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Foreword

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

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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

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

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

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

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

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

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

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

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

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

In addition:

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

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

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

1 Scope

The present document specifies the stage 3 protocol and data model for the SEAL AIMLE Services, for enabling the support of AIMLE services for vertical applications. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the AIMLE Layer entities.

The stage 2 architecture and procedures are specified in 3GPP TS 23.482 [9].

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

2 References

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

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 29.122: "T8 reference point for Northbound Application Programming Interfaces (APIs)".
- [3] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [4] 3GPP TR 21.900: "Technical Specification Group working methods".
- [5] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".
- [6] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".
- [7] 3GPP TS 33.122: "Security aspects of Common API Framework (CAPIF) for 3GPP northbound APIs".
- [8] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [9] 3GPP TS 23.482: "Functional architecture and information flows for AIML Enablement Service".
- [10] 3GPP TS 29.549: "Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage 3".
- [11] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [12] 3GPP TS 24.560: "Artificial Intelligence Machine Learning (AIML) Services - Service Enabler Architecture Layer for Verticals (SEAL); Protocol Specification; Stage 3".
- [13] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".
- [14] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".
- [15] 3GPP TS 29.558: "Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".
- [16] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".
- [17] 3GPP TS 29.548: "Service Enabler Architecture Layer for Verticals (SEAL); SEAL Data Delivery (SEALDD) Server Services; Stage 3".
- [18] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

For the purpose of the present document, the terms and definitions given in 3GPP TS 23.482 [9] 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].

AIML	Artificial Intelligence Machine Learning
AIMLE	Artificial Intelligence Machine Learning Enablement
FL	Federated Learning
MLR	Machine Learning Repository
TL	Transfer Learning
SEAL	Service Enabler Architecture Layer for Verticals
VAL	Vertical Application Layer

4 Overview

The AIMLE Layer forms part of the SEAL Enabler Layer defined in 3GPP TS 23.434 [13] and aims to ensure the efficient use and deployment of AIML capabilities for vertical applications. The AIMLE Layer, via the AIMLE Server and ML Repository, support for this purpose the functionalities defined in clause 6 of 3GPP TS 23.482 [9].

Figure 4-1 shows the reference model of the AIMLE service, with a focus on the AIMLE Server and ML Repository.

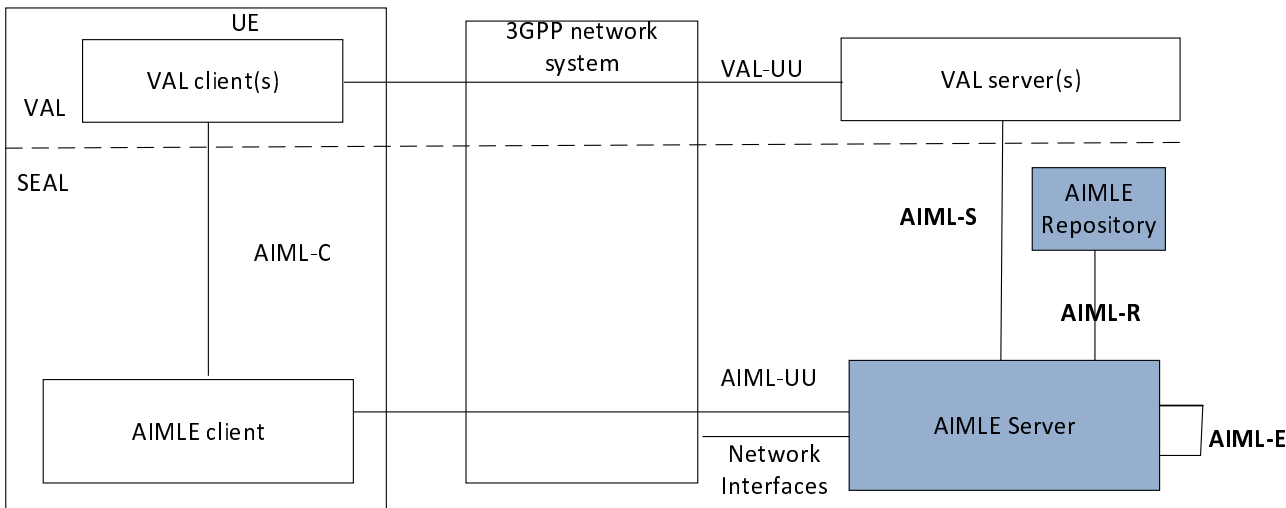


Figure 4-1: AIMLE service functional model

5 Services offered by AIMLE

5.1 Introduction

The AIMLE Server provides the following services:

- AIMLES_ContextTransfer
- AIMLES_DataManagement
- AIMLES_FLMemberGroupSupport
- AIMLES_AIMLEServiceOperationsManagement
- AIMLES_HierarchicalComputingAssist
- AIMLES_AIMLEClientDiscovery
- AIMLES_AIMLEClientSelection
- AIMLES_MLModelTraining
- AIMLES_MLModelPerfMonitor
- AIMLES_TLModelSelectionAssistance
- AIMLES_AssistedMLModelSelection
- AIMLES_SplitOpEvent
- AIMLES_MLModelRetrieval
- AIMLES_SplitOpNodeRegistration
- AIMLES_MLModelUpdate

The AIMLE Repository provides the following services:

- MLR_MLModelManagement
- MLR_ModelInformationDiscovery
- MLR_FLEvents
- MLR_FLMember

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

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	API Name	Annex
AIMLES_ContextTransfer	6.1.1	AIMLE Context Transfer Information Service	TS29482_AIMLES_ContextTransfer.yaml	aimles-ct	A.2
AIMLES_DataManagement	6.1.2	AIMLE Data Management Assistance Service	TS29482_AIMLES_DataManagement.yaml	aimles-dm	A.3
AIMLES_FLMemberGroupSupport	6.1.3	FL Member Group Management Service	TS29482_AIMLES_FLMemberGroupSupport.yaml	aimles-fl	A.14
AIMLES_AIMLEServiceOperationsManagement	6.1.4	AIMLE Operation Management Service	TS29482_AIMLES_AIMLEServiceOperationsManagementAPI.yaml	aimles-opm	A.8
AIMLES_HierarchicalComputingAssist	6.1.5	AIMLE Hierarchical Computing Assistance Service	TS29482_AIMLES_HierarchicalComputingAssist.yaml	aimles-hca	A.9
AIMLES_AIMLEClientDiscovery	6.1.6	AIMLE Client Discovery Service	TS29482_AIMLES_AIMLEClientDiscovery.yaml	aimles-disc	A.5
AIMLES_AIMLEClientSelection	6.1.7	AIMLE Client Selection Service	TS29482_AIMLES_AIMLEClientSelection.yaml	aimles-sel	A.7
AIMLES_MLModelTraining	6.1.8	AIMLE ML Model Training Service	TS29482_AIMLES_MLModelTraining.yaml	aimles-trn	A.19
AIMLES_MLModelPerfMonitor	6.1.9	AIMLE ML Model Performance Monitoring Service	TS29482_AIMLES_MLModelPerfMonitor.yaml	aimles-mlmpm	A.15
AIMLES_TLModelSelectionAssistance	6.1.10	AIMLE TL Model Selection Assistance Service	TS29482_AIMLES_TLModelSelectionAssistance.yaml	aimles-tlmsa	A.16
AIMLES_AssistedMLModelSelection	6.1.11	AIMLE Assisted ML Model Selection Service	TS29482_AIMLES_AssistedMLModelSelection.yaml	aimles-amlmsel	A.10
AIMLES_SplitOpEvent	6.1.12	AIMLE Split Operation Event Management Service	TS29482_AIMLES_SplitOpEvent.yaml	aimles-splitop-event	A.20
AIMLES_MLModelRetrieval	6.1.13	AIMLE ML Model Retrieval Service	TS29482_AIMLES_MLModelRetrieval.yaml	aimles-mlmr	A.11
AIMLES_SplitOpNodeRegistration	6.1.14	AIMLE Split Operation Node Registration Service	TS29482_AIMLES_SplitOpNodeRegistration.yaml	aimles-sonreg	A.12
AIMLES_MLModelUpdate	6.1.15	AIMLE ML Model Update	TS29482_AIMLES_MLModelUpdate.yaml	aimles-mlmupd	A.13
MLR_MLModelManagement	6.2.1	MLR Model Management Service API	TS29482_MLR_MLModelManagement.yaml	mlr-mlmm	A.4
MLR_ModelInformationDiscovery	6.2.2	MLR Model Information Discovery service	TS29482_MLR_ModelInformationDiscovery.yaml	mlr-mid	A.6
MLR_FLEvents	6.2.3	MLR FL Events Management Service API	TS29482_MLR_FLEvents.yaml	mlr-fle	A.17
MLR_FLMember	6.2.4	MLR FL Member Management Service API	TS29482_MLR_FLMember.yaml	mlr-fl	A.18

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

5.2 Services offered by the AIMLE Server

5.2.1 AIMLES_ContextTransfer Service

5.2.1.1 Service Description

The AIMLES_ContextTransfer service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE context information transfer to the AIMLE Server.

5.2.1.2 Service Operations

5.2.1.2.1 Introduction

The service operations defined for AIMLES_ContextTransfer API are shown in the table 5.2.1.2.1-1.

Table 5.2.1.2.1-1: AIMLES_ContextTransfer Service Operations

Service Operation Name	Description	Initiated by
AIMLES_ContextTransfer_Request	This service operation is used by a service consumer to request the AIMLE context information transfer.	e.g., AIMLE Server

5.2.1.2.2 AIMLES_ContextTransfer_Request

5.2.1.2.2.1 General

This service operation is used by a service consumer to request AIMLE context transfer to the AIMLE Server.

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

- AIMLE Context Transfer Request.

5.2.1.2.2.2 AIMLE Context Transfer Request

Figure 5.2.1.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE context information transfer (see also clause 8.24 of 3GPP TS 23.482 [9]).

