 6.7.6.1 General

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

Table 6.7.6.1-1 specifies the data types defined for the VAE\_SessionOrientedService API.

Table 6.7.6.1-1: VAE\_SessionOrientedService specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| Action | 6.7.6.3.3 | Indicates the action of the session-oriented service, i.e. establishment and update. |  |
| AppplicationQosRequirement | 6.7.6.2.4 | Represents the application layer QoS requirement. |  |
| Notification | 6.7.6.2.3 | Represents the result of the establishment or update of the session-oriented service. |  |
| SessionOrientedData | 6.7.6.2.2 | Represents the data to trigger establishment or update of ession-oriented service. |  |

Table 6.7.6.1-2 specifies data types re-used by the VAE\_SessionOrientedService service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_SessionOrientedService service based interface.

Table 6.7.6.1-2: VAE\_SessionOrientedService re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| 5Qi | 3GPP TS 29.571 [11] | Used to indicate a PQI. |  |
| AverWindow | 3GPP TS 29.571 [11] | Used to represent aggregation window. |  |
| ExtMaxDataBurstVol | 3GPP TS 29.571 [11] | Used to indicate the maximum data burst volume for an application requirement. |  |
| PacketDelBudget | 3GPP TS 29.571 [11] | Used to indicate the packet delay bugget for an application requirement. |  |
| PacketErrRate | 3GPP TS 29.571 [11] | Used to indicate the packet error rate for an application requirement. |  |
| QosResourceType | 3GPP TS 29.571 [11] | Used to indicate a QoS bearer type, i.e., GBR, delay critical GBR, or non-GBR. |  |
| Result | 6.1.6.3.3 | Used to indicate a success or failure. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uinteger | 3GPP TS 29.571 [11] | Used to represent integer values. |  |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Pepresents configuration for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.7.6.2 Structured data types

##### 6.7.6.2.1 Introduction

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

##### 6.7.6.2.2 Type: SessionOrientedData

Table 6.7.6.2.2-1: Definition of type SessionOrientedData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueId | V2xUeId | M | 1 | V2X UE ID of the host vehicle |  |
| notifUri | Uri | M | 1 | Identifies the recipient of notification sent by the VAE server. |  |
| serviceId | V2xServiceId | M | 1 | The V2X service ID for which application requirement corresponds to. |  |
| appSerId | AppServerId | M | 1 | Identity of the service consumer. |  |
| appQosReq | AppplicationQosRequirement | O | 0..1 | The application QoS requirements for the session-oriented service. |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer. It shall be included in the first interaction. |  |

##### 6.7.6.2.3 Type: Notification

Table 6.7.6.2.3-1: Definition of type Notification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | The resource URI of the individual Session Oriented Service Subscription related to the notification. |  |
| action | Action | M | 1 | Indicate the action to the session-oriented service. |  |
| result | Result | M | 1 | The result indicating success or failure to establish or update session-oriented service. |  |

##### 6.7.6.2.4 Type: AppplicationQosRequirement

Table 6.7.6.2.4-1: Definition of type AppplicationQosRequirement

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| pqi | 5Qi | C | 0..1 | Identifies the PQI, which is a special 5QI (see clause 5.4.2.1 of 3GPP TS 23.287 [30]).  (NOTE) |  |
| resourceType | QosResourceType | C | 0..1 | Indicates whether the resource type is GBR, delay critical GBR, or non-GBR.  (NOTE) |  |
| priorityLevel | Uinteger | C | 0..1 | Contains an unsigned integer indicating the Priority value of the ProSe Per-Packet Priority, within a range of 1 to 8 and the lower number means the higher priority.  (NOTE) |  |
| packetDelayBudget | PacketDelBudget | C | 0..1 | Contains an unsigned integer indicates the packet delay budget. Packet Delay Budget expressed in milliseconds.  (NOTE) |  |
| packetErrorRate | PacketErrRate | C | 0..1 | Contains the packet error rate.  Examples:  - Packer Error Rate 4x10-6 shall be encoded as "4E-6".  - Packer Error Rate 10-2 shall be encoded as"1E-2".  (NOTE) |  |
| averagingWindow | AverWindow | C | 0..1 | Indicates the averaging window.  This attribute shall be present only for a GBR QoS flow or a Delay Critical GBR QoS flow. |  |
| maxDataBurstVol | ExtMaxDataBurstVol | C | 0..1 | Contains an unsigned Integer indicating the maximum data burst volume.  This attribute shall be present only for a Delay Critical GBR QoS flow. |  |
| NOTE: Either the "pqi" attribute or the "resourceType", "priorityLevel", "packetDelayBudget" and "packetErrorRate" attributes shall be present. | | | | | |

#### 6.7.6.3 Simple data types and enumerations

##### 6.7.6.3.1 Introduction

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

##### 6.7.6.3.2 Simple data types

The simple data types defined in table 6.7.6.3.2-1 shall be supported.

Table 6.7.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

##### 6.7.6.3.3 Enumeration: Action

Table 6.7.6.3.3-1: Enumeration Action

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| ESTABLISHMENT | Indicates the establishment of session-oriented service. |  |
| UPDATE | Indicates the update of session-oriented service. |  |

### 6.7.7 Error Handling

#### 6.7.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_SessionOrientedServic Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_SessionOrientedServic Service API.

#### 6.7.7.2 Protocol Errors

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

#### 6.7.7.3 Application Errors

The application errors defined for the VAE\_SessionOrientedServic service are listed in table 6.7.7.3-1.

Table 6.7.7.3-1: Application errors

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

### 6.7.8 Feature negotiation

The optional features in table 6.7.8-1 are defined for the VAE\_SessionOrientedServic API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.7.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.7.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.7.5.4. This feature requires that the Notification\_test\_event feature is also supported. |

## 6.8 VAE\_V2VConfigRequirement API

### 6.8.1 Introduction

The VAE\_V2VConfigRequirement Service shall use the VAE\_V2VConfigRequirement API.

The API URI of the VAE\_V2VConfigRequirement API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-v2v-config-req".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.8.3.

### 6.8.2 Usage of HTTP

#### 6.8.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13] and IETF RFC 9111 [16]) over TLS (IETF RFC 5246 [18]) is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_V2VConfigRequirement is contained in Annex A.9.

#### 6.8.2.2 HTTP standard headers

##### 6.8.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.8.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.8.2.3 HTTP custom headers

##### 6.8.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.8.3 Resources

#### 6.8.3.1 Overview

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

Figure 6.8.3.1-1 depicts the resource URIs structure for the VAE\_V2VConfigRequirement API.



Figure 6.8.3.1-1: Resource URI structure of the VAE\_V2VConfigRequirement API

Table 6.8.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.8.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| V2V Configurations | /configurations | POST | Create a new Individual V2V Configuration. |
| Individual V2V Configuration | /configurations/{configurationId} | GET | Read an Individual V2V Configuration. |
| PUT | Update an Individual V2V Configuration. |
| DELETE | Delete an Individual V2V Configuration. |

#### 6.8.3.2 Resource: V2V Configurations

##### 6.8.3.2.1 Description

This resource represents the collection of the Individual V2V Configuration resources created in the VAE Server.

##### 6.8.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-v2v-config-req/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.8.3.2.2-1.

Table 6.8.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.8.1 |

##### 6.8.3.2.3 Resource Standard Methods

###### 6.8.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.8.3.2.3.1-1.

Table 6.8.3.2.3.1-1: 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 6.8.3.2.3.1-2 and the response data structures and response codes specified in table 6.8.3.2.3.1-3.

Table 6.8.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| V2vConfigurationData | M | 1 | Parameters to create an Individual V2V Configuration resource. |

Table 6.8.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2vConfigurationData | O | 0..1 | 201 Created | An Individual V2V Configuration resource is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.8.3.2.3.1-4: 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}/vae-v2v-config-req/<apiVersion>/configurations/{configurationId} |

##### 6.8.3.2.4 Resource Custom Operations

None.

#### 6.8.3.3 Resource: Individual V2V Configuration

##### 6.8.3.3.1 Description

The Individual V2V Configuration resource represents Individual V2V Configuration created in the VAE Server.

##### 6.8.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-v2v-config-req/<apiVersion>/ configurations/{configurationId}**

This resource shall support the resource URI variables defined in table 6.8.3.3.2-1.

Table 6.8.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.8.1 |
| configurationId | string | Unique identifier of the Individual V2V Configuration resource. |

##### 6.8.3.3.3 Resource Standard Methods

###### 6.8.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.8.3.3.3.1-1.

Table 6.8.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.8.3.3.3.1-2 and the response data structures and response codes specified in table 6.8.3.3.3.1-3.

Table 6.8.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.8.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| V2vConfigurationData | M | 1 | 200 OK | An Individual V2V Configuration resource is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.8.3.3.3.1-4: 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 VAE Server. |

Table 6.8.3.3.3.1-5: 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 VAE Server. |

###### 6.8.3.3.3.2 PUT

This method shall support the URI query parameters specified in table 6.8.3.3.3.2-1.

Table 6.8.3.3.3.2-1: 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 6.8.3.3.3.2-2 and the response data structures and response codes specified in table 6.8.3.3.3.2-3.

Table 6.8.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| V2vConfigurationData | M | 1 | Parameters to update an Individual V2V Configuration resource. |

Table 6.8.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2vConfigurationData | M | 1 | 200 OK | The Individual V2V Configuration resource was successfully updated. |
| n/a |  |  | 204 No Content | The Individual V2V Configuration resource was successfully updated. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.8.3.3.3.2-4: 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 VAE Server. |

Table 6.8.3.3.3.2-5: 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 VAE Server. |

###### 6.8.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 6.8.3.3.3.3-1.

Table 6.8.3.3.3.3-1: 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 6.8.3.3.3.3-2 and the response data structures and response codes specified in table 6.8.3.3.3.3-3.

Table 6.8.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.8.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual V2V Configuration resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.8.3.3.3.3-4: 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 VAE Server. |

Table 6.8.3.3.3.3-5: 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 VAE Server. |

#### 6.8.3.4 Resource Custom Operations

None.

### 6.8.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on V2V Configuration Requirement.

### 6.8.5 Notifications

None.

### 6.8.6 Data Model

#### 6.8.6.1 General

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

Table 6.8.6.1-1 specifies the data types defined for the VAE\_V2VConfigRequirement API.

Table 6.8.6.1-1: VAE\_V2VConfigRequirement specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| V2vConfigurationData | 6.8.6.2.2 | Contains the V2V configuration data. |  |

Table 6.8.6.1-2 specifies data types re-used by the VAE\_V2VConfigRequirement service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_V2VConfigRequirement service based interface.

Table 6.8.6.1-2: VAE\_V2VConfigRequirement re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AppplicationQosRequirement | 6.7.6.2.4 | Used to indicate an application layer QoS requirement. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| V2xGroupId | 6.1.6.3.2 | The group ID |  |
| V2xServiceId | 6.1.6.3.2 | The V2X service ID. |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |

#### 6.8.6.2 Structured data types

##### 6.8.6.2.1 Introduction

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

##### 6.8.6.2.2 Type: V2vConfigurationData

Table 6.8.6.2.2-1: Definition of type V2vConfigurationData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| groupId | V2xGroupId | C | 0..1 | Identity of the V2X group for which the V2X application requirement is initiated.  (NOTE) |  |
| serviceId | V2xServiceId | C | 1 | The V2X service ID for which application requirement corresponds to.  (NOTE) |  |
| canUeIds | array(V2xUeId) | O | 1..N | List of identities of the V2X UEs, which are candidate to serve as application layer relays. |  |
| appQosReq | AppplicationQosRequirement | O | 0..1 | The application QoS requirements for the V2X service. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer. It shall be included in the first interaction. |  |
| NOTE: Either "groupId" attribute or "serviceId" attribute shall be present. | | | | | |

#### 6.8.6.3 Simple data types and enumerations

##### 6.8.6.3.1 Introduction

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

##### 6.8.6.3.2 Simple data types

The simple data types defined in table 6.8.6.3.2-1 shall be supported.

Table 6.8.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 6.8.7 Error Handling

#### 6.8.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_V2VConfigRequirement Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_V2VConfigRequirement Service API.

#### 6.8.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the VAE\_V2VConfigRequirement API.

#### 6.8.7.3 Application Errors

The application errors defined for the VAE\_V2VConfigRequirement service are listed in Table 6.3.7.3-1.

Table 6.8.7.3-1: Application errors

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

### 6.8.8 Feature negotiation

The optional features in table 6.8.8-1 are defined for the VAE\_V2VConfigRequirement API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.8.8-1: Supported Features

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

## 6.9 VAE\_PC5ProvisioningRequirement API

### 6.9.1 Introduction

The VAE\_PC5ProvisioningRequirement Service shall use the VAE\_PC5ProvisioningRequirement API.

The API URI of the VAE\_PC5ProvisioningRequirement API shall be:

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

The request URIs used in HTTP requests from the service consumer towards the VAE Server shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [3], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [3].

- The <apiName>shall be "vae-pc5-prov-req".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.9.3.

### 6.9.2 Usage of HTTP

#### 6.9.2.1 General

Support of HTTP/1.1 (IETF RFC 9112 [12], IETF RFC 9110 [13], IETF RFC 9111 [16]) over TLS (IETF RFC 5246 [18]) is mandatory and support of HTTP/2 as specified in clause 5 of 3GPP TS 29.500 [2] is recommended. A V2X application specific server desiring to use HTTP/2 shall use the HTTP upgrade mechanism to negotiate applicable HTTP version as described in IETF RFC 9113 [5].

HTTP/2, shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [2].

An OpenAPI [6] specification of HTTP messages and content bodies for the VAE\_PC5ProvisioningRequirement is contained in Annex A.10.

#### 6.9.2.2 HTTP standard headers

##### 6.9.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [2] for the usage of HTTP standard headers.

##### 6.9.2.2.2 Content type

JSON, IETF RFC 8259 [7], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [2]. The use of the JSON format shall be signalled by the content type "application/json".

#### 6.9.2.3 HTTP custom headers

##### 6.9.2.3.1 General

The HTTP custom header fields specified in clause 5.2.8 of 3GPP TS 29.122 [22] may be applicable.

### 6.9.3 Resources

#### 6.9.3.1 Overview

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

Figure 6.9.3.1-1 depicts the resource URIs structure for the VAE\_PC5ProvisioningRequirement API.



Figure 6.9.3.1-1: Resource URI structure of the VAE\_PC5ProvisioningRequirement API

Table 6.9.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.9.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| PC5 Provisioning Requirement Subscriptions | /subscriptions | POST | Create a new Individual PC5 Provisioning Requirement Subscription. |
| Individual PC5 Provisioning Requirement Subscription | /subscriptions/{subscriptionId} | GET | Read an Individual PC5 Provisioning Requirement Subscription. |
| PUT | Update an Individual PC5 Provisioning Requirement Subscription. |
| DELETE | Delete an Individual PC5 Provisioning Requirement Subscription. |

#### 6.9.3.2 Resource: PC5 Provisioning Requirement Subscriptions

##### 6.9.3.2.1 Description

This resource represents the collection of the Individual PC5 Provisioning Requirement Subscription resources created in the VAE Server.

##### 6.9.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-pc5-prov-req/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.9.3.2.2-1.

Table 6.9.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.9.1 |

##### 6.9.3.2.3 Resource Standard Methods

###### 6.9.3.2.3.1 POST

This method shall support the URI query parameters specified in table 6.9.3.2.3.1-1.

Table 6.9.3.2.3.1-1: 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 6.9.3.2.3.1-2 and the response data structures and response codes specified in table 6.9.3.2.3.1-3.

Table 6.9.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ProvisioningRequirement | M | 1 | Parameters to create an Individual PC5 Provisioning Requirement Subscription resource. |

Table 6.9.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ProvisioningRequirement | O | 0..1 | 201 Created | An individual PC5 Provisioning Requirement Subscription resource is created successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.9.3.2.3.1-4: 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}/vae-pc5-prov-req/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.9.3.2.4 Resource Custom Operations

None.

#### 6.9.3.3 Resource: Individual PC5 Provisioning Requirement Subscription

##### 6.9.3.3.1 Description

The Individual PC5 Provisioning Requirement Subscription resource represents Individual PC5 Provisioning Requirement Subscription created in the VAE Server.

##### 6.9.3.3.2 Resource definition

Resource URI: **{apiRoot}/vae-pc5-prov-req/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.92.3.3-1.

Table 6.9.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.9.1 |
| subscriptionId | string | Unique identifier of the Individual PC5 Provisioning Requirement Subscription resource. |

##### 6.9.3.3.3 Resource Standard Methods

###### 6.9.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.9.3.3.3.1-1.

Table 6.9.3.3.3.1-1: URI query parameters supported by the GET method on this resource

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

This method shall support the request data structures specified in table 6.9.3.3.3.1-2 and the response data structures and response codes specified in table 6.9.3.3.3.1-3.

Table 6.9.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.9.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| ProvisioningRequirement | M | 1 | 200 OK | An Individual PC5 Provisioning Requirement Subscription resource is returned successfully. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.9.3.3.3.1-4: 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 VAE Server. |

Table 6.9.3.3.3.1-5: 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 VAE Server. |

###### 6.9.3.3.3.2 PUT

This method shall support the URI query parameters specified in table 6.9.3.3.3.2-1.

Table 6.9.3.3.3.2-1: 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 6.9.3.3.3.2-2 and the response data structures and response codes specified in table 6.9.3.3.3.2-3.

Table 6.9.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ProvisioningRequirement | M | 1 | Parameters to update an Individual PC5 Provisioning Requirement Subscription resource. |

Table 6.9.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ProvisioningRequirement | M | 1 | 200 OK | The Individual PC5 Provisioning Requirement Subscription resource was successfully updated. |
| n/a |  |  | 204 No Content | The Individual PC5 Provisioning Requirement Subscription resource was successfully updated. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.9.3.3.3.2-4: 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 VAE Server. |

Table 6.9.3.3.3.2-5: 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 VAE Server. |

###### 6.9.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 6.9.3.3.3.3-1.

Table 6.9.3.3.3.3-1: 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 6.9.3.3.3.3-2 and the response data structures and response codes specified in table 6.9.3.3.3.3-3.

Table 6.9.3.3.3.3-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.9.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Individual PC5 Provisioning Requirement Subscription resource was 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.9.3.3.3.3-4: 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 VAE Server. |

Table 6.9.3.3.3.3-5: 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 VAE Server. |

#### 6.9.3.4 Resource Custom Operations

None.

### 6.9.4 Custom Operations without associated resources

There are no custom operations without associated resources supported on VAE\_PC5ProvisioningRequirement.

### 6.9.5 Notifications

#### 6.9.5.1 General

The VAE server and service consumer shall support the delivery of Notifications using a separate HTTP connection towards an address as assigned the service consumer described in clause 6.9.5.2.

A VAE server and service consumer may support testing a notification connection as described in clause 6.9.5.3. A VAE server and service consumer may support the delivery of Notification using Websocket (IETF RFC 6455 [21]) as described in clause 6.9.5.4.

#### 6.9.5.2 Notification Delivery using a separate HTTP connection

The descriptions in clause 5.2.5.2 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer;

- description of SCEF applies to the VAE server; and

- "notificationDestination" attribute is replaced by the "notifUri" attribute.

#### 6.9.5.3 Notification Test Event

The descriptions in clause 5.2.5.3 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.9.5.4 Notification Delivery using Websocket

The descriptions in clause 5.2.5.4 of 3GPP TS 29.122 [22] apply with following differences:

- description of SCS/AS applies to the service consumer; and

- description of SCEF applies to the VAE server.

#### 6.9.5.5 Methods

Table 6.9.5.5-1: Methods

|  |  |  |
| --- | --- | --- |
| Callback URI | HTTP method or custom operation | Description (service operation) |
| {notifUri} | POST | Notify the result of multi operation PC5 provisioning requirement. |

#### 6.9.5.6 Notify PC5 Provisioning Requirement

##### 6.9.5.6.1 Description

This notification is used by the VAE Server to notify the result of multi operation PC5 provisioning requirement.

##### 6.9.5.6.2 Operation Definition

This operation shall support the request data structures specified in table 6.9.5.6.2-1 and the response data structure and response codes specified in table 6.9.5.6.2-2.

Table 6.9.5.6.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| Notification | M | 1 | Notify the result of multi operation PC5 provisioning requirement. |

Table 6.9.5.6.2-2: 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 notification is successfully received and processed. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| 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 [22] with the difference that the SCEF is replaced by the VAE Server and the SCS/AS is replaced by the service consumer. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.9.5.6.2-3: Headers supported by the 307 Response Code on this resource

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

Table 6.9.5.6.2-4: Headers supported by the 308 Response Code on this resource

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

### 6.9.6 Data Model

#### 6.9.6.1 General

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

Table 6.9.6.1-1 specifies the data types defined for the VAE\_PC5ProvisioningRequirement API.

Table 6.9.6.1-1: VAE\_PC5ProvisioningRequirement specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| Notification | 6.9.6.2.3 | Represents a notificaton of result of PC5 Provisioning Requirement. |  |
| ProvisioningRequirement | 6.9.6.2.2 | Represents an Individual PC5 Provisioning Requirement Subscription resource. |  |

Table 6.9.6.1-2 specifies data types re-used by the VAE\_PC5ProvisioningRequirement service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the VAE\_PC5ProvisioningRequirement service based interface.

Table 6.9.6.1-2: VAE\_PC5ProvisioningRequirement re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AppplicationQosRequirement | 6.7.6.2.4 | Used to indicate a QoS requirements for an application. |  |
| AppServerId | 6.1.6.3.2 | Represents the identifier of the application server. |  |
| PlmnId | 3GPP TS 29.571 [11] | Used to indicate a PLMN identity. |  |
| Result | 6.2.6.3.3 | Used to indicate success or failure. |  |
| SupportedFeatures | 3GPP TS 29.571 [11] | Used to negotiate the applicability of the optional features. |  |
| TestNotification | 3GPP TS 29.122 [22] | Represents a notification that can be sent to test whether a chosen notification mechanism works. | Notification\_test\_event |
| Uri | 3GPP TS 29.571 [11] | Used to indicate an URI. |  |
| V2xGroupId | 6.1.6.3.2 | Used to indicate the group ID |  |
| V2xServiceId | 6.1.6.3.2 | Used to indicate the V2X service ID. |  |
| V2xUeId | 6.1.6.3.2 | Identifier of the destination V2X UE |  |
| WebsockNotifConfig | 3GPP TS 29.122 [22] | Represents configuration for the delivery of notifications over Websockets. | Notification\_websocket |

#### 6.9.6.2 Structured data types

##### 6.9.6.2.1 Introduction

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

##### 6.9.6.2.2 Type: ProvisioningRequirement

Table 6.9.6.2.2-1: Definition of type ProvisioningRequirement

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueId | V2xUeId | C | 0..1 | Identity of the V2X UE for which V2X application requirement is initiated.  (NOTE) |  |
| groupId | V2xGroupId | C | 0..1 | Identity of the V2X group for which the V2X application requirement is initiated.  (NOTE) |  |
| notifUri | Uri | M | 1 | Identifies the recipient of notification sent by the VAE server. |  |
| serviceId | V2xServiceId | M | 1 | The V2X service ID for which application requirement corresponds to. |  |
| appQosReq | AppplicationQosRequirement | O | 0..1 | The application QoS requirements for the session-oriented service. |  |
| plmnList | array(PlmnId) | O | 1..N | The list of the PLMN identities for the PLMNs which offer the V2X service |  |
| requestTestNotification | boolean | O | 0..1 | Set to true by the service consumer to request the VAE server to send a test notification as defined in clause 6.3.5.3. Set to false or omitted otherwise. | Notification\_test\_event |
| websockNotifConfig | WebsockNotifConfig | O | 0..1 | Configuration parameters to set up notification delivery over Websocket protocol as defined in clause 6.3.5.4. | Notification\_websocket |
| suppFeat | SupportedFeatures | C | 0..1 | Indicates the features supported by the service consumer. It shall be included in the first interaction. |  |
| NOTE: Either "ueId" attribute or "groupId" attribute shall be present. | | | | | |

##### 6.9.6.2.3 Type: Notification

Table 6.9.6.2.3-1: Definition of type Notification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| resourceUri | Uri | M | 1 | The resource URI of the Individual PC5 Provisioning Requirement Subscription related to the notification. |  |
| result | Result | M | 1 | The result indicating success or failure to provisioning of QoS requirement. |  |

#### 6.9.6.3 Simple data types and enumerations

##### 6.9.6.3.1 Introduction

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

##### 6.9.6.3.2 Simple data types

The simple data types defined in table 6.9.6.3.2-1 shall be supported.

Table 6.9.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 6.9.7 Error Handling

#### 6.9.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [2].

For the VAE\_PC5ProvisioningRequirement Service API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [3].

Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [2] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [2].

In addition, the requirements in the following clauses are applicable for the VAE\_PC5ProvisioningRequirement Service API.

#### 6.9.7.2 Protocol Errors

In this Release of the specification, there are no additional protocol errors applicable for the VAE\_PC5ProvisioningRequirement API.

#### 6.9.7.3 Application Errors

The application errors defined for the VAE\_PC5ProvisioningRequirement service are listed in table 6.3.7.3-1.

Table 6.9.7.3-1: Application errors

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

### 6.9.8 Feature negotiation

The optional features in table 6.9.8-1 are defined for the VAE\_PC5ProvisioningRequirement API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [2].

Table 6.9.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
| 1 | Notification\_test\_event | The testing of notification connection is supported according to clause 6.9.5.3. |
| 2 | Notification\_websocket | The delivery of notifications over Websocket is supported according to clause 6.9.5.4. This feature requires that the Notification\_test\_event feature is also supported. |

## 6.10 VAE\_ServiceAndQoSControlInfo API

### 6.10.1 Introduction

The VAE\_ServiceAndQoSControlInfo service shall use the VAE\_ServiceAndQoSControlInfo API.

The API URI of the VAE\_ServiceAndQoSControlInfo Service API shall be:

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

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [22], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

- The <apiName>shall be "vae-sqci".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

NOTE: When 3GPP TS 29.122 [22] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.10, the VAE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

### 6.10.2 Usage of HTTP

The provisions of clause 5.2.2 of 3GPP TS 29.122 [22] shall apply for the VAE\_ServiceAndQoSControlInfo API.

### 6.10.3 Resources

#### 6.10.3.1 Overview

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

Figure 6.10.3.1-1 depicts the resource URIs structure for the VAE\_ServiceAndQoSControlInfo API.



Figure 6.10.3.1-1: Resource URIs structure of the VAE\_ServiceAndQoSControlInfo API

Table 6.10.3.1-1 provides an overview of the resources and applicable HTTP methods for the VAE\_ServiceAndQoSControlInfo API.

Table 6.10.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| Service Adaptation And QoS Control Subscriptions | /subscriptions | POST | Request the creation of a Service Adaptation And QoS Control Subscription. |
| Individual Service Adaptation And QoS Control Subscription | /subscriptions/{subscriptionId} | GET | Retrieve an existing "Individual Service Adaptation And QoS Control Subscription" resource. |
| PUT | Request the update of an existing "Individual Service Adaptation And QoS Control Subscription" resource. |
| PATCH | Request the modification of an existing "Individual Service Adaptation And QoS Control Subscription" resource. |
| DELETE | Request the deletion of an existing "Individual Service Adaptation And QoS Control Subscription" resource. |

#### 6.10.3.2 Resource: Service Adaptation And QoS Control Subscriptions

##### 6.10.3.2.1 Description

This resource represents the collection of Service Adaptation And QoS Control Subscriptions managed by the VAE Server.

##### 6.10.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-sqci/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.10.3.2.2-1.

Table 6.10.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.10.1. |

##### 6.10.3.2.3 Resource Standard Methods

###### 6.10.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a Service Adaptation And QoS Control Subscription at the VAE Server.

This method shall support the URI query parameters specified in table 6.10.3.2.3.1-1.

Table 6.10.3.2.3.1-1: 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 6.10.3.2.3.1-2 and the response data structures and response codes specified in table 6.10.3.2.3.1-3.

Table 6.10.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | Represents the parameters to request the creation of a Service Adaptation And QoS Control Subscription. |

Table 6.10.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | 201 Created | Successful case. The Service Adaptation And QoS Control Subscription is successfully created and a representation of the created "Individual Service Adaptation And QoS Control 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 [22] shall also apply. | | | | |

Table 6.10.3.2.3.1-4: 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}/vae-sqci/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.10.3.2.4 Resource Custom Operations

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

#### 6.10.3.3 Resource: Individual Service Adaptation And QoS Control Subscription

##### 6.10.3.3.1 Description

This resource represents a Service Adaptation And QoS Control Subscription managed by the VAE Server.

##### 6.10.3.3.2 Resource Definition

Resource URI: **{apiRoot}/vae-sqci/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.10.3.3.2-1.

Table 6.10.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.10.1. |
| subscriptionId | string | Represents the identifier of the "Individual Service Adaptation And QoS Control Subscription" resource. |

##### 6.10.3.3.3 Resource Standard Methods

###### 6.10.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Service Adaptation And QoS Control Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.10.3.3.3.1-1.

Table 6.10.3.3.3.1-1: 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 6.10.3.3.3.1-2 and the response data structures and response codes specified in table 6.10.3.3.3.1-3.

Table 6.10.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.10.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | 200 OK | Successful case. The requested "Individual Service Adaptation And QoS Control 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.3.3.3.1-4: 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 VAE Server. |

Table 6.10.3.3.3.1-5: 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 VAE Server. |

###### 6.10.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Service Adaptation And QoS Control Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.10.3.3.3.2-1.

Table 6.10.3.3.3.2-1: 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 6.10.3.3.3.2-2 and the response data structures and response codes specified in table 6.10.3.3.3.2-3.

Table 6.10.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | Represents the updated representation of the "Individual Service Adaptation And QoS Control Subscription" resource. |

Table 6.10.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | 200 OK | Successful case. The "Individual Service Adaptation And QoS Control 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 Service Adaptation And QoS Control 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.3.3.3.2-4: 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 VAE Server. |

Table 6.10.3.3.3.2-5: 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 VAE Server. |

###### 6.10.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual Service Adaptation And QoS Control Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.10.3.3.3.3-1.

Table 6.10.3.3.3.3-1: 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 6.10.3.3.3.3-2 and the response data structures and response codes specified in table 6.10.3.3.3.3-3.

Table 6.10.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ServAdaptQoSCtrlSubscPatch | M | 1 | Represents the parameters to request the modification of the "Individual Service Adaptation And QoS Control Subscription" resource. |

Table 6.10.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ServAdaptQoSCtrlSubsc | M | 1 | 200 OK | Successful case. The "Individual Service Adaptation And QoS Control 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 Service Adaptation And QoS Control 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.3.3.3.3-4: 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 VAE Server. |

Table 6.10.3.3.3.3-5: 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 VAE Server. |

###### 6.10.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual Service Adaptation And QoS Control Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.10.3.3.3.4-1.

Table 6.10.3.3.3.4-1: 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 6.10.3.3.3.4-2 and the response data structures and response codes specified in table 6.10.3.3.3.4-3.

Table 6.10.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.10.3.3.3.4-3: 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 Service Adaptation And QoS Control 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.3.3.3.4-4: 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 VAE Server. |

Table 6.10.3.3.3.4-5: 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 VAE Server. |

##### 6.10.3.3.4 Resource Custom Operations

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

### 6.10.4 Custom Operations without associated resources

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

### 6.10.5 Notifications

#### 6.10.5.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [22].

Table 6.10.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| Service Requirements And QoS Adaptation Notification | {notifUri}/req-qos-adapt | POST | Enables a VAE Server to notify a previously subscribed service consumer on Service Requirements And QoS Adaptation event(s). |
| QoS Change Notification | {notifUri}/qos-change | POST | Enables a VAE Server to notify a previously subscribed service consumer on QoS change event(s). |

#### 6.10.5.2 Service Requirements And QoS Adaptation Notification

##### 6.10.5.2.1 Description

The Service Requirements And QoS Adaptation Notification is used by a VAE Server to notify a previously subscribed service consumer on Service Requirements And QoS Adaptation event(s).

##### 6.10.5.2.2 Target URI

The Callback URI **"{notifUri}/req-qos-adapt"** shall be used with the callback URI variables defined in table 6.10.5.2.2-1.

Table 6.10.5.2.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| notifUri | Uri | Represents the callback URI encoded as a string formatted as a URI. |

##### 6.10.5.2.3 Standard Methods

###### 6.10.5.2.3.1 POST

This method shall support the request data structures specified in table 6.10.5.2.3.1-1 and the response data structures and response codes specified in table 6.10.5.2.3.1-2.

Table 6.10.5.2.3.1-1: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| AdaptNotif | M | 1 | Represents the Service Requirements And QoS Adaptation Notification. |

Table 6.10.5.2.3.1-2: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| AdaptNotifResp | M | 1 | 200 OK | Successful case. The Service Requirements And QoS Adaptation Notification is successfully received and acknowledged, and acknowledgment related information shall be returned in the response body. |
| n/a |  |  | 204 No Content | Successful case.  The Service Requirements And QoS Adaptation Notification is successfully received and acknowledged, and no content is returned in the response body. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection.  The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.5.2.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 6.10.5.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

#### 6.10.5.3 QoS Change Notification

##### 6.10.5.3.1 Description

The QoS Change Notification is used by a VAE Server to notify a previously subscribed service consumer on QoS change related event(s).