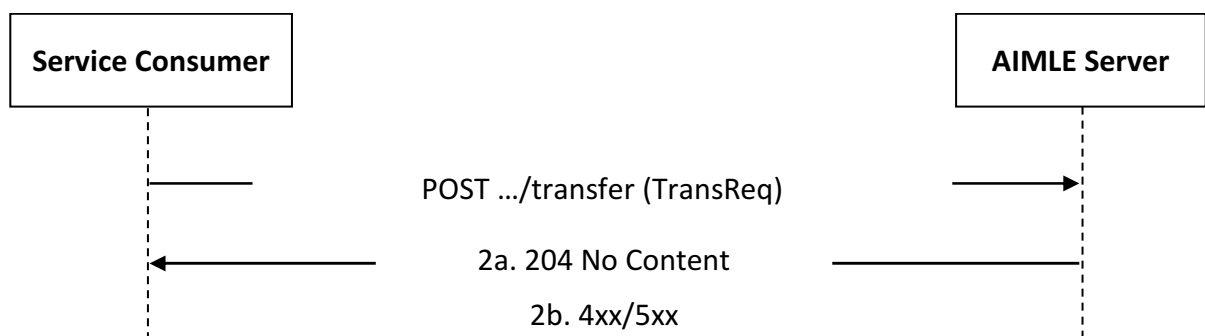


Figure 5.2.1.2.2.2-1: Procedure for AIMLE Context Transfer Request

1. In order to request AIMLE context information transfer, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation (i.e., "Transfer"), with the request body including the TransReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "204 No Content" status code to indicate that the AIMLE context transfer request is successfully received and processed.

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

5.2.2 AIMLES_DataManagement Service

5.2.2.1 Service Description

The AIMLES_DataManagement service exposed by the AIMLE Server enables a service consumer to:

- create/update/delete an AIMLE Data Management Assistance Subscription; and
- receive AIMLE Data Management Assistance Notifications.

5.2.2.2 Service Operations

5.2.2.2.1 Introduction

Table 5.2.2.2.1-1: Service operations of the AIMLES_DataManagement API

Service Operation Name	Description	Initiated by
AIMLES_DataManagement_Subscribe	This service operation enables a service consumer to create/update/delete an AIMLE Data Management Assistance Subscription.	e.g., VAL Server
AIMLES_DataManagement_Notify	This service operation enables a service consumer to receive AIMLE Data Management Assistance Notifications.	AIMLE Server

5.2.2.2.2 AIMLES_DataManagement_Subscribe

5.2.2.2.2.1 General

This service operation is used by a service consumer to request the creation/update/deletion of an AIMLE Data Management Assistance Subscription at the AIMLE Server.

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

- AIMLE Data Management Assistance Subscription Creation.
- AIMLE Data Management Assistance Subscription Update.
- AIMLE Data Management Assistance Subscription Deletion.

5.2.2.2.2.2 AIMLE Data Management Assistance Subscription Creation

Figure 5.2.2.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the creation of an AIMLE Data Management Assistance Subscription (see also clause 8.15 of 3GPP TS 23.482 [9]).

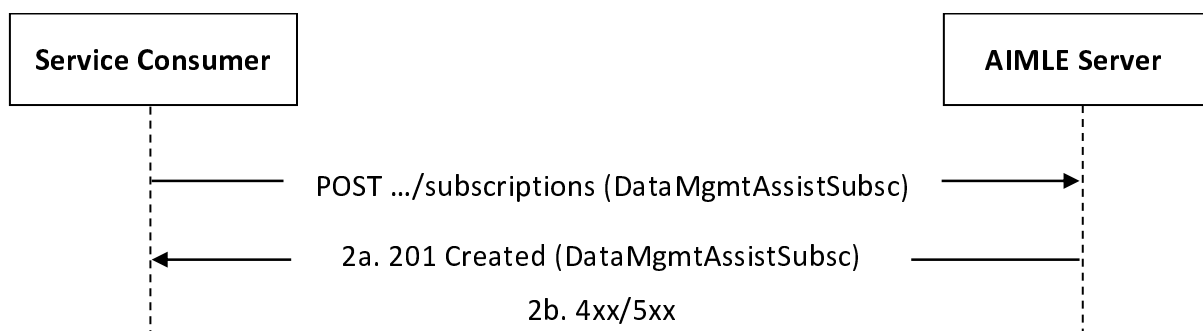


Figure 5.2.2.2.2.2-1: Procedure for AIMLE Data Management Assistance Subscription Creation

1. In order to subscribe to AIMLE Data Management Assistance reporting, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE Data Management Assistance Subscriptions" collection resource, with the request body including the DataMgmtAssistSubsc data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE Data Management Assistance Subscription" resource within the DataMgmtAssistSubsc data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.2.7.

5.2.2.2.2.3 AIMLE Data Management Assistance Subscription Update

Figure 5.2.2.2.3-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of an existing AIMLE Data Management Assistance Subscription (see also clause 8.15 of 3GPP TS 23.482 [9]).

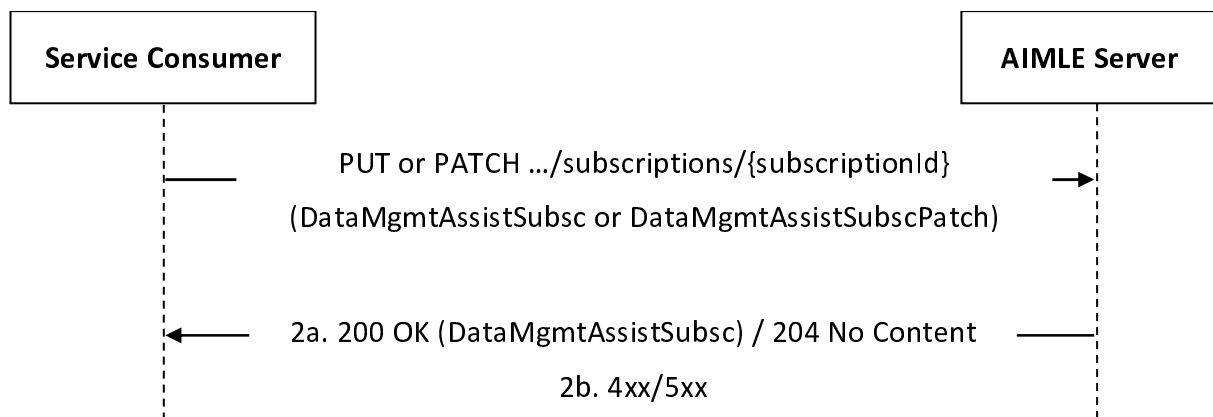


Figure 5.2.2.2.3-1: Procedure for AIMLE Data Management Assistance Subscription Creation

1. In order to request the update of an existing AIMLE Data Management Assistance Subscription, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server, targeting the URI of the corresponding "Individual AIMLE Data Management Assistance Subscription" resource, with the request body including either:
 - the updated representation of the resource within the DataMgmtAssistSubsc data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the DataMgmtAssistSubscPatch data structure, in case the HTTP PATCH method is used.
- NOTE:** An alternative service consumer (i.e., other than the ones that previously requested the creation/update of the targeted resource) can initiate this request.
- 2a. Upon success, the AIMLE Server shall update the targeted "Individual AIMLE Data Management Assistance Subscription" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE Data Management Assistance Subscription" resource within the DataMgmtAssistSubsc data structure; or
 - an HTTP "204 No Content" status code.
 - 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.2.7.

5.2.2.2.2.4 AIMLE Data Management Assistance Subscription Deletion

Figure 5.2.2.2.4-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the deletion of an existing AIMLE Data Management Assistance Subscription (see also clause 8.15 of 3GPP TS 23.482 [9]).

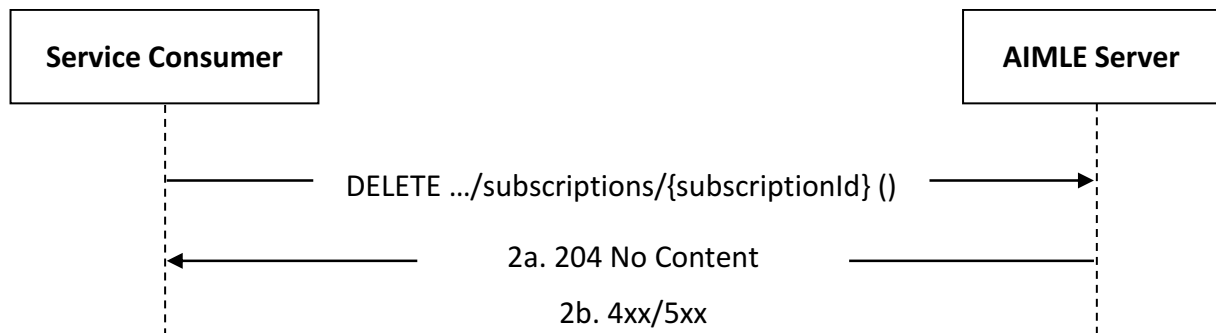


Figure 5.2.2.2.4-1: Procedure for AIMLE Data Management Assistance Subscription Deletion

1. In order to request the deletion of an existing AIMLE Data Management Assistance Subscription, the service consumer shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding "Individual AIMLE Data Management Assistance Subscription" resource.

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

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

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.2.7.

5.2.2.2.3 AIMLES_DataManagement_Notify

5.2.2.2.3.1 General

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

- AIMLE Data Management Assistance related report(s).

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

- AIMLE Data Management Assistance Notification.

5.2.2.2.3.2 AIMLE Data management Assistance Notification

Figure 5.2.2.2.3.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE Data Management Assistance related report(s) (see also clause 8.15 of 3GPP TS 23.482 [9]).