##### 6.10.5.3.2 Target URI

The Callback URI **"{notifUri}/qos-change"** shall be used with the callback URI variables defined in table 6.10.5.3.2-1.

Table 6.10.5.3.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| notifUri | Uri | Represents the callback URI encoded as a string formatted as a URI. |

##### 6.10.5.3.3 Standard Methods

###### 6.10.5.3.3.1 POST

This method shall support the request data structures specified in table 6.10.5.3.3.1-1 and the response data structures and response codes specified in table 6.10.5.3.3.1-2.

Table 6.10.5.3.3.1-1: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| QoSChangeNotif | M | 1 | Represents the QoS Change Notification. |

Table 6.10.5.3.3.1-2: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful case. The QoS Change 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.10.5.3.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 6.10.5.3.3.1-4: Headers supported by the 308 Response Code on this resource

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

### 6.10.6 Data Model

#### 6.10.6.1 General

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

Table 6.10.6.1-1 specifies the data types defined for the VAE\_ServiceAndQoSControlInfo API.

Table 6.10.6.1-1: VAE\_ServiceAndQoSControlInfo API specific Data Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data type | | Clause defined | | Description | | Applicability | |
| AckResult | | 6.10.6.3.3 | | Represents the acknowledgement result. | |  | |
| AdaptNotif | | 6.10.6.2.4 | | Represents a Service Requirements And QoS Adaptation Notification. | |  | |
| AdaptNotifResp | | 6.10.6.2.5 | | Represents the Service Requirements And QoS Adaptation Notification acknowledgment related information. | |  | |
| AdaptFeedback | | 6.10.6.2.7 | | Represents the feedback to a Service Requirements And QoS Adaptation report. | |  | |
| AdaptReport | | 6.10.6.2.6 | | Represents a Service Requirements And QoS Adaptation report. | |  | |
| LoA | | 6.10.6.3.4 | | Represents the Level of Automation (LoA). | |  | |
| QoSChangeInfo | | 6.10.6.2.8 | | Represents the QoS change related information. | |  | |
| QoSChangeNotif | | 6.10.6.2.9 | | Represents a QoS Change Notification. | |  | |
| QoSChangeReport | | 6.10.6.2.10 | | Represents a QoS Change report. | |  | |
| ServAdaptQoSCtrlSubsc | | 6.10.6.2.2 | | Represents a Service Adaptation And QoS Control Subscription. | |  | |
| ServAdaptQoSCtrlSubscPatch | | 6.10.6.2.3 | | Represents the parameters to request the modification of a Service Adaptation And QoS Control Subscription. | |  | |
| V2xTarget | | 6.10.6.2.11 | | Represents the targeted V2X entity. | |  | |

Table 6.10.6.1-2 specifies data types re-used by the VAE\_ServiceAndQoSControlInfo API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the VAE\_ServiceAndQoSControlInfo API.

Table 6.10.6.1-2: VAE\_ServiceAndQoSControlInfo API re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| Uri | 3GPP TS 29.122 [22] | Represents a URI. |  |
| V2xGroupId | Clause 6.1.6.3.2 | Represents the identifier of a V2X Group. |  |
| V2xServiceId | Clause 6.1.6.3.2 | Represents the identifier of a V2X Service. |  |
| V2xUeId | Clause 6.1.6.3.2 | Represents the identifier of a V2X UE. |  |
| SupportedFeatures | 3GPP TS 29.571 [18] | Used to negotiate the applicability of the optional features. |  |

#### 6.10.6.2 Structured data types

##### 6.10.6.2.1 Introduction

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

##### 6.10.6.2.2 Type: ServAdaptQoSCtrlSubsc

Table 6.10.6.2.2-1: Definition of type ServAdaptQoSCtrlSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscTarget | V2xTarget | M | 1 | Represents the identifier of the target (e.g., V2X group, V2X service, V2X UE) to which the subscription is related. |  |
| notifUri | Uri | M | 1 | Contains the URI via which notifications shall be delivered. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.10.8.  This attribute shall be present only when feature negotiation needs to take place. |  |

##### 6.10.6.2.3 Type: ServAdaptQoSCtrlSubscPatch

Table 6.10.6.2.3-1: Definition of type ServAdaptQoSCtrlSubscPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscTarget | V2xTarget | O | 0..1 | Represents the updated identifier of the target (e.g., V2X group, V2X service, V2X UE) to which the subscription is related. |  |
| notifUri | Uri | O | 0..1 | Contains the updated URI via which notifications shall be delivered. |  |

##### 6.10.6.2.4 Type: AdaptNotif

Table 6.10.6.2.4-1: Definition of type AdaptNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscriptionId | string | M | 1 | Contains the identifier of the subscription to which the notification is related. |  |
| adaptReports | array(AdaptReport) | M | 1..N | Contains the service requirements and QoS adaptation report(s). |  |

##### 6.10.6.2.5 Type: AdaptNotifResp

Table 6.10.6.2.5-1: Definition of type AdaptNotifResp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| result | AckResult | M | 1 | Contains the acknowledgement result. |  |
| adaptFeedbacks | array(AdaptFeedback) | C | 1..N | Contains the service requirements and QoS adaptation report(s).  This attribute may be present only if the "result" attribute is set to "POSITIVE". |  |

##### 6.10.6.2.6 Type: AdaptReport

Table 6.10.6.2.6-1: Definition of type AdaptReport

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueIdsList | array(V2xUeId) | O | 1..N | Contains the identifier(s) of the V2X UE(s) that are affected by the service requirements and QoS adaptation. |  |
| serviceId | V2xServiceId | O | 0..1 | Represents the identifier of the V2X Service that is affected by the service requirements and QoS adaptation for the V2X UE(s) identified by the "ueIdsList" attribute. |  |
| qosChangeInfo | QoSChangeInfo | M | 1 | Contains the actual or expected QoS change related information for service requirements and QoS adaptation. |  |

##### 6.10.6.2.7 Type: AdaptFeedback

Table 6.10.6.2.7-1: Definition of type AdaptFeedback

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueIdsList | array(V2xUeId) | M | 1..N | Contains the identifier(s) of the V2X UE(s) that shall be affected by the service requirements adaptation. |  |
| serviceId | V2xServiceId | O | 0..1 | Represents the identifier of the V2X Service that shall be affected by the service requirements and QoS adaptation for the V2X UE(s) identified by the "ueIdsList" attribute. |  |

##### 6.10.6.2.8 Type: QoSChangeInfo

Table 6.10.6.2.8-1: Definition of type QoSChangeInfo

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Attribute name | | Data type | P | Cardinality | Description | Applicability |
| loa | | LoA | C | 0..1 | Contains the Level of Automation (LoA) adaptation information.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | | |

##### 6.10.6.2.9 Type: QoSChangeNotif

Table 6.10.6.2.9-1: Definition of type QoSChangeNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| subscriptionId | String | M | 1 | Contains the identifier of the subscription to which the notification is related. |  |
| reports | array(QoSChangeReport) | O | 1..N | Contains the QoS change/adaptation report(s) containing the set(s) of V2X UE(s) and/or V2X service for which QoS change/adaptation was successfully performed. |  |

##### 6.10.6.2.10 Type: QoSChangeReport

Table 6.10.6.2.10-1: Definition of type QoSChangeReport

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueIdsList | array(V2xUeId) | O | 1..N | Contains the identifier(s) of the V2X UE(s) for which QoS change/adaptation was successfully performed.  (NOTE) |  |
| serviceId | V2xServiceId | O | 0..1 | Represents the identifier of the V2X Service for which QoS change/adaptation was successfully performed for the V2X UE(s) identified by the "ueIdsList" attribute.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

##### 6.10.6.2.11 Type: V2xTarget

Table 6.10.6.2.11-1: Definition of type V2xTarget

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| groupId | V2xGroupId | C | 0..1 | Represents the identifier of the target V2X group.  (NOTE) |  |
| serviceId | V2xServiceId | C | 0..1 | Represents the identifier of the target V2X service.  (NOTE) |  |
| ueId | V2xUeId | C | 0..1 | Represents the identifier of the target V2X UE.  (NOTE) |  |
| NOTE: These attributes are mutually exclusive. Either one of them shall be present. | | | | | |

#### 6.10.6.3 Simple data types and enumerations

##### 6.10.6.3.1 Introduction

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

##### 6.10.6.3.2 Simple data types

The simple data types defined in table 6.10.6.3.2-1 shall be supported.

Table 6.10.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

##### 6.10.6.3.3 Enumeration: AckResult

The enumeration AckResult represents the acknowledgement result. It shall comply with the provisions defined in table 6.10.6.3.3-1.

Table 6.10.6.3.3-1: Enumeration AckResult

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| POSITIVE | Indicates that the acknowledgement is positive. |  |
| NEGATIVE | Indicates that the acknowledgement is negative. |  |

##### 6.10.6.3.4 Enumeration: LoA

The enumeration LoA represents the Level of Automation (LoA). It shall comply with the provisions defined in table 6.10.6.3.4-1.

Table 6.10.6.3.4-1: Enumeration LoA

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| 0\_NO\_AUTOMATION | Indicates that the LoA is 0, i.e., No Automation. |  |
| 1\_DRIVER\_ASSISTANCE | Indicates that the LoA is 1, i.e., Driver Assistance. |  |
| 2\_PARTIAL\_AUTOMATION | Indicates that the LoA is 2, i.e., Partial Automation. |  |
| 3\_CONDITIONAL\_AUTOMATION | Indicates that the LoA is 3, i.e., Conditional Automation. |  |
| 4\_HIGH\_AUTOMATION | Indicates that the LoA is 4, i.e., High Automation. |  |
| 5\_FULL\_AUTOMATION | Indicates that the LoA is 5, i.e., Full Automation. |  |

NOTE: The definition of this enumeration data type complies with the LoA definition specified in clause 4.2 of 3GPP TS 22.186 [35].

#### 6.10.6.4 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.

#### 6.10.6.5 Binary data

##### 6.10.6.5.1 Binary Data Types

Table 6.10.6.5.1-1: Binary Data Types

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

### 6.10.7 Error Handling

#### 6.10.7.1 General

For the VAE\_ServiceAndQoSControlInfo API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [22]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [22] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [22].

In addition, the requirements in the following clauses are applicable for the VAE\_ServiceAndQoSControlInfo API.

#### 6.10.7.2 Protocol Errors

No specific protocol errors for the VAE\_ServiceAndQoSControlInfo API are specified.

#### 6.10.7.3 Application Errors

The application errors defined for the VAE\_ServiceAndQoSControlInfo API are listed in Table 6.10.7.3-1.

Table 6.10.7.3-1: Application errors

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

### 6.10.8 Feature negotiation

The optional features listed in table 6.10.8-1 are defined for the VAE\_ServiceAndQoSControlInfo API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [22].

Table 6.10.8-1: Supported Features

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

### 6.10.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [22] shall apply for the VAE\_ServiceAndQoSControlInfo API.

## 6.11 VAE\_VRUZoneManagement API

### 6.11.1 Introduction

The VAE\_VRUZoneManagement service shall use the VAE\_VRUZoneManagement API.

The API URI of the VAE\_VRUZoneManagement Service API shall be:

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

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [22], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

- The <apiName>shall be "vae-vzm".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

NOTE: When 3GPP TS 29.122 [22] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.11, the VAE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

### 6.11.2 Usage of HTTP

The provisions of clause 5.2.2 of 3GPP TS 29.122 [22] shall apply for the VAE\_VRUZoneManagement API.

### 6.11.3 Resources

#### 6.11.3.1 Overview

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

Figure 6.11.3.1-1 depicts the resource URIs structure for the VAE\_VRUZoneManagement API.



Figure 6.11.3.1-1: Resource URIs structure of the VAE\_VRUZoneManagement API

Table 6.11.3.1-1 provides an overview of the resources and applicable HTTP methods for the VAE\_VRUZoneManagement API.

Table 6.11.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| VRU Zone Management Subscriptions | /subscriptions | POST | Request the creation of a VRU Zone Management Subscription. |
| Individual VRU Zone Management Subscription | /subscriptions/{subscriptionId} | GET | Retrieve an existing "Individual VRU Zone Management Subscription" resource. |
| PUT | Request the update of an existing "Individual VRU Zone Management Subscription" resource. |
| PATCH | Request the modification of an existing "Individual VRU Zone Management Subscription" resource. |
| DELETE | Request the deletion of an existing "Individual VRU Zone Management Subscription" resource. |

#### 6.11.3.2 Resource: VRU Zone Management Subscriptions

##### 6.11.3.2.1 Description

This resource represents the collection of VRU Zone Management Subscriptions managed by the VAE Server.

##### 6.11.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-vzm/****<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 6.11.3.2.2-1.

Table 6.11.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.11.1. |

##### 6.11.3.2.3 Resource Standard Methods

###### 6.11.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a VRU Zone Management Subscription at the VAE Server.

This method shall support the URI query parameters specified in table 6.11.3.2.3.1-1.

Table 6.11.3.2.3.1-1: 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 6.11.3.2.3.1-2 and the response data structures and response codes specified in table 6.11.3.2.3.1-3.

Table 6.11.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VRUZoneMngtSubsc | M | 1 | Represents the parameters to request the creation of a VRU Zone Management Subscription. |

Table 6.11.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VRUZoneMngtSubsc | M | 1 | 201 Created | Successful case. The VRU Zone Management Subscription is successfully created and a representation of the created "Individual VRU Zone Management 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 [22] shall also apply. | | | | |

Table 6.11.3.2.3.1-4: 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}/vae-vzm/<apiVersion>/subscriptions/{subscriptionId} |

##### 6.11.3.2.4 Resource Custom Operations

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

#### 6.11.3.3 Resource: Individual VRU Zone Management Subscription

##### 6.11.3.3.1 Description

This resource represents a VRU Zone Management Subscription managed by the VAE Server.

##### 6.11.3.3.2 Resource Definition

Resource URI: **{apiRoot}/vae-vzm/<apiVersion>/subscriptions/{subscriptionId}**

This resource shall support the resource URI variables defined in table 6.11.3.3.2-1.

Table 6.11.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.11.1. |
| subscriptionId | string | Represents the identifier of the "Individual VRU Zone Management Subscription" resource. |

##### 6.11.3.3.3 Resource Standard Methods

###### 6.11.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual VRU Zone Management Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.11.3.3.3.1-1.

Table 6.11.3.3.3.1-1: 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 6.11.3.3.3.1-2 and the response data structures and response codes specified in table 6.11.3.3.3.1-3.

Table 6.11.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.11.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VRUZoneMngtSubsc | M | 1 | 200 OK | Successful case. The requested "Individual VRU Zone Management 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.11.3.3.3.1-4: 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 VAE Server. |

Table 6.11.3.3.3.1-5: 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 VAE Server. |

###### 6.11.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual VRU Zone Management Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.11.3.3.3.2-1.

Table 6.11.3.3.3.2-1: 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 6.11.3.3.3.2-2 and the response data structures and response codes specified in table 6.11.3.3.3.2-3.

Table 6.11.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VRUZoneMngtSubsc | M | 1 | Represents the updated representation of the "Individual VRU Zone Management Subscription" resource. |

Table 6.11.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VRUZoneMngtSubsc | M | 1 | 200 OK | Successful case. The "Individual VRU Zone Management 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 VRU Zone Management 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.11.3.3.3.2-4: 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 VAE Server. |

Table 6.11.3.3.3.2-5: 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 VAE Server. |

###### 6.11.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual VRU Zone Management Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.11.3.3.3.3-1.

Table 6.11.3.3.3.3-1: 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 6.11.3.3.3.3-2 and the response data structures and response codes specified in table 6.11.3.3.3.3-3.

Table 6.11.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| VRUZoneMngtSubscPatch | M | 1 | Represents the parameters to request the modification of the "Individual VRU Zone Management Subscription" resource. |

Table 6.11.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| VRUZoneMngtSubsc | M | 1 | 200 OK | Successful case. The "Individual VRU Zone Management 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 VRU Zone Management 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.11.3.3.3.3-4: 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 VAE Server. |

Table 6.11.3.3.3.3-5: 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 VAE Server. |

###### 6.11.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual VRU Zone Management Subscription" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.11.3.3.3.4-1.

Table 6.11.3.3.3.4-1: 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 6.11.3.3.3.4-2 and the response data structures and response codes specified in table 6.11.3.3.3.4-3.

Table 6.11.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.11.3.3.3.4-3: 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 VRU Zone Management 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.11.3.3.3.4-4: 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 VAE Server. |

Table 6.11.3.3.3.4-5: 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 VAE Server. |

##### 6.11.3.3.4 Resource Custom Operations

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

### 6.11.4 Custom Operations without associated resources

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

### 6.11.5 Notifications

#### 6.11.5.1 General

Notifications shall comply to clause 5.2.5 of 3GPP TS 29.122 [22].

Table 6.11.5.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
| VRU Zone Management Enter/Leave Notification | {notifUri} | POST | Enables a VAE Server to notify a previously subscribed service consumer on VRU Zone Management Enter/Leave event(s). |

#### 6.11.5.2 VRU Zone Management Enter/Leave Notification

##### 6.11.5.2.1 Description

The VRU Zone Management Enter/Leave Notification is used by a VAE Server to notify a previously subscribed service consumer on VRU Zone Management Enter/Leave event(s).

##### 6.11.5.2.2 Target URI

The Callback URI **"{notifUri}"** shall be used with the callback URI variables defined in table 6.11.5.2.2-1.

Table 6.11.5.2.2-1: Callback URI variables

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| notifUri | Uri | Represents the callback URI encoded as a atring formatted as a URI. |

##### 6.11.5.2.3 Standard Methods

###### 6.11.5.2.3.1 POST

This method shall support the request data structures specified in table 6.11.5.2.3.1-1 and the response data structures and response codes specified in table 6.11.5.2.3.1-2.

Table 6.11.5.2.3.1-1: Data structures supported by the POST Request Body

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| EnterLeaveNotif | M | 1 | Represents the VRU Zone Management Enter/Leave Notification. |

Table 6.11.5.2.3.1-2: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful case. The VRU Zone Management Enter/Leave notification is successfully received and acknowledged, and no content is returned in the response body. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection.  The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 towards which the notification should be sent.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.11.5.2.3.1-3: Headers supported by the 307 Response Code on this resource

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

Table 6.11.5.2.3.1-4: Headers supported by the 308 Response Code on this resource

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

### 6.11.6 Data Model

#### 6.11.6.1 General

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

Table 6.11.6.1-1 specifies the data types defined for the VAE\_VRUZoneManagement API.

Table 6.11.6.1-1: VAE\_VRUZoneManagement API specific Data Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data type | | Clause defined | | Description | | Applicability | |
| EnterLeaveInfo | | 6.11.6.2.8 | | Represents the information related to a V2X UE or a V2X group entering/leaving a VRU zone. | |  | |
| EnterLeaveNotif | | 6.11.6.2.4 | | Represents a VRU Zone Management Enter/Leave Notification. | |  | |
| GeographicAreaRm | | 6.11.6.2.10 | | Represents the same as the GeographicArea data type defined in clause 6.1.6.2.5 of 3GPP TS 29.572 [42], but with the "nullable: true" property. | |  | |
| MobilityInfo | | 6.11.6.2.9 | | Represents mobility information. | |  | |
| MsgType | | 6.11.6.3.5 | | Represents the message types. | |  | |
| TimeValidity | | 6.11.6.2.7 | | Represents the time validity information. | |  | |
| UEType | | 6.11.6.3.3 | | Represents the type of UE(s) to be considered. | |  | |
| VRUAppReqs | | 6.11.6.2.6 | | Represents application requirements. | |  | |
| VRUZoneInfo | | 6.11.6.2.5 | | Represents VRU zone related information. | |  | |
| VRUZoneMngtSubsc | | 6.11.6.2.2 | | Represents a VRU Zone Management Subscription. | |  | |
| VRUZoneMngtSubscPatch | | 6.11.6.2.3 | | Represents the parameters to request the modification of a VRU Zone Management Subscription. | |  | |
| VRUZoneType | | 6.11.6.3.4 | | Represents the VRU zone type. | |  | |

Table 6.11.6.1-2 specifies data types re-used by the VAE\_VRUZoneManagement API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the VAE\_VRUZoneManagement API.

Table 6.11.6.1-2: VAE\_VRUZoneManagement API re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| AppplicationQosRequirement | 6.7.6.2.4 | Represents the V2X application QoS requirements. |  |
| DateTime | 3GPP TS 29.122 [22] | Represents a data and a time. |  |
| Direction | 3GPP TS 29.520 [33] | Represents a direction. |  |
| DurationSec | 3GPP TS 29.122 [22] | Represents a duration expressed in seconds. |  |
| GeographicArea | 3GPP TS 29.572 [42] | Represents a geographical area. |  |
| Float | 3GPP TS 29.571 [18] | Represents a float number. |  |
| Uri | 3GPP TS 29.122 [22] | Represents a URI. |  |
| V2xGroupId | Clause 6.1.6.3.2 | Represents the identifier of a V2X Group. |  |
| V2xUeId | Clause 6.1.6.3.2 | Represents the identifier of a V2X UE. |  |
| SupportedFeatures | 3GPP TS 29.571 [18] | Used to negotiate the applicability of the optional features. |  |

#### 6.11.6.2 Structured data types

##### 6.11.6.2.1 Introduction

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

##### 6.11.6.2.2 Type: VRUZoneMngtSubsc

Table 6.11.6.2.2-1: Definition of type VRUZoneMngtSubsc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| requestorId | string | M | 1 | Represents the identifier of the service requestor. |  |
| ueIdsList | array(V2xUeId) | C | 1..N | Represents the list of the identifier(s) of the V2X UE(s) to which the subscription is related.  (NOTE 1) |  |
| vruZoneInfo | VRUZoneInfo | M | 1 | Represents the VRU zone related information.  (NOTE 1) |  |
| vruAppReqs | VRUAppReqs | M | 1 | Represents the VRU application requirements. |  |
| notifUri | Uri | M | 1 | Contains the URI via which notifications shall be delivered. |  |
| vruZoneId | string | O | 0..1 | Contains the identifier of the VRU zone.  (NOTE 2) |  |
| areaOfInterest | GeographicArea | C | 0..1 | Represents the targeted area of interest.  (NOTE 1) |  |
| timeValidity | TimeValidity | O | 0..1 | Represents the subscription's time validity information. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.11.8.  This attribute shall be present only when feature negotiation needs to take place. |  |
| NOTE 1: When the "vruZoneType" attribute of the VRUZoneInfo data structure used to encode the "vruZoneInfo" attribute is set to "STATIC", then one of the "ueIdsList" attribute or the "areaOfInterest" attribute shall be present. When the "vruZoneType" attribute of the VRUZoneInfo data structure used to encode the "vruZoneInfo" attribute is set to "DYNAMIC", then at least one of the "ueIdsList" attribute and the "areaOfInterest" attribute shall be present.  NOTE 2: The VRU zone ID within the "vruZoneId" attribute may either be assigned and provided by the service consumer in requests or assigned and provided by the VAE Server in responses. | | | | | |

##### 6.11.6.2.3 Type: VRUZoneMngtSubscPatch

Table 6.11.6.2.3-1: Definition of type VRUZoneMngtSubscPatch

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute name | | Data type | | P | | Cardinality | | Description | | Applicability | |
| ueIdsList | | array(V2xUeId) | | O | | 1..N | | Represents the updated list of the identifier(s) of the V2X UE(s) to which the subscription is related.  (NOTE) | |  | |
| vruZoneInfo | | VRUZoneInfo | | O | | 0..1 | | Represents the updated VRU zone related information.  (NOTE) | |  | |
| vruAppReqs | | VRUAppReqs | | O | | 0..1 | | Represents the updated VRU application requirements. | |  | |
| notifUri | | Uri | | O | | 0..1 | | Contains the updated URI via which notifications shall be delivered. | |  | |
| areaOfInterest | | GeographicAreaRm | | O | | 0..1 | | Represents the updated targeted area of interest.  (NOTE) | |  | |
| timeValidity | | TimeValidity | | O | | 0..1 | | Represents the updated subscription's time validity information. | |  | |
| NOTE: The respect of the conditions of NOTE 1 of Table 6.11.6.2.2-1 shall be ensured. | | | | | | | | | | | |

##### 6.11.6.2.4 Type: EnterLeaveNotif

Table 6.11.6.2.4-1: Definition of type EnterLeaveNotif

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| groupId | V2xGroupId | C | 0..1 | Represents the identifier of the V2X group to which the notification is related.  (NOTE) |  |
| ueId | V2xUeId | C | 0..1 | Represents the identifier of the V2X UE to which the notification is related.  (NOTE) |  |
| vruZoneInfo | VRUZoneInfo | M | 1 | Represents the VRU zone related information. |  |
| vruZoneId | string | M | 1 | Contains the identifier of the VRU zone. |  |
| enterLeaveInfo | EnterLeaveInfo | M | 1 | Indicates whether the V2X UE(s) enter or leave the VRU zone and the related timing information. |  |
| mobilityInfo | MobilityInfo | O | 0..1 | Represents the mobility information of the V2X UE or V2X group. |  |
| NOTE: These attributes are mutually exclusive. Either one of them shall be present. | | | | | |

##### 6.11.6.2.5 Type: VRUZoneInfo

Table 6.11.6.2.5-1: Definition of type VRUZoneInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueTypes | array(UEType) | M | 1..N | Indicates the UE type(s) (e.g., V2X UE(s), pedestrian UE(s) to be considered.  (NOTE) |  |
| zoneType | VRUZoneType | M | 1 | Represents the VRU zone type (e.g., static or dynamic) for the considered UE type(s).  (NOTE) |  |

##### 6.11.6.2.6 Type: VRUAppReqs

Table 6.11.6.2.6-1: Definition of type VRUAppReqs

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute name | | Data type | | P | | Cardinality | | Description | | Applicability | |
| supportedMsgs | | array(MsgType) | | O | | 1..N | | Represents the supported types of messages within the VRU zone.  (NOTE) | |  | |
| appQosReq | | AppplicationQosRequirement | | O | | 0..1 | | Represents the V2X application requirements for the VRU zone.  (NOTE) | |  | |
| NOTE: At least one of these attributes shall be present. | | | | | | | | | | | |

##### 6.11.6.2.7 Type: TimeValidity

Table 6.11.6.2.7-1: Definition of type TimeValidity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| startTime | DateTime | O | 0..1 | Represents the start time.  When absent, this means that the validity shall apply immediately.  (NOTE) |  |
| endTime | DateTime | O | 0..1 | Represents the end time.  When absent, this means that the validity shall never end.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

##### 6.11.6.2.8 Type: EnterLeaveInfo

Table 6.11.6.2.8-1: Definition of type EnterLeaveInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| time | DateTime | M | 1 | Represents the time of VRUP.  - When the reported event is entering the VRU zone, the start time of VRUP.  - When the reported event is leaving the VRU zone, the time at which the V2X UE or V2X group is/are expected to leave the VRU zone. |  |
| duration | DurationSec | C | 0..1 | Represents the duration the V2X UE or V2X group is/are expected to stay within the VRU zone.  This attribute shall be present only when the reported event is entering the VRU zone. |  |

##### 6.11.6.2.9 Type: MobilityInfo

Table 6.11.6.2.9-1: Definition of type MobilityInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| speed | Float | O | 0..1 | Represents the expected speed (expressed in kilometres per second) of the V2X UE or V2X group.  (NOTE) |  |
| direction | Direction | O | 0..1 | Represents the expected direction of the V2X UE or V2X group.  (NOTE) |  |
| NOTE: At least one of these attributes shall be present. | | | | | |

##### 6.11.6.2.10 Type: GeographicAreaRm

This data type is defined in the same way as the GeographicArea data type defined in clause 6.1.6.2.5 of 3GPP TS 29.572 [42], but with the OpenAPI "nullable: true" property.

#### 6.11.6.3 Simple data types and enumerations

##### 6.11.6.3.1 Introduction

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

##### 6.11.6.3.2 Simple data types

The simple data types defined in table 6.11.6.3.2-1 shall be supported.

Table 6.11.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

##### 6.11.6.3.3 Enumeration: UEType

The enumeration UEType represents the type of UE(s) to be considered. It shall comply with the provisions defined in table 6.11.6.3.3-1.

Table 6.11.6.3.3-1: Enumeration UEType

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| V2X | Indicates V2X UE(s). |  |
| PEDESTRIAN | Indicates pedestrian UE(s). |  |

##### 6.11.6.3.4 Enumeration: VRUZoneType

The enumeration VRUZoneType represents the VRU zone type. It shall comply with the provisions defined in table 6.11.6.3.4-1.

Table 6.11.6.3.4-1: Enumeration VRUZoneType

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| STATIC | Indicates that the VRU zone is static. |  |
| DYNAMIC | Indicates that the VRU zone is dynamic. |  |

##### 6.11.6.3.5 Enumeration: MsgType

The enumeration MsgType represents the message type. It shall comply with the provisions defined in table 6.11.6.3.5-1.

Table 6.11.6.3.5-1: Enumeration MsgType

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| VAM | Indicates that the message type is VAM. |  |
| CAM | Indicates that the message type is CAM. |  |
| DENM | Indicates that the message type is DENM. |  |
| BSM | Indicates that the message type is BSM. |  |
| CPM | Indicates that the message type is CPM. |  |

#### 6.11.6.4 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.

#### 6.11.6.5 Binary data

##### 6.11.6.5.1 Binary Data Types

Table 6.11.6.5.1-1: Binary Data Types

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

### 6.11.7 Error Handling

#### 6.11.7.1 General

For the VAE\_VRUZoneManagement API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [22]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [22] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [22].

In addition, the requirements in the following clauses are applicable for the VAE\_VRUZoneManagement API.

#### 6.11.7.2 Protocol Errors

No specific protocol errors for the VAE\_VRUZoneManagement API are specified.

#### 6.11.7.3 Application Errors

The application errors defined for the VAE\_VRUZoneManagement API are listed in Table 6.11.7.3-1.

Table 6.11.7.3-1: Application errors

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

### 6.11.8 Feature negotiation

The optional features listed in table 6.11.8-1 are defined for the VAE\_VRUZoneManagement API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [22].

Table 6.11.8-1: Supported Features

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

### 6.11.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [22] shall apply for the VAE\_VRUZoneManagement API.

## 6.12 VAE\_V2PApplicationRequirement API

### 6.12.1 Introduction

The VAE\_V2PApplicationRequirement service shall use the VAE\_V2PApplicationRequirement API.

The API URI of the VAE\_V2PApplicationRequirement Service API shall be:

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

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.4 of 3GPP TS 29.122 [22], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

- The <apiName>shall be "vae-v2p-app-req".

- The <apiVersion> shall be "v1".

- The <apiSpecificSuffixes> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [22].

NOTE: When 3GPP TS 29.122 [22] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.12, the VAE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

### 6.12.2 Usage of HTTP

The provisions of clause 5.2.2 of 3GPP TS 29.122 [22] shall apply for the VAE\_V2PApplicationRequirement API.

### 6.12.3 Resources

#### 6.12.3.1 Overview

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

Figure 6.12.3.1-1 depicts the resource URIs structure for the VAE\_V2PApplicationRequirement API.



Figure 6.12.3.1-1: Resource URIs structure of the VAE\_V2PApplicationRequirement API

Table 6.12.3.1-1 provides an overview of the resources and applicable HTTP methods for the VAE\_V2PApplicationRequirement API.

Table 6.12.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| V2P Application Requirements Provisionings | /provisionings | POST | Request the creation of a V2P Application Requirements Provisioning. |
| Individual V2P Application Requirements Provisioning | /provisionings/{provId} | GET | Retrieve an existing "Individual V2P Application Requirements Provisioning" resource. |
| PUT | Request the update of an existing "Individual V2P Application Requirements Provisioning" resource. |
| PATCH | Request the modification of an existing "Individual V2P Application Requirements Provisioning" resource. |
| DELETE | Request the deletion of an existing "Individual V2P Application Requirements Provisioning" resource. |

#### 6.12.3.2 Resource: V2P Application Requirements Provisionings

##### 6.12.3.2.1 Description

This resource represents the collection of V2P Application Requirements Provisionings managed by the VAE Server.

##### 6.12.3.2.2 Resource Definition

Resource URI: **{apiRoot}/vae-v2p-app-req/<apiVersion>/provisionings**

This resource shall support the resource URI variables defined in table 6.12.3.2.2-1.

Table 6.12.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.12.1. |

##### 6.12.3.2.3 Resource Standard Methods

###### 6.12.3.2.3.1 POST

The HTTP POST method allows a service consumer to request the creation of a V2P Application Requirements Provisioning at the VAE Server.

This method shall support the URI query parameters specified in table 6.12.3.2.3.1-1.

Table 6.12.3.2.3.1-1: 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 6.12.3.2.3.1-2 and the response data structures and response codes specified in table 6.12.3.2.3.1-3.

Table 6.12.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| V2pAppReqData | M | 1 | Represents the parameters to request the creation of a V2P Application Requirements Provisioning. |

Table 6.12.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2pAppReqData | M | 1 | 201 Created | Successful case. The V2P Application Requirements Provisioning is successfully created and a representation of the created "Individual V2P Application Requirements Provisioning" 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 [22] shall also apply. | | | | |

Table 6.12.3.2.3.1-4: 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}/vae-v2p-app-req/<apiVersion>/provisionings/{provId} |

##### 6.12.3.2.4 Resource Custom Operations

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

#### 6.12.3.3 Resource: Individual V2P Application Requirements Provisioning

##### 6.12.3.3.1 Description

This resource represents a V2P Application Requirements Provisioning managed by the VAE Server.