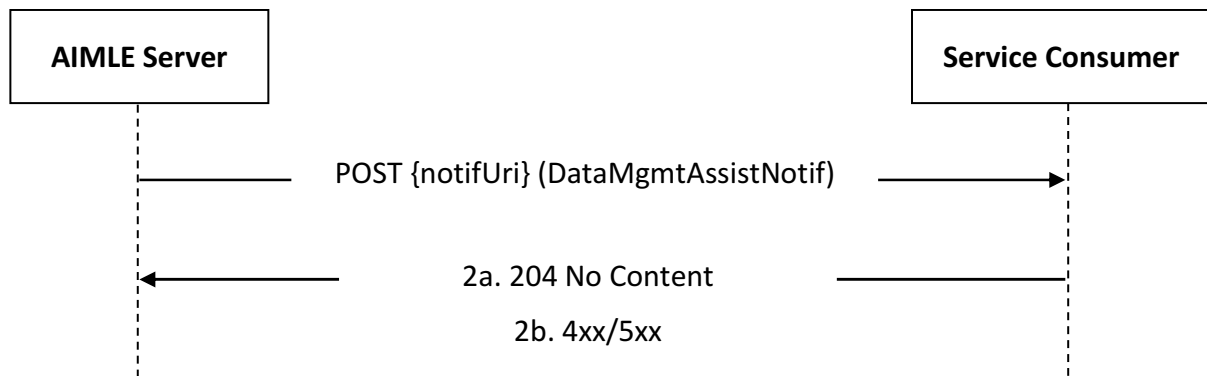


Figure 5.2.2.3.2-1: Procedure for AIMLE Data Management Assistance Notification

1. In order to notify a previously subscribed service consumer on AIMLE Data Management Assistance related report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation/update of the corresponding AIMLE Data Management Assistance Subscription using the procedures defined in clauses 5.2.2.2.2.2, and the request body including the DataMgmtAssistNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the successful reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.2.7.

5.2.3 AIMLES_FLMemberGroupSupport Service

5.2.3.1 Service Description

The AIMLES_FLMemberGroupSupport service, exposed by the AIMLE Server, enables a service consumer to:

- create, update, and delete an FL Member Support Group for an FL process as defined in clause 8.17 of 3GPP TS 23.482 [9].

5.2.3.2 Service Operations

5.2.3.2.1 Introduction

The service operation defined for AIMLES_FLMemberGroupSupport API for is shown in the table 5.2.3.2.1-1.

Table 5.2.3.2.1-1: Operations for AIMLES_FLMemberGroupSupport API

Service operation name	Description	Initiated by
AIMLES_FLMemberGroupSupport_Create	This service operation is used to create an Individual FL Member Support Group for an FL process.	Service consumer e.g., VAL Server
AIMLES_FLMemberGroupSupport_Query	This service operation is used to query for an Individual FL Member Support Group for an FL process.	Service consumer e.g., VAL Server
AIMLES_FLMemberGroupSupport_Update	This service operation is used to update an Individual FL Member Support Group for an FL process.	Service consumer e.g., VAL Server
AIMLES_FLMemberGroupSupport_Delete	This service operation is used to delete an Individual FL Member Support Group for an FL process.	Service consumer e.g., VAL Server

5.2.3.2.2 AIMLES_FLMemberGroupSupport_Create

5.2.3.2.2.1 General

This service operation is used by a service consumer e.g., VAL Server to request the AIMLE Server to create an Individual FL Member Support Group for an FL process.

The following procedure is supported by the "AIMLES_FLMemberGroupSupport_Create" service operation:

- AIMLES FL Member Group Support Create.

5.2.3.2.2.2 AIMLES FL Member Group Support Create

Figure 5.2.3.2.2.2-1 depicts a scenario where a service consumer e.g., VAL Server sends a request to the AIMLE Server to create an Individual FL Member Support Group for an FL process. (see also clause 8.17.2 of 3GPP TS 23.482 [9]).

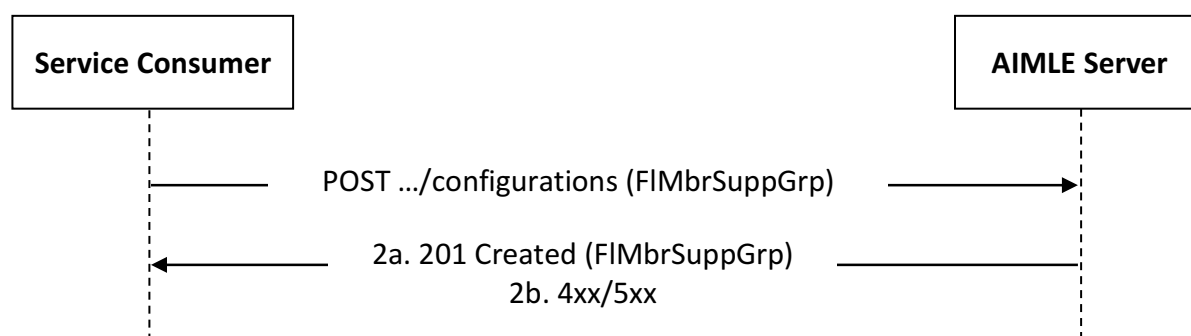


Figure 5.2.3.2.2.2-1: Procedure for AIMLES FL Member Group Support Create

1. In order to create an Individual FL Member Support Group for an FL process, the service consumer e.g., VAL Server shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding resource (i.e., "FL Member Group Support Configurations"), with the request body including the FIMbrSuppGrp data structure.
- 2a. Upon success that the request to create the Individual FL Member Support Group for an FL process is successfully received and processed, the AIMLE Server shall respond with an HTTP "201 Created" status code with the request body including the FIMbrSuppGrp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.3.7.

5.2.3.2.3 AIMLES_FLMemberGroupSupport_Query

5.2.3.2.3.1 General

This service operation is used by a service consumer e.g., VAL Server to request the AIMLE Server to query an Individual FL Member Support Group for an FL process.

The following procedure is supported by the "AIMLES_FLMemberGroupSupport_Query" service operation:

- AIMLES FL Member Group Support Query.

5.2.3.2.3.2 AIMLES FL Member Group Support Query

Figure 5.2.3.2.3.2-1 depicts a scenario where a service consumer e.g., VAL Server sends a request to the AIMLE Server to query an Individual FL Member Support Group for an FL process. (see also clause 8.17.2 of 3GPP TS 23.482 [9]).

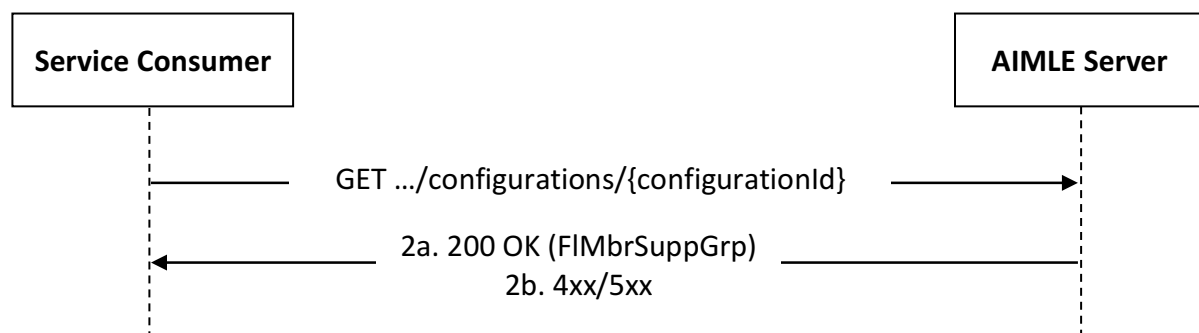


Figure 5.2.3.2.3.2-1: Procedure for AIMLES FL Member Group Support Query

1. In order to query an Individual FL Member Support Group for an FL process, the service consumer e.g., VAL Server shall send an HTTP GET request to the AIMLE Server targeting the URI of the corresponding resource (i.e., "Individual FL Member Group Support Configuration").
- 2a. Upon success that the request to query the Individual FL Member Support Group for an FL process is successfully received and processed, the AIMLE Server shall respond with an HTTP "200 OK" status code with the request body including the FIMbrSuppGrp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.1.3.7.

5.2.3.2.4 AIMLES_FLMemberGroupSupport_Update

5.2.3.2.4.1 General

This service operation is used by a service consumer e.g., VAL Server to request the AIMLE Server to update an Individual FL Member Support Group for an FL process.

The following procedure is supported by the "AIMLES_FLMemberGroupSupport_Update" service operation:

- AIMLES FL Member Group Support Update.

5.2.3.2.4.2 AIMLES FL Member Group Support Update

Figure 5.2.3.2.4.2-1 depicts a scenario where a service consumer e.g., VAL Server sends a request to the AIMLE Server to update an Individual FL Member Support Group for an FL process. (see also clause 8.17.2 of 3GPP TS 23.482 [9]).

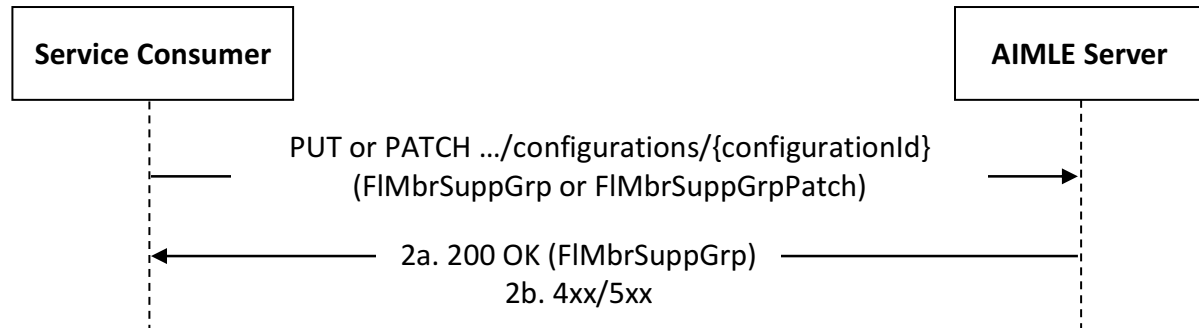


Figure 5.2.3.2.4.2-1: Procedure for AIMLES FL Member Group Support Update

1. In order to update an Individual FL Member Support Group for an FL process, the service consumer e.g., VAL Server shall send an HTTP PUT/PATCH request to the AIMLE Server targeting the URI of the corresponding resource (i.e., "Individual FL Member Group Support Configuration"), with the request body including either:
 - the updated representation of the resource within the FIMbrSuppGrp data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the FIMbrSuppGrpPatch 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 that the request to update the Individual FL Member Support Group for an FL process is successfully received and processed, the AIMLE Server shall respond with an HTTP "200 OK" status code with the request body including the FIMbrSuppGrp data structure.

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual FL Member Group Support Configuration" resource within the FIMbrSuppGrp data structure; or
- an HTTP "204 No Content" status code.

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

5.2.3.2.5 AIMLES_FLMemberGroupSupport_Delete

5.2.3.2.5.1 General

This service operation is used by a service consumer e.g., VAL Server to request the AIMLE Server to delete an Individual FL Member Support Group for an FL process.

The following procedure is supported by the "AIMLES_FLMemberGroupSupport_Delete" service operation:

- AIMLES FL Member Group Support Delete.

5.2.3.2.5.2 AIMLES FL Member Group Support Delete

Figure 5.2.3.2.5.2-1 depicts a scenario where a service consumer e.g., VAL Server sends a request to the AIMLE Server to delete an Individual FL Member Support Group for an FL process. (see also clause 8.17.2 of 3GPP TS 23.482 [9]).

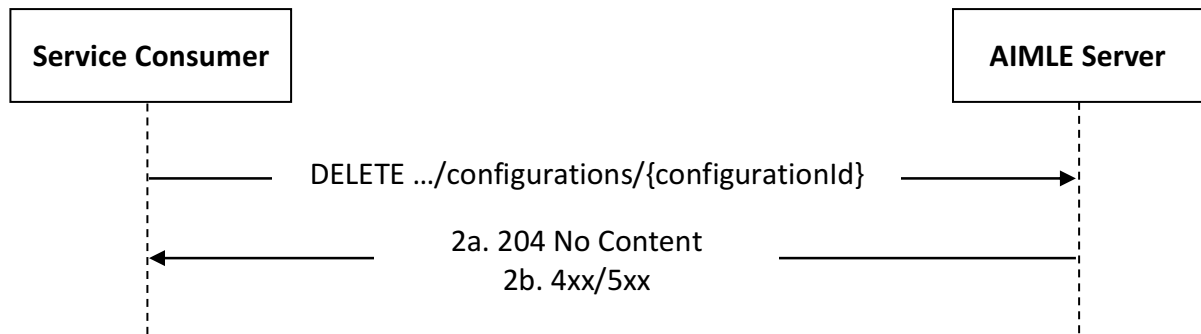


Figure 5.2.3.2.5.2-1: Procedure for AIMLES FL Member Group Support Delete

1. In order to delete an Individual FL Member Support Group for an FL process, the service consumer e.g., VAL Server shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding resource (i.e., "Individual FL Member Group Support Configuration").
- 2a. Upon success that the request to delete the Individual FL Member Support Group for an FL process is successfully received and processed, the AIMLE Server shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.3.7.

5.2.4 AIMLES_AIMLEServiceOperationsManagement Service

5.2.4.1 Service Description

The AIMLES_AIMLEServiceOperationsManagement service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE server to provide AIMLE service operation management.

5.2.4.2 Service Operations

5.2.4.2.1 Introduction

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

Table 5.2.4.2.1-1: AIMLES_AIMLEServiceOperationsManagement Service Operations

Service Operation Name	Description	Initiated by
AIMLES_AIMLEServiceOperationsManagement_Request	This service operation is used by a service consumer to request AIMLE service operation management.	e.g., VAL Server.

5.2.4.2.2 AIMLES_AIMLEServiceOperationsManagement_Request

5.2.4.2.2.1 General

This service operation is used by a service consumer to request AIMLE Service Operations Management to the AIMLE server.

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

- AIMLE Service Operations Management Request.

5.2.4.2.2.2 AIMLE Service Operations Management Request

Figure 5.2.4.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE Service Operations Management (see also clause 8.20 of 3GPP TS 23.482 [9]).

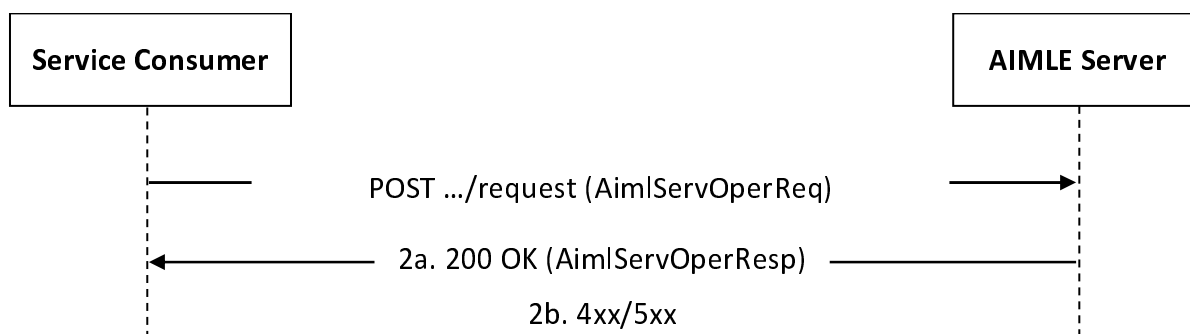


Figure 5.2.4.2.2-1: Procedure for AIMLE Service Operations Management Request

1. In order to request AIMLE service operations management, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation (i.e., "RequestServOpMngt"), with the request body including the AimlServOperReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code including the AimlServOperResp data type to indicate that the request is successfully received and processed.

- 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 6.1.4.7.

5.2.5 AIMLES_HierarchicalComputingAssist Service

5.2.5.1 Service Description

The AIMLES_HierarchicalComputingAssist service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE server to request the hierarchical computing assistance.

5.2.5.2 Service Operations

5.2.5.2.1 Introduction

The service operation defined for AIMLES_HierarchicalComputingAssist API is shown in the table 5.2.5.2.1-1.

Table 5.2.5.2.1-1: AIMLES_HierarchicalComputingAssist Service Operations

Service Operation Name	Description	Initiated by
AIMLES_HierarchicalComputingAssist_Request	This service operation is used by a service consumer to request the hierarchical computing assistance.	e.g., AIMLE Server.

5.2.5.2.2 AIMLES_HierarchicalComputingAssist_Request

5.2.5.2.2.1 General

This service operation is used by a service consumer to request AIMLE hierarchical computing assist to the AIMLE server.

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

- AIMLE Hierarchical Computing Assist Request.

5.2.5.2.2.2 AIMLE Hierarchical Computing Assist Request

Figure 5.2.5.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE hierarchical computing assist (see also clause 8.25 of 3GPP TS 23.482 [9]).



Figure 5.2.5.2.2.2-1: Procedure for AIMLE Hierarchical Computing Assist Request

1. In order to request AIMLE hierarchical computing assist, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation (i.e., "RequestServOpMngt"), with the request body including the AimlHierAssitReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code including the AimlHierAssitResp data type to indicate that the request is successfully received and processed.
- 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 6.1.5.7.

5.2.6 AIMLES_AIMLEClientDiscovery Service

5.2.6.1 Service Description

The AIMLES_AIMLEClientDiscovery service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE server to discover the AIMLE Clients according to the filtering criteria

5.2.6.2 Service Operations

5.2.6.2.1 Introduction

The service operation defined for AIMLES_AIMLEClientDiscovery API is shown in the table 5.2.6.2.1-1.

Table 5.2.6.2.1-1: AIMLES_AIMLEClientDiscovery Service Operations

Service Operation Name	Description	Initiated by
AIMLES_AIMLEClientDiscovery_Request	This service operation is used by a service consumer to discover the AIMLE clients.	e.g., VAL Server.

5.2.6.2.2 AIMLES_AIMLEClientDiscovery_Request

5.2.6.2.2.1 General

This service operation is used by a service consumer to request the discovery of the AIMLE Clients.

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

- AIMLE Clients discovery request.

5.2.6.2.2.2 AIMLE Clients discovery request

Figure 5.2.6.2.2.2-1 depicts a scenario where a service consumer sends a request to the MLR to request the discovery of the ML model(s) (see also clause 8.8 of 3GPP TS 23.482 [9]).

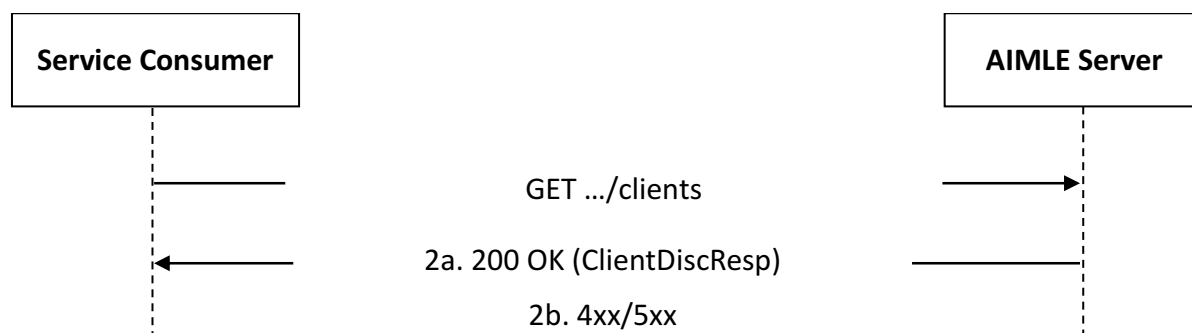


Figure 5.2.6.2.2.2-1: Procedure for AIMLE Clients discovery request

1. In order to discover the AIMLE Client(s), the service consumer shall send an HTTP GET request to the AIMLE Server targeting the URI of the "AIMLE Clients" resource.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code with the response body containing the ClientDiscResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.1.6.7.

5.2.7 AIMLES_AIMLEClientSelection Service

5.2.7.1 Service Description

The AIMLES_AIMLEClientSelection service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE server to select the AIMLE Clients according to the filtering criteria; and
- request AIMLE server to select the AIMLE Clients and subscribe to the notifications.

5.2.7.2 Service Operations

5.2.7.2.1 Introduction

The service operation defined for AIMLES_AIMLEClientSelection API is shown in the table 5.2.7.2.1-1.