##### 6.12.3.3.2 Resource Definition

Resource URI: **{apiRoot}/vae-v2p-app-req/<apiVersion>/provisionings/{provId}**

This resource shall support the resource URI variables defined in table 6.12.3.3.2-1.

Table 6.12.3.3.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.12.1. |
| provId | string | Represents the identifier of the "Individual V2P Application Requirements Provisioning" resource. |

##### 6.12.3.3.3 Resource Standard Methods

###### 6.12.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual V2P Application Requirements Provisioning" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.12.3.3.3.1-1.

Table 6.12.3.3.3.1-1: 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 6.12.3.3.3.1-2 and the response data structures and response codes specified in table 6.12.3.3.3.1-3.

Table 6.12.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

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

Table 6.12.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2pAppReqData | M | 1 | 200 OK | Successful case. The requested "Individual V2P Application Requirements Provisioning" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.12.3.3.3.1-4: 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 VAE Server. |

Table 6.12.3.3.3.1-5: 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 VAE Server. |

###### 6.12.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual V2P Application Requirements Provisioning" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.12.3.3.3.2-1.

Table 6.12.3.3.3.2-1: 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 6.12.3.3.3.2-2 and the response data structures and response codes specified in table 6.12.3.3.3.2-3.

Table 6.12.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| V2pAppReqData | M | 1 | Represents the updated representation of the "Individual V2P Application Requirements Provisioning" resource. |

Table 6.12.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2pAppReqData | M | 1 | 200 OK | Successful case. The "Individual V2P Application Requirements Provisioning" 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 V2P Application Requirements Provisioning" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.12.3.3.3.2-4: 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 VAE Server. |

Table 6.12.3.3.3.2-5: 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 VAE Server. |

###### 6.12.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual V2P Application Requirements Provisioning" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.12.3.3.3.3-1.

Table 6.12.3.3.3.3-1: 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 6.12.3.3.3.3-2 and the response data structures and response codes specified in table 6.12.3.3.3.3-3.

Table 6.12.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| V2pAppReqDataPatch | M | 1 | Represents the parameters to request the modification of the "Individual V2P Application Requirements Provisioning" resource. |

Table 6.12.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| V2pAppReqData | M | 1 | 200 OK | Successful case. The "Individual V2P Application Requirements Provisioning" 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 V2P Application Requirements Provisioning" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.12.3.3.3.3-4: 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 VAE Server. |

Table 6.12.3.3.3.3-5: 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 VAE Server. |

###### 6.12.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual V2P Application Requirements Provisioning" resource at the VAE Server.

This method shall support the URI query parameters specified in table 6.12.3.3.3.4-1.

Table 6.12.3.3.3.4-1: 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 6.12.3.3.3.4-2 and the response data structures and response codes specified in table 6.12.3.3.3.4-3.

Table 6.12.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

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

Table 6.12.3.3.3.4-3: 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 V2P Application Requirements Provisioning" 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| 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 VAE Server.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [22]. |
| NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [22] shall also apply. | | | | |

Table 6.12.3.3.3.4-4: 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 VAE Server. |

Table 6.12.3.3.3.4-5: 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 VAE Server. |

##### 6.12.3.3.4 Resource Custom Operations

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

### 6.12.4 Custom Operations without associated resources

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

### 6.12.5 Notifications

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

### 6.12.6 Data Model

#### 6.12.6.1 General

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

Table 6.12.6.1-1 specifies the data types defined for the VAE\_V2PApplicationRequirement API.

Table 6.12.6.1-1: VAE\_V2PApplicationRequirement API specific Data Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data type | | Clause defined | | Description | | Applicability | |
| AppTrafficPattern | | 6.12.6.2.4 | | Represents an application traffic pattern for V2P services. | |  | |
| V2pAppReqData | | 6.12.6.2.2 | | Represents a V2P Application Requirements Provisioning. | |  | |
| V2pAppReqDataPatch | | 6.12.6.2.3 | | Represents the requested modifications to a V2P Application Requirements Provisioning. | |  | |

Table 6.12.6.1-2 specifies data types re-used by the VAE\_V2PApplicationRequirement API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the VAE\_V2PApplicationRequirement API.

Table 6.12.6.1-2: VAE\_V2PApplicationRequirement API re-used Data Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data type | | Reference | | Comments | | Applicability | |
| DurationSec | | 3GPP TS 29.122 [22] | | Represents a time duration expressed in seconds. | |  | |
| AppplicationQosRequirement | | 6.7.6.2.4 | | Represents the V2X application QoS requirements. | |  | |
| ParameterOverPc5 | | 3GPP TS 29.522 [34] | | Represents V2X policies/parameters for V2X communication over PC5. | |  | |
| ParameterOverPc5Rm | | 3GPP TS 29.522 [34] | | Represents the same as the ParameterOverPc5 data type but with the "nullable: true" property. | |  | |
| TimeWindow | | 3GPP TS 29.122 [22] | | Represents a time window. | |  | |
| SupportedFeatures | | 3GPP TS 29.571 [18] | | Used to negotiate the applicability of the optional features. | |  | |
| V2xGroupId | | 6.1.6.3.2 | | Represents the identifier of a V2X Group. | |  | |
| V2xServiceId | | 6.1.6.3.2 | | Represents the identifier of a V2X Service. | |  | |

#### 6.12.6.2 Structured data types

##### 6.12.6.2.1 Introduction

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

##### 6.12.6.2.2 Type: V2pAppReqData

Table 6.12.6.2.2-1: Definition of type V2pAppReqData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| requestorId | string | M | 1 | Represents the identifier of the requestor. |  |
| serviceId | V2xServiceId | C | 0..1 | Represents the identifier of the V2X service to which the provisioned V2P Application Requirements are related.  (NOTE) |  |
| groupId | V2xGroupId | C | 0..1 | Represents the identifier of the V2X group to which the provisioned V2P Application Requirements are related.  (NOTE) |  |
| v2pQosReqs | AppplicationQosRequirement | M | 1 | Represents the V2P QoS requirements. |  |
| trafficPattern | AppTrafficPattern | M | 1 | Represents the application traffic pattern for the V2P service. |  |
| paramOverPc5 | ParameterOverPc5 | O | 0..1 | Represents the PC5 provisioning policies/parameters to be used by the involved V2X UE(s). |  |
| suppFeat | SupportedFeatures | C | 0..1 | Contains the list of supported features among the ones defined in clause 6.12.8.  This attribute shall be present only when feature negotiation needs to take place. |  |
| NOTE: These attributes are mutually exclusive. Either one of them shall be present. | | | | | |

##### 6.12.6.2.3 Type: V2pAppReqDataPatch

Table 6.12.6.2.3-1: Definition of type V2pAppReqDataPatch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| v2pQosReqs | AppplicationQosRequirement | O | 0..1 | Represents the updated V2P QoS requirements. |  |
| trafficPattern | AppTrafficPattern | O | 0..1 | Represents the updated application traffic pattern for the V2P service. |  |
| paramOverPc5 | ParameterOverPc5Rm | O | 0..1 | Represents the updated PC5 provisioning policies/parameters to be used by the involved V2X UE(s). |  |

##### 6.12.6.2.4 Type: AppTrafficPattern

Table 6.12.6.2.4-1: Definition of type AppTrafficPattern

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| timeWindows | array(TimeWindow) | M | 1..N | Contains one or several time window(s).  This attribute shall include either:  - a single array element containing the start time and end time of the transmission cycle for the V2P service; or  - one or several array element(s) with a set of pre-defined time window(s) constituting the schedule of the expected transmission/reception of V2X messages for the V2P service. |  |
| periodicity | DurationSec | C | 0..1 | Contains the periodicity of the tansmission cycle.  This attribute shall be present only if the application traffic pattern is in the form of a transmission cycle, i.e., the "timeWindows" contains a single array element containing the transmission cycle's time window. |  |

#### 6.12.6.3 Simple data types and enumerations

##### 6.12.6.3.1 Introduction

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

##### 6.12.6.3.2 Simple data types

The simple data types defined in table 6.12.6.3.2-1 shall be supported.

Table 6.12.6.3.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

#### 6.12.6.4 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.

### 6.12.7 Error Handling

#### 6.12.7.1 General

For the VAE\_V2PApplicationRequirement API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [22]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [22] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [22].

In addition, the requirements in the following clauses are applicable for the VAE\_V2PApplicationRequirement API.

#### 6.12.7.2 Protocol Errors

No specific protocol errors for the VAE\_V2PApplicationRequirement API are specified.

#### 6.12.7.3 Application Errors

The application errors defined for the VAE\_V2PApplicationRequirement API are listed in Table 6.12.7.3-1.

Table 6.12.7.3-1: Application errors

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

### 6.12.8 Feature negotiation

The optional features listed in table 6.12.8-1 are defined for the VAE\_V2PApplicationRequirement API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.7 of 3GPP TS 29.122 [22].

Table 6.12.8-1: Supported Features

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

### 6.12.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [22] shall apply for the VAE\_V2PApplicationRequirement API.

# 7 Security

TLS shall be used to support the security communication between the VAE Server and the VASS over the Vs interface, and also between different VAE Servers over the VAE-E interface as specified in 3GPP TS 33.536 [31] and 3GPP TS 33.501 [32]. The access to the VAE service APIs shall be authorized by means of OAuth2.0 protocol (see IETF RFC 6749 [23]), based on local configuration, using the "Client Credentials" authorization grant. If OAuth2.0 is used, a client, prior to consuming services offered by the VAE service APIs, shall obtain a "token" from the authorization server.

# 8 Using Common API Framework

## 8.1 General

When CAPIF is used with a VAE service, the VAE Server shall support the following as defined in 3GPP TS 29.222 [26]:

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

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

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

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

In a centralized deployment as defined in 3GPP TS 23.222 [25], where the CAPIF Core Function and API provider domain functions are co-located, the interactions between the CAPIF Core Function and API provider domain functions may be independent of CAPIF-3/3e, CAPIF-4/4e and CAPIF-5/5e reference points.

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

## 8.2 Security

When CAPIF is used for external exposure, before invoking the API exposed by the VAE Server, the service consumer, acting as a CAPIF API invoker, shall negotiate the security method (PKI, TLS-PSK or OAuth2.02) with the CAPIF Core Function and ensure that the VAE Server has enough credentials to authenticate the service consumer (e.g., VASS), see clauses 5.6.2.2 and 6.2.2.2 of 3GPP TS 29.222 [26].

If the PKI or TLS-PSK is used as the selected security method between the service consumer and the VAE Server, upon API invocation, the VAE Server shall retrieve the authorization information from the CAPIF Core Function as described in clause 5.6.2.4 of 3GPP TS 29.222 [26].

As indicated in 3GPP TS 33.122 [27], the access to the VAE Server APIs may be authorized by means of the OAuth2.0 protocol (see IETF RFC 6749 [23]), using the "Client Credentials" authorization grant, where the CAPIF Core Function (see 3GPP TS 29.222 [26]) plays the role of the authorization server.

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

If OAuth2.0 is used as the selected security method between the service consumer and the VAE Server:

- the service consumer shall, prior to consuming the services offered by the VAE Server, obtain a "token" from the authorization server, by invoking the Obtain\_Authorization service as described in clause 5.6.2.3.2 of 3GPP TS 29.222 [26]; and

- the VAE Server APIs do not define any scopes for OAuth2.0 authorization. It is the VAE Server responsibility to check whether the service consumer is authorized to use an API based on the OAuth2.0 "token". Once the VAE Server verifies the "token", it shall check whether the VAE Server identifier in the "token" matches its own published identifier, and whether the API name in the "token" matches its own published API name. If those checks are passed, the service consumer has full authority to access any resources or operations of the invoked API.

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

Annex A (normative):  
OpenAPI specification

# A.1 General

This Annex is based on the OpenAPI Specification [6] and provides corresponding representations of all APIs defined in the present specification.

NOTE 1: An OpenAPIs representation embeds JSON Schema representations of HTTP message bodies.

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

NOTE 2: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository, that uses the GitLab software version control system (see clause 5B of the 3GPP TS 21.900 [8] and clause 5.3.1 of the 3GPP TS 29.501 [3] for further information).

# A.2 VAE\_MessageDelivery API

openapi: 3.0.0

info:

version: 1.3.0-alpha.1

title: VAE\_MessageDelivery

description: |

API for VAE Message Delivery Service

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externalDocs:

description: 3GPP TS 29.486 V19.0.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-message-delivery/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/subscriptions:

post:

summary: Create a new Individual Message Delivery Data Subscription resource.

operationId: CreateIndividualMessageDeliveryDataSubscription

tags:

- Message Delivery Data Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: >

The Message Delivery Subscription is successfully created and a representation of the

created Individual Message Delivery Subscription resource shall be returned..

content:

application/json:

schema:

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

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

callbacks:

uplinkMessageDelivery:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, the notification was successful received.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

receptReportOfDownlinkMesageDelivery:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, the notification was successfully received.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:

parameters:

- name: subscriptionId

in: path

description: >

Contains the identifier of the Individual Message Delivery Subscription.

required: true

schema:

type: string

get:

summary: Get an existing Individual Message Delivery Subscription resource

operationId: ReadIndividualMessageDeliverySubscription

tags:

- Individual Message Delivery Subscription (Document)

responses:

'200':

description: >

The requested Individual Message Delivery Subscription resource shall be

returned.

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

put:

summary: Request the update of an existing Individual Message Delivery Subscription resource.

operationId: UpdateMessageDeliverySubscription

tags:

- Individual Message Delivery Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'200':

description: >

OK. The Individual Message Delivery 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/MessageDeliverySubscriptionData'

'204':

description: >

No Content. The Individual Message Delivery 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 Message Delivery Subscription resource.

operationId: ModifyMessageDeliverySubscription

tags:

- Individual Message Delivery Subscription (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

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

responses:

'200':

description: >

OK. The Individual Message Delivery 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/MessageDeliverySubscriptionData'

'204':

description: >

No Content. The Individual Message Delivery 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 individual Message Delivery Subscription resource

operationId: DeleteMessageDeliverySubscription

tags:

- Individual Message Delivery Subscription (Document)

responses:

'204':

description: >

The Individual Message Delivery Subscription resource is successfully deleted.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}/message-deliveries:

parameters:

- name: subscriptionId

in: path

description: >

Contains the identifier of the Individual Message Delivery Subscription.

required: true

schema:

type: string

post:

summary: Request the creation of a Downlink Message Delivery.

operationId: CreateDownlinkMessageDelivery

tags:

- Downlink Message Deliveries (Collection)

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: >

Created. The Downlink Message Delivery is successfully created and a representation of

the created Individual Downlink Message Delivery resource shall be returned.

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

content:

application/json:

schema:

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}/message-deliveries/{dlDeliveryId}:

parameters:

- name: subscriptionId

in: path

description: >

Contains the identifier of the Individual Message Delivery Subscription.

required: true

schema:

type: string

- name: dlDeliveryId

in: path

description: Contains the identifier of the Individual Downlink Message Delivery resource.

required: true

schema:

type: string

get:

summary: Enables to retrieve an existing Individual Downlink Message Delivery resource.

operationId: ReadIndividualDownlinkMessageDelivery

tags:

- Individual Downlink Message Delivery (Document)

responses:

'200':

description: >

OK. The requested Individual Downlink Message Delivery resource is successfully

returned.

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

delete:

summary: Enables to delete an existing Individual Downlink Message Delivery resource.

operationId: DeleteMessageDelivery

tags:

- Individual message delivery (Document)

responses:

'204':

description: >

No Content. The Individual Downlink Message Delivery resource is successfully

deleted.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

#

# STRUCTURED DATA TYPES

#

DownlinkMessageDeliveryData:

description: Represents the Downlink V2X Message Delivery data.

type: object

properties:

ueId:

$ref: '#/components/schemas/V2xUeId'

groupId:

$ref: '#/components/schemas/V2xGroupId'

serviceId:

$ref: '#/components/schemas/V2xServiceId'

duration:

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

geoId:

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

payload:

$ref: '#/components/schemas/V2xMessagePayload'

receptionRepReq:

type: boolean

default: true

description: >

Contains the indication on whether a reception report is requested for this downlink V2X

message delivery.

true indicates that a reception report is requested.

false indicates that a reception report is not requested.

The default value is true when this attribute is omitted.

notifUri:

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

suppFeat:

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

required:

- payload

MessageDeliverySubscriptionData:

description: Represents the Message Delivery Subscription data.

type: object

properties:

appSerId:

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

serviceId:

$ref: '#/components/schemas/V2xServiceId'

geoId:

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

notifUri:

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

requestTestNotification:

type: boolean

description: >

Contains the test notification indication.

Set to true by the service consumer to request the VAE Server to send a test

notification.

Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- appSerId

- serviceId

- notifUri

MsgDelSubscDataPatch:

description: Represents the requested modifications to a Message Delivery Subscription.

type: object

properties:

serviceId:

$ref: '#/components/schemas/V2xServiceId'

geoId:

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

notifUri:

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

UplinkMessageDeliveryData:

description: Represents the Uplink V2X Message Delivery data.

type: object

properties:

resourceUri:

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

ueId:

$ref: '#/components/schemas/V2xUeId'

serviceId:

$ref: '#/components/schemas/V2xServiceId'

geoId:

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

payload:

$ref: '#/components/schemas/V2xMessagePayload'

required:

- resourceUri

- ueId

- payload

# SIMPLE DATA TYPES

#

AppServerId:

description: Represents the identifier of the service consumer.

type: string

V2xUeId:

description: Represents the identifier of a V2X UE.

type: string

V2xGroupId:

description: Represents the identifier of a V2X group.

type: string

V2xServiceId:

description: Represents the the identifier of a V2X service.

type: string

GeoId:

description: Represents the identifier of a geographical area.

type: string

V2xMessagePayload:

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

#

# ENUMERATIONS

#

Result:

anyOf:

- type: string

enum:

- SUCCESS

- FAIL

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the result of message delivery.

Possible values are:

- SUCCESS: Indicates that the message delivery was successful.

- FAIL: Indicates that the message delivery failed.

# A.3 VAE\_FileDistribution API

openapi: 3.0.0

info:

version: 1.2.0

title: VAE\_FileDistribution

description: |

API for VAE File Distribution Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-file-distribution/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/file-distributions:

post:

summary: VAE File Distributions resource create service Operation

tags:

- file distributions collection (Document)

operationId: CreateFileDistributions

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: File Distribution Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

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

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

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

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/file-distributions/{distributionId}:

get:

summary: Get an existing individual file distribution resource

operationId: ReadIndividualFileDistribution

tags:

- Individual File Distribution (Document)

parameters:

- name: distributionId

in: path

description: Identifier of a file distribution resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

delete:

summary: VAE File Distribution resource delete service Operation

tags:

- Individual file distribution (Document)

operationId: DeleteFileDistribution

parameters:

- name: distributionId

in: path

required: true

description: Unique ID of the file distribution to be deleted

schema:

type: string

responses:

'204':

description: The subscription was terminated successfully.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

FileDistributionData:

description: Represents an individual File Distribution resource for a V2X group ID.

type: object

properties:

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

fileLists:

type: array

items:

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

minItems: 1

serviceClass:

type: string

geoArea:

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

maxBitrate:

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

maxDelay:

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

duration:

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

localMbmsInfo:

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

localMbmsActInd:

type: boolean

suppFeat:

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

qoeMetrics:

type: array

items:

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

minItems: 1

required:

- fileLists

- geoArea

- maxBitrate

- maxDelay

FileList:

description: Represents a file list.

type: object

properties:

fileUri:

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

fileDisplayUri:

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

fileEarFetchTime:

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

fileLatFetchTime:

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

fileSize:

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

fileStatus:

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

completionTime:

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

keepUpdateInterval:

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

uniAvailability:

type: boolean

fileRepetition:

type: integer

required:

- fileUri

- fileDisplayUri

- fileEarFetchTime

- fileLatFetchTime

- fileStatus

- completionTime

- keepUpdateInterval

LocalMbmsInfo:

description: Contains the local MBMS information.

type: object

properties:

mbmsEnbIpv4MulAddr:

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

mbmsEnbIpv6MulAddr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

mbmsGwIpv4SsmAddr:

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

mbmsGwIpv6SsmAddr:

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

cteid:

type: string

bmscIpv4Addr:

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

bmscIpv6Addr:

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

bmscPort:

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

# Simple data types and Enumerations

FileStatus:

description: Represents a file status.

anyOf:

- type: string

enum:

- PENDING

- FETCHED

- PREPARED

- TRANSMITTING

- SENT

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration and is not used to encode

content defined in the present version of this API.

QoeMetric:

description: Represents the QoE metric.

anyOf:

- type: string

enum:

- CORR\_DUR\_METRIC

- REBUFF\_DUR\_METRIC

- INITBUFF\_DUR\_METRIC

- LOSS\_RTP\_PACKETS

- FRAME\_RATE\_DEV

- JITTER\_DURATION

- CON\_ACC\_SW\_TIME

- NET\_RESOURCE

- AVG\_CODEC\_BIT\_RATE

- CODEC\_INFO

- LOSS\_OBJECT

- SYM\_COUNT\_FOR\_FAILED\_BLOCK

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration and is not used to encode

content defined in the present version of this API.

# A.4 VAE\_ApplicationRequirement API

openapi: 3.0.0

info:

version: 1.2.0

title: VAE\_ApplicationRequirement

description: |

API for VAE Application Requirement Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-app-req/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/application-requirements:

post:

summary: VAE\_Application\_Requirements resource create service Operation

tags:

- application requirements collection (Document)

operationId: CreateApplicationRequirement

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: Application Requirement Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

callbacks:

NotifyNetworkResource:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/application-requirements/{requirementId}:

get:

summary: VAE Application Requirement resource read service Operation

tags:

- Individual application requirement (Document)

operationId: ReadApplicationRequirement

parameters:

- name: requirementId

in: path

description: Identifier of an application requirement resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

delete:

summary: VAE Application Requirement resource delete service Operation

tags:

- Individual application requirement (Document)

operationId: DeleteApplicationRequirement

parameters:

- name: requirementId

in: path

required: true

description: Unique ID of the application requirement to be deleted

schema:

type: string

responses:

'204':

description: The subscription was terminated successfully.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

ApplicationRequirementData:

description: >

Represents an individual Application Requirement resource for a V2X UE ID or a V2X group ID.

type: object

properties:

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

duration:

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

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

appRequirement:

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

notifUri:

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

requestTestNotification:

type: boolean

description: >

Set to true by the service consumer to request the VAE server to send a test

notification as defined in clause 6.3.5.3. Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- serviceId

- appRequirement

- notifUri

ApplicationRequirement:

description: Represents the requirements for application change.

type: object

properties:

serviceLevel:

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

AppReqNotification:

description: >

Represents a notificaton of the result of the network resource adaptation corresponding to

the V2X application requirement.

type: object

properties:

resourceUri:

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

result:

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

required:

- resourceUri

- result

# Simple data types and Enumerations

ServiceLevel:

description: Indicates a service level for application service.

anyOf:

- type: string

enum:

- HIGH

- MEDIUM

- LOW

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration and is not used to encode

content defined in the present version of this API.

ReservationResult:

description: >

Represents the result of the network resource adaptation corresponding to the V2X

application requirement.

anyOf:

- type: string

enum:

- SUCCESSFUL

- FAILURE

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration and is not used to encode

content defined in the present version of this API.

# A.5 VAE\_DynamicGroup API

openapi: 3.0.0

info:

version: 1.2.0

title: VAE\_DynamicGroup

description: |

VAE\_Dynamic\_Group Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-dynamic-group/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/group-configurations:

post:

summary: VAE\_Dynamice\_Group resource create service Operation

tags:

- application requirements collection (Document)

operationId: CreateGroupConfiguration

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: Application Requirement Resource created

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

content:

application/json:

schema:

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

callbacks:

NotifyDynamicGroup:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, notification was succesfull

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

/group-configurations/{configId}:

get:

summary: VAE Group Configuration resource read service Operation

tags:

- Individual Group Configuration(Document)

operationId: ReadDynamicGroupConfiguration

parameters:

- name: configId

in: path

description: Identifier of an group configuration resource.

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned.

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

delete:

summary: VAE Group Configuration resource delete service Operation

tags:

- Individual group configuration (Document)

operationId: DeleteGroupConfiguration

parameters:

- name: configId

in: path

required: true

description: Unique ID of the group configuration to be deleted.

schema:

type: string

responses:

'204':

description: The subscription was terminated successfully.

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

GroupConfigurationData:

description: Represents an individual Group Configuration resource for a V2X group ID.

type: object

properties:

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

definition:

type: string

leaderId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

notifUri:

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

duration:

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

requestTestNotification:

type: boolean

description: >

Set to true by the service consumer to request the VAE server to test

a notification connection. Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- groupId

- definition

- leaderId

- notifUri

DynamicGroupNotification:

description: >

Represents a notification on the dynamic group information (i.e. group member

joins or leaves).

type: object

properties:

resourceUri:

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

joinedUeIds:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

leftUeIds:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

required:

- resourceUri

# A.6 VAE\_ServiceContinuity API

openapi: 3.0.0

info:

version: 1.2.0

title: VAE\_Service Continuity

description: |

API for VAE Service Continuity Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-service-continuity/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/geo-areas/{geoId}:

get:

summary: VAE service continuity query service operation

tags:

- Individual geographical area (Document)

operationId: QueryServiceContinuity

parameters:

- name: geoId

in: path

description: Identifier of a geographical area

required: true

schema:

type: string

- name: service-id

in: query

description: Identifier of a V2X service

required: true

schema:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

- name: supp-feat

in: query

description: To filter irrelevant responses related to unsupported features

schema:

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

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

$ref: '#/components/schemas/V2xServiceInfo'

'307':

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

'308':

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

'400':

$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'406':

$ref: 'TS29571\_CommonData.yaml#/components/responses/406'

'429':

$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

V2xServiceInfo:

description: >

Represents an individual geographical area resource including the designated V2X

service identifier.

type: object

properties:

serviceIds:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

minItems: 1

suppFeat:

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

required:

- serviceIds

# A.7 VAE\_HDMapDynamicInfo API

openapi: 3.0.0

info:

version: 1.1.0

title: VAE\_HDMapDynamicInfo

description: |

API for VAE HDMapDynamicInfo Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-hdmap-dynamic-info/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/subscriptions:

post:

summary: VAE\_HDMapDynamicInfo resource create service Operation

tags:

- hdmap dynamicinfo subscriptions collection (Document)

operationId: Create

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: HdMap DynamicInfo Subscription Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

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

'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:

NotifyHdMapDynamicInfo:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'307':

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

'308':

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

'400':

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

'401':

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

'403':

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

'404':

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

'411':

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

'413':

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

'415':

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

'429':

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

'500':

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

'503':

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

default:

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

/subscriptions/{subscriptionId}:

get:

summary: VAE HdMap DynamicInfo Subscription resource read service Operation

tags:

- Individual HdMap DynamicInfo Subscription(Document)

operationId: ReadHdMapDynamicInfoSubscription

parameters:

- name: subscriptionId

in: path

description: Identifier of an HdMap DynamicIfo Subscription resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'307':

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

'308':

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

'400':

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

'401':

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

'403':

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

'404':

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

'406':

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

'429':

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

'500':

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

'503':

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

default:

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

delete:

summary: VAE HdMap DynamicInfo Subscription resource delete service Operation

tags:

- Individual hdmap dynamicinfo subscription (Document)

operationId: DeleteHdMapDynamicInfoSubscription

parameters:

- name: subscriptionId

in: path

required: true

description: Unique ID of the hdmap dynamicinfo subscription to be deleted

schema:

type: string

responses:

'204':

description: The subscription was terminated 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'

'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:

HdMapDynamicInfoData:

description: >

Represents an individual HdMap DynamicInfo Subscription resource for a V2X UE ID.

type: object

properties:

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

notifUri:

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

range:

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

requestTestNotification:

type: boolean

description: >

Set to true by the service consumer to request the VAE server to send a test

notification as defined in clause 6.3.5.3. Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- ueId

- notifUri

- range

HdMapDynamicInfoNotification:

description: >

Represents a notificaton of HD map dynamic info corresponding to the subscription.

type: object

properties:

resourceUri:

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

nearbyUeInfo:

type: array

items:

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

minItems: 1

description: Contains the informaiotn of nearby UEs.

required:

- resourceUri

- nearbyUeInfo

NearbyUeInfo:

description: Represents the informaiotn of nearby UEs.

type: object

properties:

nearbyUeId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

location:

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

distance:

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

required:

- nearbyUeId

- location

- distance

# A.8 VAE\_SessionOrientedService API

openapi: 3.0.0

info:

version: 1.1.0

title: VAE\_SessionOrientedService

description: |

API for VAE\_SessionOrientedService

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-session-Oriented-service/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/subscriptions:

post:

summary: VAE\_SessionOrientedService resource create service Operation

tags:

- session oriented service subscriptions collection (Document)

operationId: Create

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: Session Oriented Service Subscription Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

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

'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:

NotifyResutOfSessionOrientedService:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'307':

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

'308':

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

'400':

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

'401':

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

'403':

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

'404':

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

'411':

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

'413':

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

'415':

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

'429':

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

'500':

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

'503':

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

default:

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

/subscriptions/{subscriptionId}:

get:

summary: VAE Session Oriented Service Subscription resource read service Operation

tags:

- Individual Session Oriented Service Subscription (Document)

operationId: ReadSessionOrientedServiceSubscription

parameters:

- name: subscriptionId

in: path

description: Identifier of an Session Oriented Service Subscription resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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: Updates/replaces an existing subscription resource

tags:

- VAE Session Oriented Service Subscription resource put service Operation

parameters:

- name: subscriptionId

in: path

description: Identifier of an Session Oriented Service Subscription resource

required: true

schema:

type: string

requestBody:

description: Parameters to update/replace the existing subscription

required: true

content:

application/json:

schema:

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

responses:

'200':

description: OK (Successful update of the subscription)

content:

application/json:

schema:

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

'204':

description: No Content (Successful update of the subscription)

'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: VAE Session Oriented Service Subscription resource delete service Operation

tags:

- Individual Session Oriented Service Subscription (Document)

operationId: DeleteSessionOrientedServiceSubscription

parameters:

- name: subscriptionId

in: path

required: true

description: Unique ID of the Session Oriented Service Subscription n to be deleted

schema:

type: string

responses:

'204':

description: The subscription was terminated 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'

'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:

SessionOrientedData:

description: >

Represents data to trigger establishment or update of session-oriented service.

type: object

properties:

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

notifUri:

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

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

appSerId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/AppServerId'

appQosReq:

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

requestTestNotification:

type: boolean

description: >

Set to true by the service consumer to request the VAE server to send a test

notification as defined in clause 6.3.5.3. Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- ueId

- notifUri

- serviceId

- appSerId

Notification:

description: >

Represents the result of the establishment or update of the session-oriented service.

type: object

properties:

resourceUri:

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

action:

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

result:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/Result'

required:

- resourceUri

- action

- result

AppplicationQosRequirement:

description: Represents application layer QoS requirement.

type: object

properties:

pqi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/5Qi'

resourceType:

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

priorityLevel:

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

packetDelayBudget:

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

packetErrorRate:

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

averagingWindow:

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

maxDataBurstVol:

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

not:

required: [pqi, resourceType, packetDelayBudget, packetErrorRate]

# Simple data types and Enumerations

Action:

description: Indicate the action to the session-oriented service.

anyOf:

- type: string

enum:

- ESTABLISHMENT

- UPDATE

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration and is not used to encode

content defined in the present version of this API.