Table 5.2.7.2.1-1: AIMLES_AIMLEClientSelection Service Operations

Service Operation Name	Description	Initiated by
AIMLES_AIMLEClientSelection_Request	This service operation is used by a service consumer to select the AIMLE clients.	e.g., VAL Server.
AIMLES_ClientSelection_Subscribe	This service operation is used by a service consumer to subscribe for monitoring and selection of AIMLE clients for AI/ML operations.	e.g., VAL Server.
AIMLES_ClientSelection_Update	This service operation is used by a service consumer to update the subscription for monitoring and selection of AIMLE clients for AI/ML operations.	e.g., VAL Server.
AIMLES_ClientSelection_Unsubscribe	This service operation is used by a service consumer to delete the subscription for monitoring and selection of AIMLE clients for AI/ML operations.	e.g., VAL Server.
AIMLES_ClientSelection_Notify	This service operation enables a service consumer to receive AIMLE client selection notifications.	AIMLE Server

5.2.7.2.2 AIMLES_ClientSelection_Subscribe

5.2.7.2.2.1 General

This service operation is used by a service consumer to request the creation of AIMLE Client Selection Subscription at the AIMLE server.

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

- AIMLE Client Selection Subscription Creation.

This service operation is used by the analytics consumer for AIMLE Client Selection Subscription to the AIMLE Server.

5.2.7.2.2.2 AIMLE Client Selection Subscription Creation

Figure 5.2.7.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the creation of AIMLE Client Selection Subscription (see also clause 8.13 of 3GPP TS 23.482 [9]).

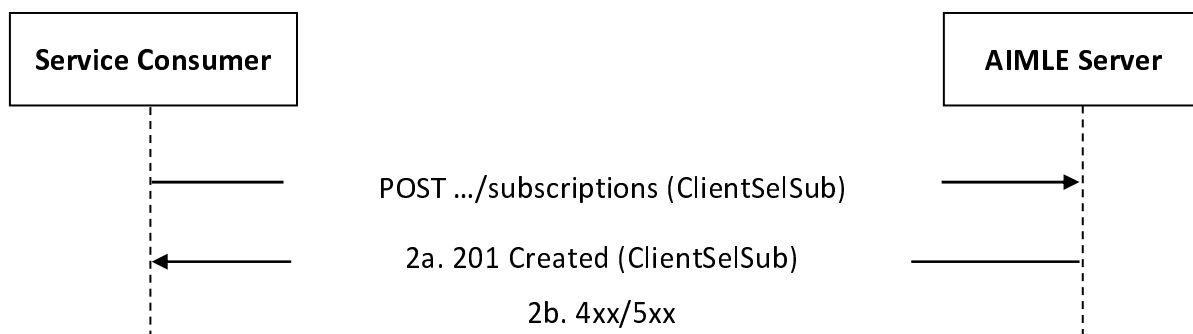


Figure 5.2.7.2.2-1: Procedure for AIMLE Client Selection Subscription Creation

1. In order to subscribe to AIMLE Client Selection reporting, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE Client Selection Subscriptions" collection resource, with the request body including the ClientSelSub data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE Client Selection Subscription" resource within the DataMgmtAssistSubsc data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.7.7.

5.2.7.2.3 AIMLES_ClientSelection_Update

5.2.7.2.3.1 General

This service operation is used by a service consumer to request the update of a AIMLE Client Selection Subscription at the AIMLE server.

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

- AIMLE Client Selection Subscription Update.

This service operation is used by the analytics consumer for AIMLE Client Selection Subscription to the AIMLE Server.

5.2.7.2.3.2 AIMLE Client Selection Subscription Update

Figure 5.2.7.2.3.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of AIMLE Client Selection Subscription (see also clause 8.13 of 3GPP TS 23 482 [9]).

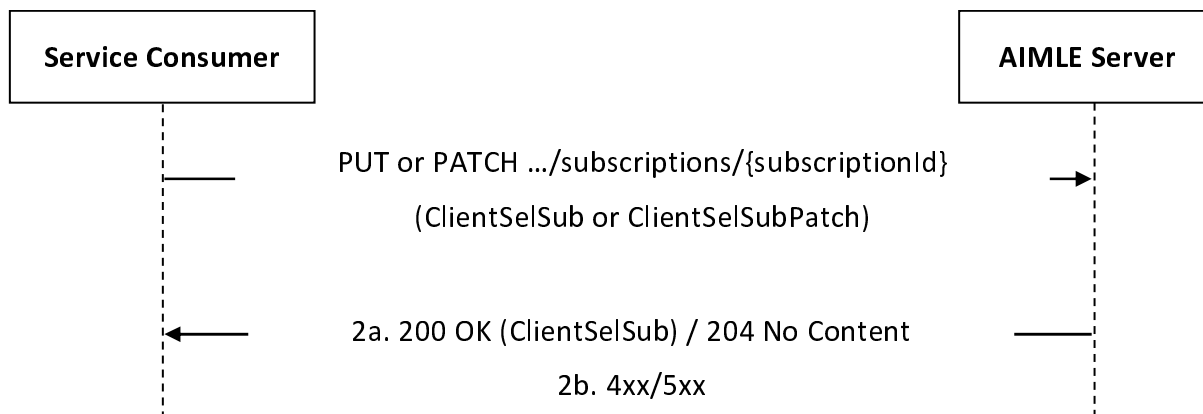


Figure 5.2.7.2.3.2-1: Procedure for AIMLE Client Selection Subscription Update

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

- the updated representation of the resource within the ClientSelSub data structure, in case the HTTP PUT method is used; or
- the requested modifications to the resource within the ClientSelSubPatch 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 AIMLE Server shall update the targeted "AIMLE Client Selection Subscriptions" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE Client Selection Subscriptions" resource within the ClientSelSub data structure; or
- an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.7.7.

5.2.7.2.4 AIMLES_ClientSelection_Unsubscribe

5.2.7.2.4.1 General

This service operation is used by a service consumer to request the deletion of AIMLE Client Selection Subscription at the ADAE Server.

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

- AIMLE Client Selection Subscription Deletion.

5.2.7.2.4.2 AIMLE Client Selection Subscription Deletion

Figure 5.2.7.2.4.2-1 depicts a scenario where a service consumer sends a request to the ADAE Server to delete an existing AIMLE Client Selection Subscription (see also clause 8.13 of 3GPP TS 23.482 [9]).

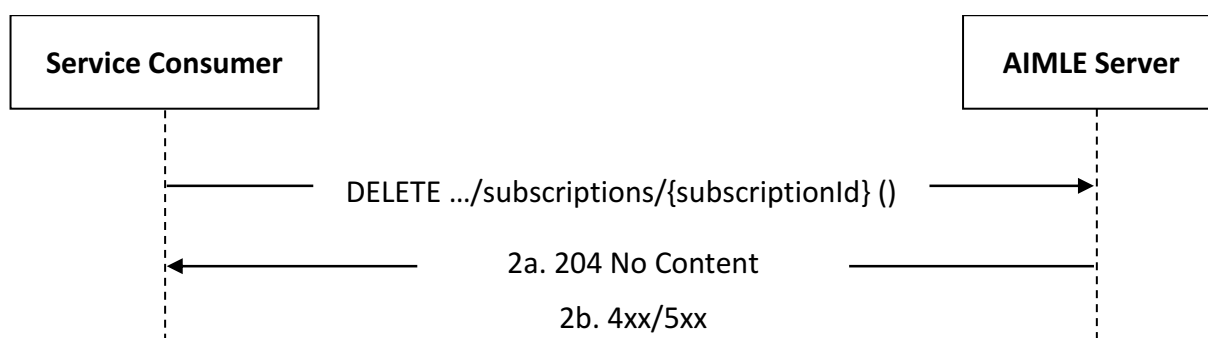


Figure 5.2.7.2.4.2-1: Procedure for AIMLE Client Selection Subscription Deletion

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

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

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

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.7.7.

5.2.7.2.5 AIMLES_ClientSelection_Notify

5.2.7.2.5.1 General

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

- AIMLE Client Selection report(s).

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

- AIMLE Client Selection Notification.

5.2.7.2.5.2 AIMLE Client Selection Notification

Figure 5.2.7.2.5.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE Client Selection report(s) (see also clause 8.13 of 3GPP TS 23.482 [9]).

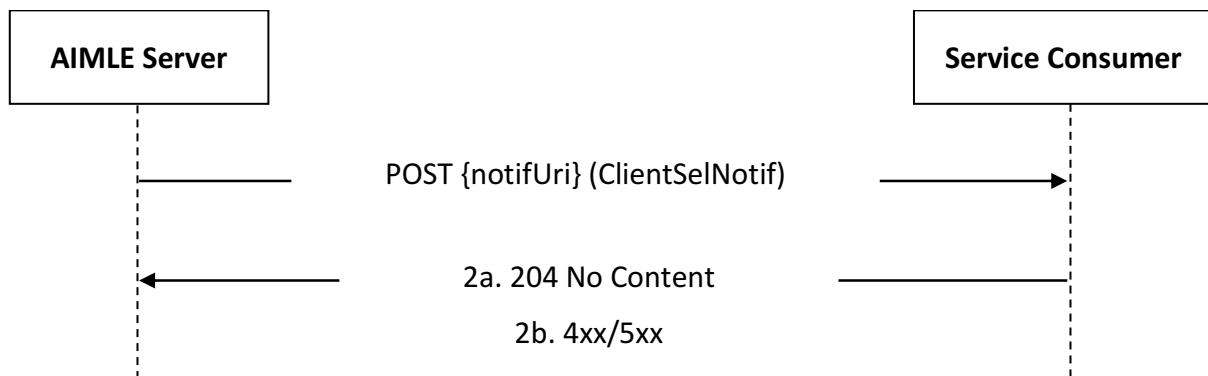


Figure 5.2.7.2.5.2-1: Procedure for AIMLE Client Selection Notification

1. In order to notify a previously subscribed service consumer on AIMLE Client Selection report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE Client Selection Subscription using the procedures defined in clauses 5.2.7.2.2.2, and the request body including the DataMgmtAssistNotif data structure.

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

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.7.7.

5.2.7.2.6 AIMLES_AIMLEClientSelection_Request

5.2.7.2.6.1 General

This service operation is used by a service consumer to request AIMLE Client selection to the AIMLE server.

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

- AIMLE Client Selection Request.

5.2.7.2.6.2 AIMLE Client Selection Request

Figure 5.2.7.2.6.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE Client Selection (see also clause 8.24.3.1 of 3GPP TS 23.482 [9]).

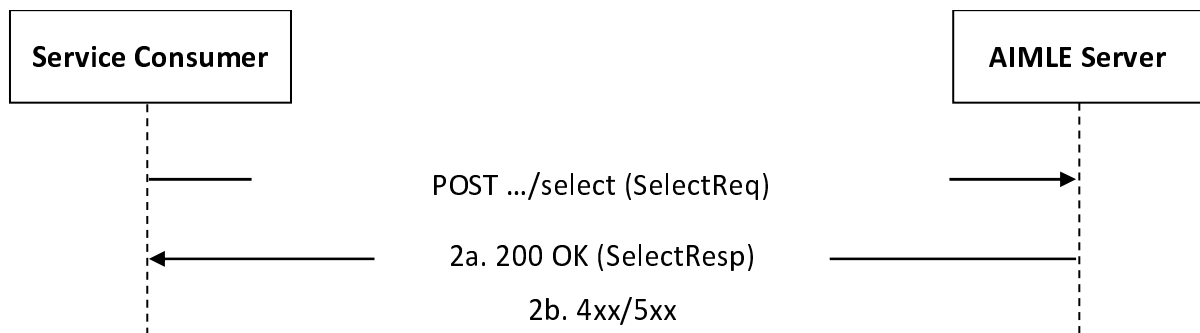


Figure 5.2.7.2.6.2-1: Procedure for AIMLE Client Selection Request

1. In order to request AIMLE Client Selection , the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation (i.e., "Select"), with the request body including the ClientSelReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code including the ClientSelReq data type to indicate that the request is successfully received and processed.
- 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 6.1.7.7.

5.2.8 AIMLES_MLModelPerfMonitor Service

5.2.8.1 Service Description

The AIMLES_MLModelPerfMonitor Service, exposed by the AIMLE Server, enables a service consumer to:

- create/update/delete an AIMLE ML Model Performance Monitor Subscription; and
- receive AIMLE ML Model Performance Monitor Notifications.

5.2.8.2 Service Operations

5.2.8.2.1 Introduction

The service operations defined for the AIMLES_MLModelPerfMonitor API are shown in the table 5.2.8.2.1-1.

Table 5.2.8.2.1-1: Service operations of the AIMLES_MLModelPerfMonitor API

Service Operation Name	Description	Initiated by
AIMLES_MLModelPerfMonitor_Subscribe	This service operation enables a service consumer to create an AIMLE ML model performance monitor subscription.	e.g., VAL Server
AIMLES_MLModelPerfMonitor_Update	This service operation enables a service consumer to update an existing AIMLE ML model performance monitor subscription.	e.g., VAL Server
AIMLES_MLModelPerfMonitor_Unsubscribe	This service operation enables a service consumer to delete an existing AIMLE ML model performance monitor subscription.	e.g., VAL Server
AIMLES_MLModelPerfMonitor_Notify	This service operation enables a service consumer to receive AIMLE notifications.	AIMLE Server

5.2.8.2.2 AIMLES_MLModelPerfMonitor_Subscribe

5.2.8.2.2.1 General

This service operation is used by a service consumer to request the creation of AIMLE ML Model Performance Monitor Subscription at the AIMLE server.

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

- AIMLE ML Model Performance Monitor Subscription Creation.

5.2.8.2.2.2 AIMLE ML Model Performance Monitor Subscription Creation

Figure 5.2.8.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the creation of AIMLE ML Model Performance Monitor Subscription (see also clause 8.22 of 3GPP TS 23.482 [9]).

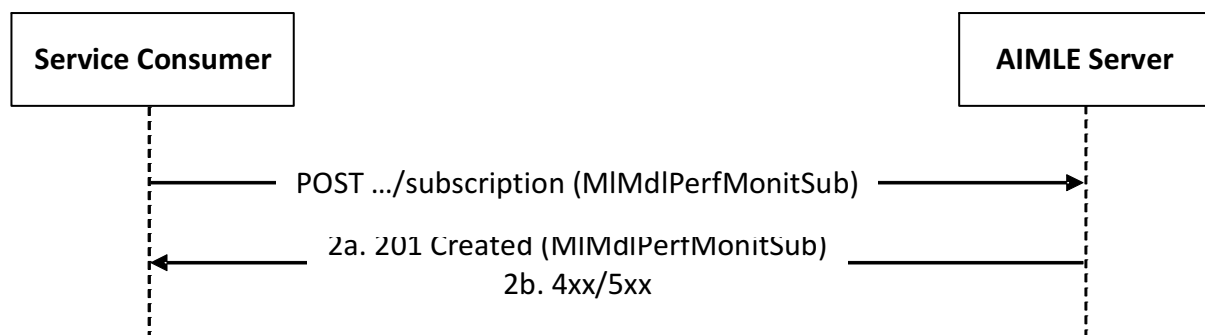


Figure 5.2.8.2.2.2-1: Procedure for AIMLE ML Model Performance Monitor Subscription Creation

1. In order to subscribe to AIMLE ML model performance monitoring, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE ML Model Performance Monitor Subscriptions" collection resource, with the request body including the MIMdIPerfMonitSub data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE ML Model Performance Monitor Subscription" resource within the MIMdIPerfMonitSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.9.7.

5.2.8.2.3 AIMLES_MLModelPerfMonitor_Update

5.2.8.2.3.1 General

This service operation is used by a service consumer to request the update of an AIMLE ML Model Performance Monitor Subscription at the AIMLE server.

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

- AIMLE ML Model Performance Monitor Subscription Update.

5.2.8.2.3.2 AIMLE ML Model Performance Monitor Subscription Update

Figure 5.2.8.2.3.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of AIMLE ML Model Performance Monitor Subscription (see also clause 8.22 of 3GPP TS 23.482 [9]).

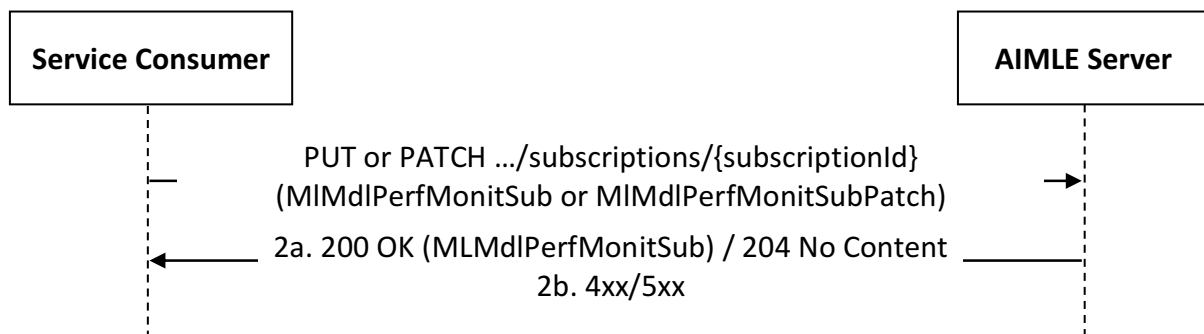


Figure 5.2.8.2.3.2-1: Procedure for AIMLE ML Model Performance Monitor Subscription Update

1. In order to request the update of an existing AIMLE ML model performance monitoring subscription, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server, targeting the URI of the corresponding "Individual AIMLE ML Model Performance Monitor Subscriptions" resource, with the request body including either:
 - the updated representation of the resource within the MIMdIPerfMonitSub data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the MIMdIPerfMonitSubPatch data structure, in case the HTTP PATCH method is used.
- 2a. Upon success, the AIMLE Server shall update the targeted "AIMLE ML Model Performance Monitor Subscriptions" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE ML Model Performance Monitor Subscriptions" resource within the MIMdIPerfMonitSub data structure; or
 - an HTTP "204 No Content" status code.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.9.7.

5.2.8.2.4 AIMLES_MLModelPerfMonitor_Unsubscribe

5.2.8.2.4.1 General

This service operation is used by a service consumer to request the deletion of AIMLE ML Model Performance Monitor Subscription at the ADAE Server.

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

- AIMLE ML Model Performance Monitor Subscription Deletion.

5.2.8.2.4.2 AIMLE ML Model Performance Monitor Subscription Deletion

Figure 5.2.8.2.4.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to delete an existing AIML ML Model Performance Monitor Subscription (see also clause 8.22 of 3GPP TS 23.482 [9]).

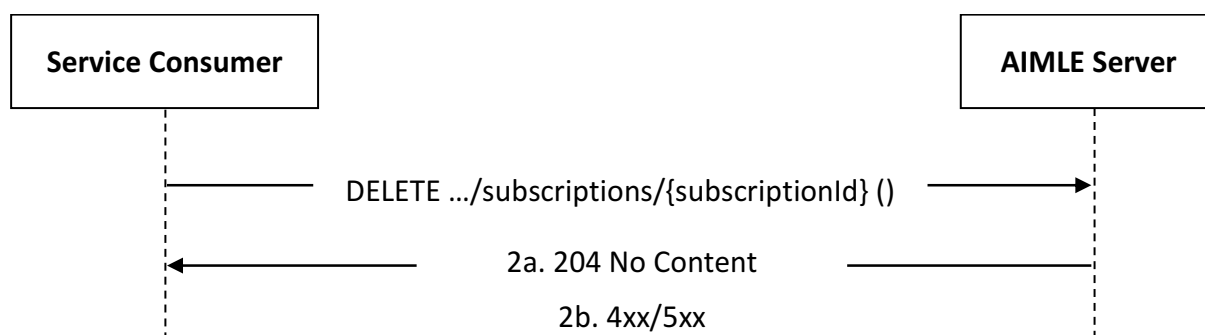


Figure 5.2.8.2.4.2-1: Procedure for AIMLE ML Model Performance Monitor Subscription Deletion

1. In order to request the deletion of an existing AIMLE ML model performance monitoring subscription, the service consumer shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding "Individual AIMLE ML Model Performance Subscription" resource.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.9.7.

5.2.8.2.5 AIMLES_MLModelPerfMonitor_Notify

5.2.8.2.5.1 General

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

- AIMLE ML Model Performance Monitor report(s).

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

- AIMLE ML Model Performance Monitor Notification.