# A.9 VAE\_V2VConfigRequirement API

openapi: 3.0.0

info:

version: 1.1.0

title: VAE\_V2VConfigRequirement

description: |

API for VAE\_V2VConfigRequirement

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-v2v-config-req/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/configurations:

post:

summary: VAE V2V Configuration resource create service Operation

tags:

- V2V Configurations collection (Document)

operationId: Create

requestBody:

content:

application/json:

schema:

$ref: '#/components/schemas/V2vConfigurationData'

required: true

responses:

'201':

description: V2V Configuration Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

$ref: '#/components/schemas/V2vConfigurationData'

'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'

/configurations/{configurationId}:

get:

summary: VAE V2V Configuration resource read service Operation

tags:

- Individual V2V Configuration (Document)

operationId: ReadV2VConfiguration

parameters:

- name: configurationId

in: path

description: Identifier of a V2V Configuration resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

$ref: '#/components/schemas/V2vConfigurationData'

'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: Updates/replaces an existing configuration resource

tags:

- VAE V2V Configuration resource put service Operation

operationId: UpdateV2VConfiguration

parameters:

- name: configurationId

in: path

description: Identifier of a V2V Configuration resource

required: true

schema:

type: string

requestBody:

description: Parameters to update/replace the existing configuration

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/V2vConfigurationData'

responses:

'200':

description: OK (Successful update of the configuration)

content:

application/json:

schema:

$ref: '#/components/schemas/V2vConfigurationData'

'204':

description: No Content (Successful update of the configuration)

'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: VAE V2V Configuration resource delete service Operation

tags:

- Individual V2V Configuration (Document)

operationId: DeleteV2VConfiguration

parameters:

- name: configurationId

in: path

required: true

description: Unique ID of the V2V Configuration to be deleted

schema:

type: string

responses:

'204':

description: The configuration was deleted 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'

'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:

V2vConfigurationData:

description: Contains the V2V configuration data.

type: object

properties:

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

canUeIds:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

appQosReq:

$ref: 'TS29486\_VAE\_SessionOrientedService.yaml#/components/schemas/AppplicationQosRequirement'

suppFeat:

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

# A.10 VAE\_PC5ProvisioningRequirement API

openapi: 3.0.0

info:

version: 1.1.0

title: VAE\_PC5ProvisioningRequirement

description: |

API for VAE\_PC5ProvisioningRequirement

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-pc5-prov-req/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/subscriptions:

post:

summary: VAE\_PC5 Provisioning Requirement resource create service Operation

tags:

- PC5 provisioning requirement subscriptions collection (Document)

operationId: Create

requestBody:

content:

application/json:

schema:

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

required: true

responses:

'201':

description: PC5 Provisioning Requirement Subscription Resource Created

headers:

Location:

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

required: true

schema:

type: string

content:

application/json:

schema:

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

'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:

NotifyResutOfMultiOperationPC5Provisioning:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: No Content, Notification was succesfull

'307':

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

'308':

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

'400':

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

'401':

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

'403':

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

'404':

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

'411':

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

'413':

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

'415':

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

'429':

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

'500':

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

'503':

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

default:

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

/subscriptions/{subscriptionId}:

get:

summary: VAE PC5 Provisioning Requirement Subscription resource read service Operation

tags:

- Individual PC5 Provisioning Requirement Subscription (Document)

operationId: ReadPC5ProvisioningRequirementSubscription

parameters:

- name: subscriptionId

in: path

description: Identifier of an PC5 Provisioning Requirement Subscription resource

required: true

schema:

type: string

responses:

'200':

description: OK. Resource representation is returned

content:

application/json:

schema:

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

'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: Updates/replaces an existing subscription resource

tags:

- VAE PC5 Provisioning Requirement Subscription resource put service Operation

operationId: UpdatePC5ProvisioningRequirementSubscription

parameters:

- name: subscriptionId

in: path

description: Identifier of an PC5 Provisioning Requirement Subscription resource

required: true

schema:

type: string

requestBody:

description: Parameters to update/replace the existing subscription

required: true

content:

application/json:

schema:

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

responses:

'200':

description: OK (Successful update of the subscription)

content:

application/json:

schema:

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

'204':

description: No Content (Successful update of the subscription)

'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: VAE PC5 Provisioning Requirement Subscription resource delete service Operation

tags:

- Individual PC5 Provisioning Requirement Subscription (Document)

operationId: DeletePC5ProvisioningRequirementSubscription

parameters:

- name: subscriptionId

in: path

required: true

description: Unique ID of the PC5 Provisioning Requirement Subscription to be deleted

schema:

type: string

responses:

'204':

description: The subscription was terminated 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'

'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:

ProvisioningRequirement:

description: Represents an Individual PC5 Provisioning Requirement Subscription resource.

type: object

properties:

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

notifUri:

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

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

appQosReq:

$ref: 'TS29486\_VAE\_SessionOrientedService.yaml#/components/schemas/AppplicationQosRequirement'

plmnList:

type: array

items:

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

minItems: 1

requestTestNotification:

type: boolean

description: >

Set to true by the service consumer to request the VAE server to send a test

notification as defined in clause 6.3.5.3. Set to false or omitted otherwise.

websockNotifConfig:

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

suppFeat:

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

required:

- serviceId

- notifUri

Notification:

description: Represents a notificaton of result of PC5 Provisioning Requirement.

type: object

properties:

resourceUri:

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

result:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/Result'

required:

- resourceUri

- result

# A.11 VAE\_ServiceAndQoSControlInfo API

openapi: 3.0.0

info:

title: VAE Server Service And QoS Control Info Service

version: 1.0.0

description: |

VAE Server Service And QoS Control Info Service.

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

servers:

- url: '{apiRoot}/vae-sqci/v1'

variables:

apiRoot:

default: https://example.com

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

security:

- {}

- oAuth2ClientCredentials: []

paths:

/subscriptions:

post:

summary: Request the creation of a Service Adaptation And QoS Control Subscription.

operationId: CreateServAdaptQoSCtrlSubsc

tags:

- Service Adaptation And QoS Control Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: >

Created. The Service Adaptation And QoS Control Subscription is successfully created

and a representation of the created Individual Service Adaptation And QoS Control

Subscription resource shall be returned.

content:

application/json:

schema:

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

headers:

Location:

description: >

Contains the URI of the created Individual Service Adaptation And QoS Control

Subscription resource.

required: true

schema:

type: string

'400':

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

'401':

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

'403':

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

'404':

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

'411':

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

'413':

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

'415':

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

'429':

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

'500':

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

'503':

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

default:

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

callbacks:

ServReqQoSAdaptNotif:

'{$request.body#/notifUri}/req-qos-adapt':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'200':

description: >

OK. The Service Requirements And QoS Adaptation notification is successfully

received and acknowledged, and the acknowledgment related information shall be

returned in the response body.

content:

application/json:

schema:

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

'204':

description: >

No Content. The Service Requirements And QoS Adaptation notification is

successfully received and acknowledged, 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'

QoSChangeNotif:

'{$request.body#/notifUri}/qos-change':

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: >

No Content. The QoS Change notification is successfully received and

acknowledged, 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'

/subscriptions/{subscriptionId}:

parameters:

- name: subscriptionId

in: path

description: >

Represents the identifier of the Individual Service Adaptation And QoS Control

Subscription resource.

required: true

schema:

type: string

get:

summary: Retrieve an existing Individual Service Adaptation And QoS Control Subscription resource.

operationId: GetIndServAdaptQoSCtrlSubsc

tags:

- Individual Service Adaptation And QoS Control Subscription (Document)

responses:

'200':

description: >

OK. The requested Individual Service Adaptation And QoS Control Subscription resource

shall be returned.

content:

application/json:

schema:

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

'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 Service Adaptation And QoS Control Subscription resource.

operationId: UpdateIndServAdaptQoSCtrlSubsc

tags:

- Individual Service Adaptation And QoS Control Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'200':

description: >

OK. The Individual Service Adaptation And QoS Control 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/ServAdaptQoSCtrlSubsc'

'204':

description: >

No Content. The Individual Service Adaptation And QoS Control 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 Service Adaptation And QoS Control Subscription resource.

operationId: ModifyIndServAdaptQoSCtrlSubsc

tags:

- Individual Service Adaptation And QoS Control Subscription (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

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

responses:

'200':

description: >

OK. The Individual Service Adaptation And QoS Control 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/ServAdaptQoSCtrlSubsc'

'204':

description: >

No Content. The Individual Service Adaptation And QoS Control 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 Service Adaptation And QoS Control Subscription resource.

operationId: DeleteIndServAdaptQoSCtrlSubsc

tags:

- Individual Service Adaptation And QoS Control Subscription (Document)

responses:

'204':

description: >

No Content. The Individual Service Adaptation And QoS Control 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:

ServAdaptQoSCtrlSubsc:

description: >

Represents a Service Adaptation And QoS Control Subscription.

type: object

properties:

subscTarget:

$ref: '#/components/schemas/V2xTarget'

notifUri:

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

suppFeat:

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

required:

- subscTarget

- notifUri

ServAdaptQoSCtrlSubscPatch:

description: >

Represents the requested modifications to a Service Adaptation And QoS Control subscription.

type: object

properties:

subscTarget:

$ref: '#/components/schemas/V2xTarget'

notifUri:

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

AdaptNotif:

description: >

Represents a Service Requirements And QoS Adaptation Notification.

type: object

properties:

subscriptionId:

type: string

adaptReports:

type: array

items:

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

minItems: 1

required:

- subscriptionId

- adaptReports

AdaptNotifResp:

description: >

Represents the Service Requirements And QoS Adaptation Notification acknowledgment related

information.

type: object

properties:

result:

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

adaptFeedbacks:

type: array

items:

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

minItems: 1

required:

- result

AdaptReport:

description: >

Represents a Service Requirements And QoS Adaptation report.

type: object

properties:

ueIdsList:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

qosChangeInfo:

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

required:

- qosChangeInfo

AdaptFeedback:

description: >

Represents the feedback to a Service Requirements And QoS Adaptation report.

type: object

properties:

ueIdsList:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

required:

- ueIdsList

QoSChangeInfo:

description: >

Represents the QoS change related information.

type: object

properties:

loa:

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

anyOf:

- required: [loa]

QoSChangeNotif:

description: >

Represents a QoS Change Notification.

type: object

properties:

subscriptionId:

type: string

reports:

type: array

items:

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

minItems: 1

required:

- subscriptionId

QoSChangeReport:

description: >

Represents a QoS Change report.

type: object

properties:

ueIdsList:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

anyOf:

- required: [ueIdsList]

- required: [serviceId]

V2xTarget:

description: >

Represents the targeted V2X entity.

type: object

properties:

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

oneOf:

- required: [groupId]

- required: [serviceId]

- required: [ueId]

#

# SIMPLE DATA TYPES

#

#

# ENUMERATIONS

#

AckResult:

anyOf:

- type: string

enum:

- POSITIVE

- NEGATIVE

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the acknowledgement result.

Possible values are:

- POSITIVE: Indicates that the acknowledgement is positive.

- NEGATIVE: Indicates that the acknowledgement is negative.

LoA:

anyOf:

- type: string

enum:

- 0\_NO\_AUTOMATION

- 1\_DRIVER\_ASSISTANCE

- 2\_PARTIAL\_AUTOMATION

- 3\_CONDITIONAL\_AUTOMATION

- 4\_HIGH\_AUTOMATION

- 5\_FULL\_AUTOMATION

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the Level of Automation (LoA).

Possible values are:

- 0\_NO\_AUTOMATION: Indicates that the LoA is 0, i.e., No Automation.

- 1\_DRIVER\_ASSISTANCE: Indicates that the LoA is 1, i.e., Driver Assistance.

- 2\_PARTIAL\_AUTOMATION: Indicates that the LoA is 2, i.e., Partial Automation.

- 3\_CONDITIONAL\_AUTOMATION: Indicates that the LoA is 3, i.e., Conditional Automation.

- 4\_HIGH\_AUTOMATION: Indicates that the LoA is 4, i.e., High Automation.

- 5\_FULL\_AUTOMATION: Indicates that the LoA is 5, i.e., Full Automation.

# A.12 VAE\_VRUZoneManagement API

openapi: 3.0.0

info:

title: VAE Server VRU Zone Management Service

version: 1.0.0

description: |

VAE Server VRU Zone Management Service.

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

servers:

- url: '{apiRoot}/vae-vzm/v1'

variables:

apiRoot:

default: https://example.com

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

security:

- {}

- oAuth2ClientCredentials: []

paths:

/subscriptions:

post:

summary: Request the creation of a VRU Zone Management Subscription.

operationId: CreateVRUZoneMngtSubsc

tags:

- VRU Zone Management Subscriptions (Collection)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'201':

description: >

Created. The VRU Zone Management Subscription is successfully created and a

representation of the created Individual VRU Zone Management Subscription resource

shall be returned.

content:

application/json:

schema:

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

headers:

Location:

description: >

Contains the URI of the created Individual VRU Zone Management Subscription

resource.

required: true

schema:

type: string

'400':

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

'401':

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

'403':

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

'404':

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

'411':

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

'413':

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

'415':

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

'429':

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

'500':

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

'503':

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

default:

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

callbacks:

EnterLeaveNotif:

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

post:

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'204':

description: >

No Content. The VRU Zone Management Enter/Leave notification is successfully

received and acknowledged, 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'

/subscriptions/{subscriptionId}:

parameters:

- name: subscriptionId

in: path

description: >

Represents the identifier of the Individual VRU Zone Management Subscription

resource.

required: true

schema:

type: string

get:

summary: Retrieve an existing Individual VRU Zone Management Subscription resource.

operationId: GetIndVRUZoneMngtSubsc

tags:

- Individual VRU Zone Management Subscription (Document)

responses:

'200':

description: >

OK. The requested Individual VRU Zone Management Subscription resource shall be

returned.

content:

application/json:

schema:

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

'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 VRU Zone Management Subscription resource.

operationId: UpdateIndVRUZoneMngtSubsc

tags:

- Individual VRU Zone Management Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

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

responses:

'200':

description: >

OK. The Individual VRU Zone Management 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/VRUZoneMngtSubsc'

'204':

description: >

No Content. The Individual VRU Zone Management 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 VRU Zone Management Subscription resource.

operationId: ModifyIndVRUZoneMngtSubsc

tags:

- Individual VRU Zone Management Subscription (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

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

responses:

'200':

description: >

OK. The Individual VRU Zone Management 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/VRUZoneMngtSubsc'

'204':

description: >

No Content. The Individual VRU Zone Management 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 VRU Zone Management Subscription resource.

operationId: DeleteIndVRUZoneMngtSubsc

tags:

- Individual VRU Zone Management Subscription (Document)

responses:

'204':

description: >

No Content. The Individual VRU Zone Management 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:

VRUZoneMngtSubsc:

description: >

Represents a VRU Zone Management Subscription.

type: object

properties:

requestorId:

type: string

ueIdsList:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

vruZoneInfo:

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

vruAppReqs:

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

notifUri:

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

vruZoneId:

type: string

areaOfInterest:

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

timeValidity:

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

suppFeat:

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

required:

- requestorId

- notifUri

- vruZoneInfo

- vruAppReqs

VRUZoneMngtSubscPatch:

description: >

Represents the requested modifications to a VRU Zone Management Subscription.

type: object

properties:

ueIdsList:

type: array

items:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

minItems: 1

nullable: true

vruZoneInfo:

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

vruAppReqs:

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

notifUri:

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

areaOfInterest:

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

timeValidity:

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

EnterLeaveNotif:

description: >

Represents a VRU Zone Management Enter/Leave Notification.

type: object

properties:

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

ueId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xUeId'

vruZoneInfo:

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

vruZoneId:

type: string

enterLeaveInfo:

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

mobilityInfo:

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

required:

- vruZoneInfo

- vruZoneId

- enterLeaveInfo

oneOf:

- required: [groupId]

- required: [ueId]

VRUZoneInfo:

description: >

Represents VRU zone related information.

type: object

properties:

ueTypes:

type: array

items:

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

minItems: 1

zoneType:

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

required:

- ueTypes

- zoneType

VRUAppReqs:

description: >

Represents VRU application requirements.

type: object

properties:

supportedMsgs:

type: array

items:

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

minItems: 1

appQosReq:

$ref: 'TS29486\_VAE\_SessionOrientedService.yaml#/components/schemas/AppplicationQosRequirement'

anyOf:

- required: [supportedMsgs]

- required: [appQosReq]

TimeValidity:

description: >

Represents the time validity information.

type: object

properties:

startTime:

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

endTime:

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

anyOf:

- required: [startTime]

- required: [endTime]

EnterLeaveInfo:

description: >

Represents the information related to a V2X UE or a V2X group entering/leaving a VRU

zone.

type: object

properties:

time:

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

duration:

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

required:

- time

MobilityInfo:

description: >

Represents mobility information.

type: object

properties:

speed:

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

direction:

$ref: 'TS29520\_Nnwdaf\_EventsSubscription.yaml#/components/schemas/Direction'

anyOf:

- required: [speed]

- required: [direction]

GeographicAreaRm:

description: Geographic area specified by different shape.

nullable: true

anyOf:

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

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

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

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

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

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

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

UEType:

anyOf:

- type: string

enum:

- V2X

- PEDESTRIAN

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the type of UE(s) to be considered.

Possible values are:

- V2X: Indicates V2X UE(s).

- PEDESTRIAN: Indicates pedestrian UE(s).

VRUZoneType:

anyOf:

- type: string

enum:

- STATIC

- DYNAMIC

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the VRU zone type.

Possible values are:

- STATIC: Indicates that the VRU zone is static.

- DYNAMIC: Indicates that the VRU zone is dynamic.

MsgType:

anyOf:

- type: string

enum:

- VAM

- CAM

- DENM

- BSM

- CPM

- type: string

description: >

This string provides forward-compatibility with future extensions to the enumeration

and is not used to encode content defined in the present version of this API.

description: |

Represents the message type.

Possible values are:

- VAM: Indicates that the message type is VAM.

- CAM: Indicates that the message type is CAM.

- DENM: Indicates that the message type is DENM.

- BSM: Indicates that the message type is BSM.

- CPM: Indicates that the message type is CPM.

# A.13 VAE\_V2PApplicationRequirement API

openapi: 3.0.0

info:

version: 1.1.0

title: VAE Server V2P Application Requirement Service

description: |

API for VAE Server V2P Application Requirement Service

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externalDocs:

description: 3GPP TS 29.486 V18.3.0 V2X Application Enabler (VAE) Services

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.486/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/vae-v2P-app-req/v1'

variables:

apiRoot:

default: https://example.com

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

paths:

/provisionings:

post:

summary: Request the creation of a V2P Application Requirements Provisioning.

tags:

- V2P Application Requirements Provisionings (Collection)

operationId: CreateV2PAppReqsProv

requestBody:

content:

application/json:

schema:

$ref: '#/components/schemas/V2pAppReqData'

required: true

responses:

'201':

description: >

Created. The V2P Application Requirements Provisioning is successfully created and a

representation of the created Individual V2P Application Requirements Provisioning

resource shall be returned.

content:

application/json:

schema:

$ref: '#/components/schemas/V2pAppReqData'

headers:

Location:

description: >

Contains the URI of the created Individual V2P Application Requirements

Provisioning 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'

/provisionings/{provId}:

parameters:

- name: provId

in: path

description: >

Represents the identifier of the Individual V2P Application Requirements Provisioning

required: true

schema:

type: string

get:

summary: Retrieve an existing Individual V2P Application Requirement Provisioning resource.

operationId: GetIndV2pAppReqsProv

tags:

- Individual V2P Application Requirements Provisioning (Document)

responses:

'200':

description: >

OK. The requested Individual V2P Application Requirements Provisioning resource

shall be returned.

content:

application/json:

schema:

$ref: '#/components/schemas/V2pAppReqData'

'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 V2P Application Requirements Provisioning resource.

operationId: UpdateIndV2pAppReqsProv

tags:

- Individual V2P Application Requirements Provisioning (Document)

requestBody:

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/V2pAppReqData'

responses:

'200':

description: >

OK. The Individual V2P Application Requirements Provisioning 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/V2pAppReqData'

'204':

description: >

No Content. The Individual V2P Application Requirements Provisioning 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 V2P Application Requirements Provisioning resource.

operationId: ModifyIndV2pAppReqsProv

tags:

- Individual V2P Application Requirements Provisioning (Document)

requestBody:

required: true

content:

application/merge-patch+json:

schema:

$ref: '#/components/schemas/V2pAppReqDataPatch'

responses:

'200':

description: >

OK. The Individual V2P Application Requirements Provisioning 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/V2pAppReqData'

'204':

description: >

No Content. The Individual V2P Application Requirements Provisioning 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 V2P Application Requirements Provisioning resource.

operationId: DeleteIndV2pAppReqsProv

tags:

- Individual V2P Application Requirements Provisioning (Document)

responses:

'204':

description: >

No Content. The Individual V2P Application Requirements Provisioning 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:

V2pAppReqData:

description: Represents the V2P Application Requirements Provisioning.

type: object

properties:

requestorId:

type: string

serviceId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xServiceId'

groupId:

$ref: 'TS29486\_VAE\_MessageDelivery.yaml#/components/schemas/V2xGroupId'

v2pQosReqs:

$ref: 'TS29486\_VAE\_SessionOrientedService.yaml#/components/schemas/AppplicationQosRequirement'

trafficPattern:

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

paramOverPc5:

$ref: 'TS29522\_ServiceParameter.yaml#/components/schemas/ParameterOverPc5'

suppFeat:

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

oneOf:

- required: [serviceId]

- required: [groupId]

required:

- requestorId

- v2pQosReqs

- trafficPattern

V2pAppReqDataPatch:

description: >

Represents the requested modifications to a V2P Application Requirements Provisioning.

type: object

properties:

v2pQosReqs:

$ref: 'TS29486\_VAE\_SessionOrientedService.yaml#/components/schemas/AppplicationQosRequirement'

trafficPattern:

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

paramOverPc5:

$ref: 'TS29522\_ServiceParameter.yaml#/components/schemas/ParameterOverPc5Rm'

AppTrafficPattern:

description: >

Represents an application traffic pattern for V2P services.

type: object

properties:

timeWindows:

type: array

items:

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

minItems: 1

periodicity:

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

required:

- timeWindows

Annex B (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2019-06 |  |  |  |  |  | TS skeleton of V2X Application Enabler (VAE) Services | 0.0.0 |
| 2019-09 | CT3#105 |  |  |  |  | Inclusion of C3-193499, C3-193310, C3-193501, C3-193603, C3-193604 and editorial changes from Rapporteur | 0.1.0 |
| 2019-10 | CT3#106 |  |  |  |  | Inclusion of C3-193142, C3-194143, C3-194309, C3-194417, C3-194311 and editorial changes from Rapporteur | 0.2.0 |
| 2019-11 | CT3#107 |  |  |  |  | Inclusion of C3-195320, C3-195102, C3-195321, C3-195322, C3-195323, C3-195407 and editorial changes from Rapporteur | 0.3.0 |
| 2020-02 | CT3#108e |  |  |  |  | Inclusion of C3-201341, C3-201342, C3-201343, C3-201344, C3-201345, C3-201453, C3-201454, C3-201455 and editorial changes from Rapporteur | 0.4.0 |
| 2020-03 | CT#87e | CP-200186 |  |  |  | TS sent to plenary for approval | 1.0.0 |
| 2020-03 | CT#87e | CP-200186 |  |  |  | TS approved by plenary | 16.0.0 |
| 2020-06 | CT#88e | CP-201251 | 0001 | 1 | B | Apiversion of VAE\_FileDistribution API | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0003 |  | F | Correction to DELETE method of VAE\_FileDistribution API | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0004 | 1 | F | Editoral corrections of 29.486 | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0005 | 1 | F | Storage of YAML files | 16.1.0 |
| 2020-06 | CT#88e | CP-201256 | 0006 | 1 | F | URI of the VAE APIs | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0007 | 1 | F | Correct resource tree and service | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0009 | 1 | F | Corrections to apiVersion | 16.1.0 |
| 2020-06 | CT#88e | CP-201251 | 0010 | 1 | F | Supported headers, Resource Data type and yaml mapping | 16.1.0 |
| 2020-06 | CT#88e | CP-201255 | 0011 |  | F | Update of OpenAPI version and TS version in externalDocs field | 16.1.0 |
| 2020-12 | CT#90e | CP-203139 | 0012 | 1 | F | Essential corrections and alignments | 16.2.0 |
| 2020-12 | CT#90e | CP-203139 | 0013 |  | F | Storage of YAML files in 3GPP Forge | 16.2.0 |
| 2021-03 | CT#91e | CP-210245 | 0015 |  | F | Error handling of 29.486 | 16.3.0 |
| 2021-03 | CT#91e | CP-210236 | 0014 | 3 | F | Support Redirection for V2XAPP APIs | 17.0.0 |
| 2021-03 | CT#91e | CP-210221 | 0017 | 1 | F | Adding some missing description fields to data type definitions in OpenAPI specification files | 17.0.0 |
| 2021-03 | CT#91e | CP-210220 | 0018 |  | F | Corrections to HTTP custom headers handling for Northbound APIs | 17.0.0 |
| 2021-03 | CT#91e | CP-210220 | 0019 |  | F | OpenAPI reference | 17.0.0 |
| 2021-03 | CT#91e | CP-210240 | 0020 |  | F | Update of OpenAPI version and TS version in externalDocs field | 17.0.0 |
| 2021-06 | CT#92e | CP-211239 | 0021 | 1 | F | Additional corrections to HTTP custom headers handling for Northbound APIs | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0022 | 3 | B | Support Local MBMS | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0023 | 2 | B | Introduction of VAE\_HDMapDynamicInfo service | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0024 | 2 | B | Procedure of VAE\_HDMapDynamicInfo service | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0025 | 2 | B | Resources and methods of VAE\_HDMapDynamicInfo service | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0026 | 2 | B | OpenAPI file of VAE\_HDMapDynamicInfo service | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0027 |  | F | Correct the subclause number of reference | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0029 |  | A | Correct referenced datatype for VAE\_MessageDelivery | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0031 |  | A | Correct resourceUri used in Message Delivery procedures | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0033 |  | A | Correction of Individual Downlink Message Delivery resource name | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0035 |  | A | Correct service operation name for VAE\_FileDistribution | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0037 |  | A | Correct serivce name and resourceUri for VAE\_ApplicationRequirement | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0039 |  | A | Correct service name and resourceUri for VAE\_DynamicGroup | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0041 | 1 | F | Termination of Downlink Message Delivery procedure | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0043 | 1 | F | Termination of File Distribution procedure | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0045 | 1 | F | Network Resource Reservation procedure | 17.1.0 |
| 2021-06 | CT#92e | CP-211260 | 0047 | 1 | A | Termination of Dynamic Group Configuration procedure | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0048 | 1 | F | Common default HTTP response | 17.1.0 |
| 2021-06 | CT#92e | CP-211255 | 0049 |  | F | Termination of Dynamic Group Configuration procedure | 17.1.0 |
| 2021-06 | CT#92e | CP-211179 | 0050 | 1 | B | Reception report for downlink message delivery | 17.1.0 |
| 2021-06 | CT#92e | CP-211240 | 0051 |  | B | Reception report for uplink message delivery | 17.1.0 |
| 2021-06 | CT#92e | CP-211241 | 0052 | 1 | B | Behaviour of the VAE server for VAE\_ApplicationRequirement Service | 17.1.0 |
| 2021-06 | CT#92e | CP-211241 | 0053 | 1 | B | Behaviour of the VAE server for VAE\_DynamicGroup Service | 17.1.0 |
| 2021-06 | CT#92e | CP-211240 | 0054 |  | B | Behaviour of the VAE server for VAE\_ServiceContinuity Service | 17.1.0 |
| 2021-06 | CT#92e | CP-211223 | 0055 | 1 | B | CAPIF support | 17.1.0 |
| 2021-06 | CT#92e | CP-211265 | 0056 |  | F | Update of OpenAPI version and TS version in externalDocs field | 17.1.0 |
| 2021-09 | CT#93e | CP-212214 | 0058 |  | F | Resource URI correction on VAE APIs | 17.2.0 |
| 2021-09 | CT#93e | CP-212214 | 0059 |  | F | Correction of some remaining invalid characters in OpenAPI specification files | 17.2.0 |
| 2021-09 | CT#93e | CP-212223 | 0060 |  | F | Update of OpenAPI version and TS version in externalDocs field | 17.2.0 |
| 2021-12 | CT#94e | CP-213232 | 0061 |  | B | Introduction of VAE\_SessionOrientedService | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0062 |  | B | Procedure of VAE\_SessionOrientedService | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0063 |  | B | Resources and methods of VAE\_SessionOrientedService | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0064 | 2 | B | OpenAPI file of VAE\_SessionOrientedService | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0065 |  | B | Introduction of VAE\_V2VConfigRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0066 |  | B | Procedure of VAE\_V2VConfigRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0067 |  | B | Resources and methods of VAE\_V2VConfigRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0068 | 2 | B | OpenAPI file of VAE\_PC5ProvisioningRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0069 |  | B | Introduction of VAE\_PC5ProvisioningRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0070 |  | B | Procedure of VAE\_PC5ProvisioningRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0071 | 2 | B | Resources and methods of VAE\_PC5ProvisioningRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213232 | 0072 | 2 | B | OpenAPI file of VAE\_PC5ProvisioningRequirement | 17.3.0 |
| 2021-12 | CT#94e | CP-213220 | 0073 |  | B | Alignment with SA3 supported TLS profiles | 17.3.0 |
| 2022-03 | CT#95e | CP-220184 | 0078 |  | F | Correction to VAE\_PC5ProvisioningRequirement Service | 17.4.0 |
| 2022-03 | CT#95e | CP-220184 | 0079 |  | F | Correction to VAE\_SessionOrientedService Service | 17.4.0 |
| 2022-03 | CT#95e | CP-220184 | 0080 |  | F | Correction to VAE\_V2VConfigRequirement Service | 17.4.0 |
| 2022-03 | CT#95e | CP-220201 | 0081 |  | F | Formatting of Description Fields | 17.4.0 |
| 2022-03 | CT#95e | CP-220194 | 0082 |  | F | Update of info and externalDocs fields | 17.4.0 |
| 2022-06 | CT#96 | CP-221147 | 0083 | 1 | F | VAE\_DynamicGroup API corrections | 17.5.0 |
| 2022-06 | CT#96 | CP-221147 | 0084 | 2 | F | Removing the apiVersion placeholder from the Resource URI variables tables | 17.5.0 |
| 2022-06 | CT#96 | CP-221151 | 0085 |  | F | Update of info and externalDocs fields | 17.5.0 |
| 2022-09 | CT#97e | CP-222117 | 0086 |  | F | Correction of the "SubscriptionId" resource URI variable name | 17.6.0 |
| 2022-12 | CT#98e | CP-223185 | 0088 |  | F | Correction of the tables for the re-used, API-specific data structures in VAE APIs | 18.0.0 |
| 2022-12 | CT#98e | CP-223185 | 0089 | 1 | F | Correction the enumerations in the VAE OpenAPI files | 18.0.0 |
| 2022-12 | CT#98e | CP-223185 | 0090 |  | F | Correction of the OpenAPI file formating and descriptions in the VAE APIs | 18.0.0 |
| 2022-12 | CT#98e | CP-223189 | 0091 |  | F | Update of info and externalDocs fields | 18.0.0 |
| 2023-12 | CT#102 | CP-233252 | 0093 | 1 | B | Define the service description clauses of the VAE\_ServiceAndQoSControlInfo API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0094 | 2 | B | Define the API definition clauses of the VAE\_VRUZoneManagement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0095 | 2 | B | Define the OpenAPI description of the VAE\_ServiceAndQoSControlInfo API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0096 | 1 | B | Define the service description clauses of the VAE\_VRUZoneManagement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0097 | 2 | B | Define the API definition clauses of the VAE\_ServiceAndQoSControlInfo API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0098 | 2 | B | Define the OpenAPI description of the VAE\_VRUZoneManagement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233231 | 0099 | 2 | F | Updating the obsoleted IETF HTTP RFCs | 18.1.0 |
| 2023-12 | CT#102 | CP-233232 | 0101 | 1 | F | Various necessary updates and corrections | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0102 |  | B | Define the API definition clauses of the VAE\_V2PApplicationRequirement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0103 | 1 | B | Define the service description clauses of the VAE\_V2PApplicationRequirement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233252 | 0104 |  | B | Define the OpenAPI description of the VAE\_V2PApplicationRequirement API | 18.1.0 |
| 2023-12 | CT#102 | CP-233237 | 0105 |  | F | Update of info and externalDocs fields | 18.1.0 |
| 2024-03 | CT#103 | CP-240171 | 0106 |  | F | Implementation of CR #0099 | 18.2.0 |
| 2024-03 | CT#103 | CP-240189 | 0107 | 1 | A | Missing parameter in VAE\_FileDistribution API | 18.2.0 |
| 2024-03 | CT#103 | CP-240171 | 0108 | 1 | F | Various corrections to several data models | 18.2.0 |
| 2024-03 | CT#103 | CP-240171 | 0109 | 1 | B | V2X service id in VAE\_MessageDelivery API | 18.2.0 |
| 2024-03 | CT#103 | CP-240195 | 0110 |  | B | Complete the definition of the VAE\_ServiceAndQoSControlInfo API | 18.2.0 |
| 2024-03 | CT#103 | CP-240244 | 0111 | 2 | B | Complete the definition of the VAE\_VRUZoneManagement API | 18.2.0 |
| 2024-03 | CT#103 | CP-240195 | 0112 |  | B | Complete the definition of the VAE\_V2PApplicationRequirement API | 18.2.0 |
| 2024-03 | CT#103 | CP-240166 | 0117 |  | F | Update of info and externalDocs fields | 18.2.0 |
| 2024-06 | CT#104 | CP-241083 | 0118 |  | F | Several OpenAPI corrections | 18.3.0 |
| 2024-06 | CT#104 | CP-241084 | 0119 | 3 | B | QoE metric parameter in VAE\_FileDistribution | 18.3.0 |
| 2024-06 | CT#104 | CP-241124 | 0120 | 1 | F | Corrections on VAE\_V2VConfigRequirement api name | 18.3.0 |
| 2024-06 | CT#104 | CP-241083 | 0121 | 1 | F | Various additional corrections | 18.3.0 |
| 2024-06 | CT#104 | CP-241083 | 0122 | 1 | F | Corrections and updates to the security related provisions | 18.3.0 |
| 2024-06 | CT#104 | CP-241124 | 0124 |  | A | Essential corrections to the VAE Server APIs | 18.3.0 |
| 2024-06 | CT#104 | CP-241126 | 0126 | 1 | A | Feature definition correction | 18.3.0 |
| 2024-06 | CT#104 | CP-241084 | 0127 | 1 | F | Various corrections | 18.3.0 |
| 2024-06 | CT#104 | CP-241260 | 0128 | 2 | F | Service consumer update | 18.3.0 |
| 2024-06 | CT#104 | CP-241085 | 0130 |  | F | Update of info and externalDocs fields | 18.3.0 |
| 2024-09 | CT#105 | CP-242114 | 0131 | 1 | B | Updates and corrections to the VAE\_MessageDelivery API | 19.0.0 |
| 2024-09 | CT#105 | CP-242113 | 0132 |  | F | Update of info and externalDocs fields | 19.0.0 |