5.2.8.2.5.2 AIMLE ML Model Performance Monitor Notification

Figure 5.2.8.2.5.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE ML Model Performance Monitor report(s) (see also clause 8.22 of 3GPP TS 23.482 [9]).

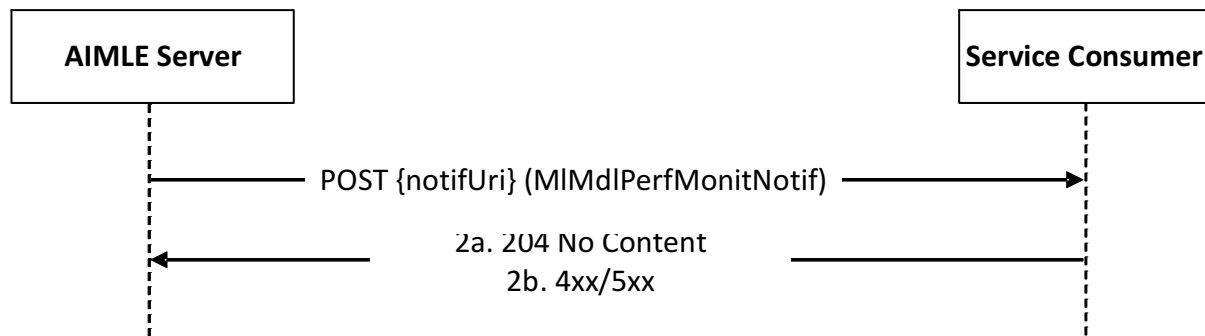


Figure 5.2.8.2.5.2-1: Procedure for AIMLE ML Model Performance Monitor Notification

1. In order to notify a previously subscribed service consumer on AIMLE ML Model Performance Monitor report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE ML Model Performance Monitor Subscription using the procedures defined in clauses 5.2.8.2.2.2, and the request body including the MlMdlPerfMonitNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.9.7.

5.2.9 AIMLES_AssistedMLModelSelection Service

5.2.9.1 Service Description

The AIMLES_AssistedMLModelSelection service exposed by the AIMLE Server enables a service consumer to:

- create/update/delete a AIMLE Assisted ML Model Selection Subscription; and
- receive AIMLE Assisted ML Model Selection Notifications.

5.2.9.2 Service Operations

5.2.9.2.1 Introduction

The service operations defined for the AIMLES_AssistedMLModelSelection API are shown in the table 5.2.9.10.2.1-1.

Table 5.2.9.2.1-1: Service operations of the AIMLES_AssistedMLModelSelection API

Service Operation Name	Description	Initiated by
AIMLES_AssistedMLModelSelection_Subscribe	This service operation enables a service consumer to create a AIMLE Assisted ML Model Selection Subscription.	e.g. VAL Server
AIMLES_AssistedMLModelSelection_Update	This service operation enables a service consumer to update an existing AIMLE Assisted ML Model Selection Subscription.	e.g. VAL Server
AIMLES_AssistedMLModelSelection_Unsubscribe	This service operation enables a service consumer to delete an existing AIMLE Assisted ML Model Selection Subscription.	e.g. VAL Server
AIMLES_AssistedMLModelSelection_Notify	This service operation enables a service consumer to receive AIMLE Assisted ML Model Selection notifications.	AIMLE Server

5.2.9.2.2 AIMLES_AssistedMLModelSelection_Subscribe

5.2.9.2.2.1 General

This service operation is used by a service consumer to request the creation of AIMLE Assisted ML Model Selection Subscription at the AIMLE server.

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

- AIMLE Assisted ML Model Selection Subscription Creation.

This service operation is used by the analytics consumer for AIMLE Assisted ML Model Selection Subscription to the AIMLE Server.

5.2.9.2.2.2 AIMLE Assisted ML Model Selection Subscription Creation

Figure 5.2.9.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the creation of AIMLE Assisted ML Model Selection Subscription (see also clause 8.23 of 3GPP TS 23.482 [9]).

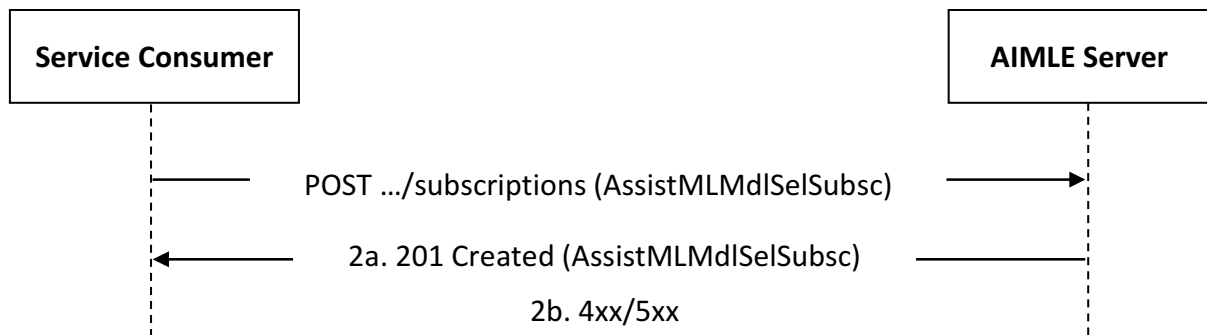


Figure 5.2.9.2.2.2-1: Procedure for AIMLE Assisted ML Model Selection Subscription Creation

1. In order to subscribe to AIMLE Assisted ML Model Selection notification, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE Assisted ML Model Selection Subscriptions" collection resource, with the request body including the AssistMLMdlSelSubsc data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE Assisted ML Model Selection Subscription" resource within the AssistMLMdlSelSubsc data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.10.7.

5.2.9.2.3 AIMLES_AssistedMLModelSelection_Update

5.2.9.2.3.1 General

This service operation is used by a service consumer to request the update of a AIMLE Assisted ML Model Selection Subscription at the AIMLE server.

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

- AIMLE Assisted ML Model Selection Subscription Update.

This service operation is used by the analytics consumer for AIMLE Assisted ML Model Selection Subscription to the AIMLE Server.

5.2.9.2.3.2 AIMLE Assisted ML Model Selection Subscription Update

Figure 5.2.9.2.3.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of AIMLE Assisted ML Model Selection Subscription (see also clause 8.23 of 3GPP TS 23.482 [9]).

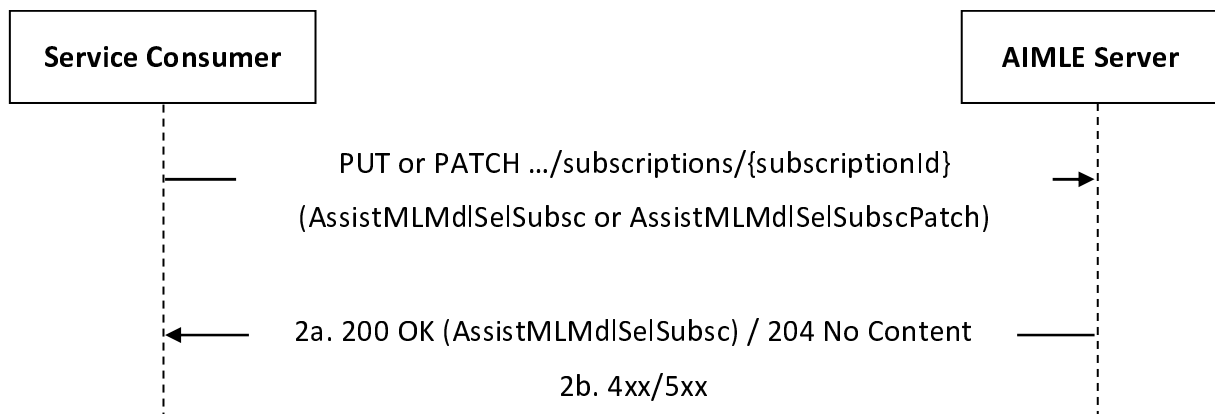


Figure 5.2.9.2.3.2-1: Procedure for AIMLE Assisted ML Model Selection Subscription Update

1. In order to request the update of an existing AIMLE Assisted ML Model Selection notification, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server, targeting the URI of the corresponding "Individual AIMLE Assisted ML Model Selection Subscription" resource, with the request body including either:
 - the updated representation of the resource within the AssistMLMdlSelSubsc data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the AssistMLMdlSelSubscPatch 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 AIMLE Server shall update the targeted "AIMLE Assisted ML Model Selection Subscriptions" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE Assisted ML Model Selection Subscription" resource within the AssistMLMdlSelSubsc data structure; or
 - an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.10.7.

5.2.9.2.4 AIMLES_AssistedMLModelSelection_Unsubscribe

5.2.9.2.4.1 General

This service operation is used by a service consumer to request the deletion of AIMLE Assisted ML Model Selection Subscription at the AIMLE Server.

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

- AIMLE Assisted ML Model Selection Subscription Deletion.

5.2.9.2.4.2 AIMLE Assisted ML Model Selection Subscription Deletion

Figure 5.2.9.2.4.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to delete an existing AIML Member Capability Analytics Subscription (see also clause 8.23 of 3GPP TS 23.482 [9]).

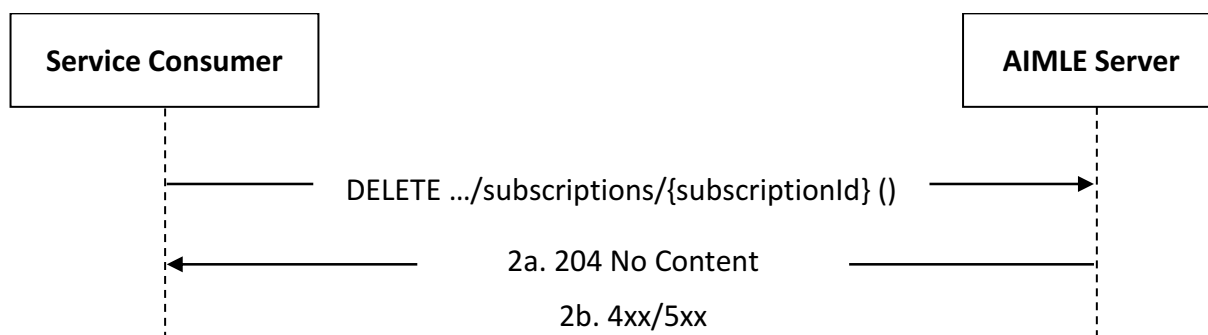


Figure 5.2.9.2.4.2-1: Procedure for AIMLE Assisted ML Model Selection Subscription Deletion

1. In order to request the deletion of an existing AIMLE Assisted ML Model Selection Subscription, the service consumer shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding "Individual AIMLE Assisted ML Model Selection Subscription" resource.

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

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

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.10.7.

5.2.9.2.5 AIMLES_AssistedMLModelSelection_Notify

5.2.9.2.5.1 General

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

- AIMLE Assisted ML Model Selection report(s).

The following procedures are supported by the "AIMLE Assisted ML Model Selection_Notify" service operation:

- AIMLE Assisted ML Model Selection Notification.

5.2.9.2.5.2 AIMLE Assisted ML Model Selection Notification

Figure 5.2.9.2.5.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE Assisted ML Model Selection report(s) (see also clause 8.23 of 3GPP TS 23.482 [9]).

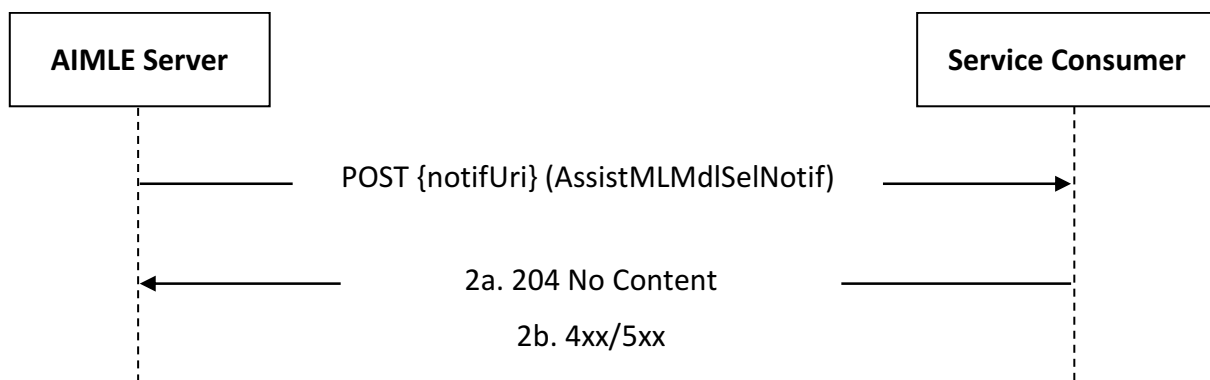


Figure 5.2.9.2.5.2-1: Procedure for AIMLE Assisted ML Model Selection Notification

1. In order to notify a previously subscribed service consumer on AIMLE Assisted ML Model Selection report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE Assisted ML Model Selection Subscription using the procedures defined in clauses 5.2.9.2.2.2, and the request body including the AssistMLMdlSelNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.10.7.

5.2.10 AIMLES_MLModelRetrieval Service

5.2.10.1 Service Description

The AIMLES_MLModelRetrieval service exposed by the AIMLE Server enables a service consumer to:

- request AIMLE server for AIMLE ML Model retrieval according to filtering criteria;
- request AIMLE server to create/update/delete a AIMLE ML Model retrieval subscription; and
- receive AIMLE ML Model retrieval notifications.

5.2.10.2 Service Operations

5.2.10.2.1 Introduction

The service operations defined for the AIMLES_MLModelRetrieval API are shown in the table 5.2.10.2.1-1.

Table 5.2.10.2.1-1: Service operations of the AIMLES_MLModelRetrieval API

Service Operation Name	Description	Initiated by
AIMLES_MLModelRetrieval_Request	This service operation enables a service consumer to request for AIMLE ML Model Retrieval.	e.g. VAL Server, AIMLE Client
AIMLES_MLModelRetrieval_Subscribe	This service operation enables a service consumer to create a AIMLE ML Model Retrieval Subscription.	e.g. VAL Server, AIMLE Client
AIMLES_MLModelRetrieval_Update	This service operation enables a service consumer to update an existing AIMLE ML Model Retrieval Subscription.	e.g. VAL Server, AIMLE Client
AIMLES_MLModelRetrieval_Unsubscribe	This service operation enables a service consumer to delete an existing AIMLE ML Model Retrieval Subscription.	e.g. VAL Server, AIMLE Client
AIMLES_MLModelRetrieval_Notify	This service operation enables a service consumer to receive AIMLE ML Model Retrieval notifications.	AIMLE Server, AIMLE Client

5.2.10.2.2 AIMLES_MLModelRetrieval_Request

5.2.10.2.2.1 General

This service operation is used by a service consumer to request for one time ML AIMLE Model retrieval at the AIMLE server.

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

- AIMLE ML Model Retrieval Request.

5.2.10.2.2.2 AIMLE ML Model Retrieval Request

Figure 5.2.10.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server for one time AIMLE ML Model Retrieval (see also clause 8.2 of 3GPP TS 23.482 [9]).

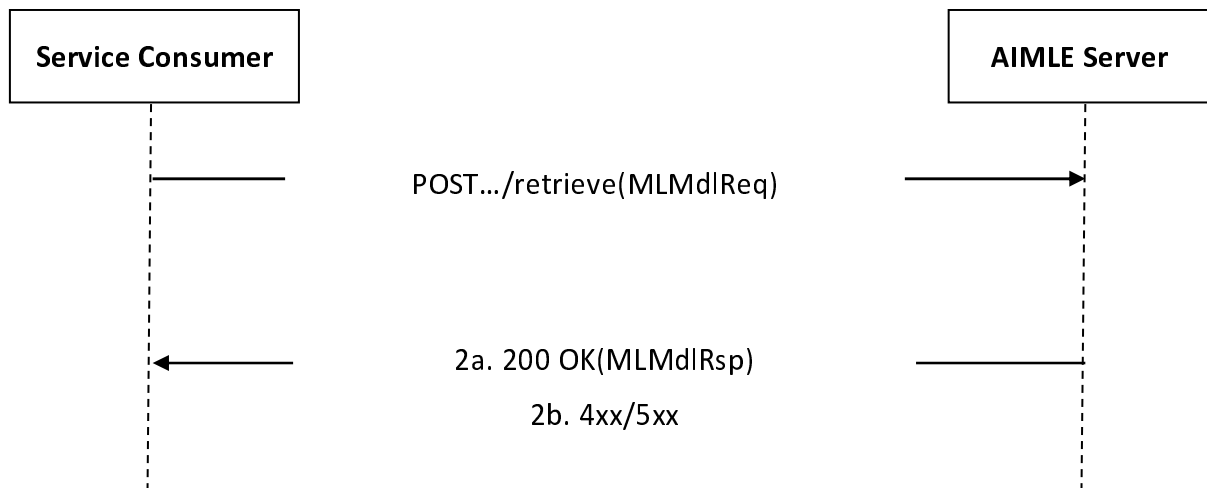


Figure 5.2.10.2.2-1: Procedure for AIMLE ML Model Retrieval Request

1. In order to request for one time AIMLE ML Model Retrieval, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "Retrieve" custom operation (i.e., "{apiRoot}/aimless-mlmr/<apiVersion>/retrieve") as specified in clause 6.1.13.4, with the request body including the MLMdlReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code with the response body including the MLMdlRsp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.13.7.

5.2.10.2.3 AIMLES_MLModelRetrieval_Subscribe

5.2.10.2.3.1 General

This service operation is used by a service consumer to request the creation of AIMLE ML Model Retrieval Subscription at the AIMLE server.

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

- AIMLE ML Model Retrieval Subscription Creation.

5.2.10.2.3.2 AIMLE ML Model Retrieval Subscription Creation

Figure 5.2.10.2.3.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the creation of AIMLE ML Model Retrieval Subscription (see also clause 8.2 of 3GPP TS 23.482 [9]).

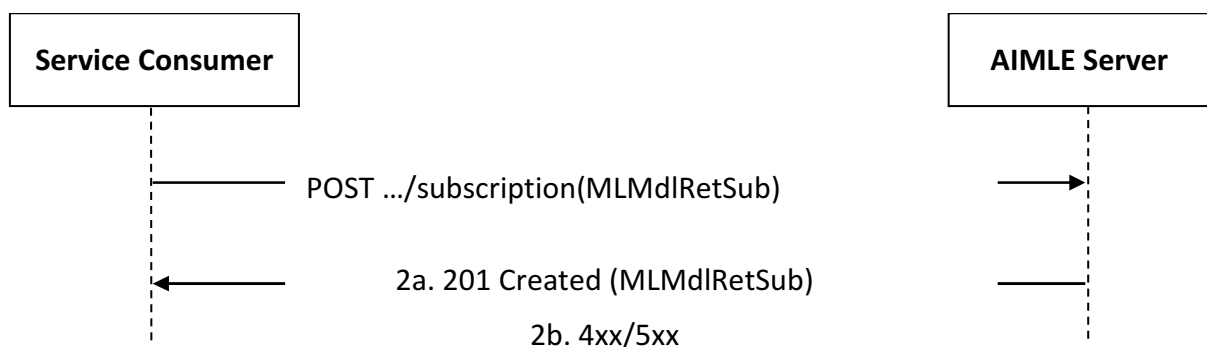


Figure 5.2.10.2.3.2-1: Procedure for AIMLE ML Model Retrieval Subscription Creation

1. In order to subscribe to AIMLE ML Model Retrieval, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE ML Model Retrieval Subscriptions" collection resource, with the request body including the MLMdlRetSub data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE ML Model Retrieval Subscription" resource within the MLMdlRetSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.13.7.

5.2.10.2.4 AIMLES_MLModelRetrieval_Update

5.2.10.2.4.1 General

This service operation is used by a service consumer to request the update of a AIMLE ML Model Retrieval Subscription at the AIMLE server.

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

- AIMLE ML Model Retrieval Subscription Update.

5.2.10.2.4.2 AIMLE ML Model Retrieval Subscription Update

Figure 5.2.10.2.4.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of AIMLE ML Model Retrieval Subscription (see also clause 8.2 of 3GPP TS 23.482 [9]).

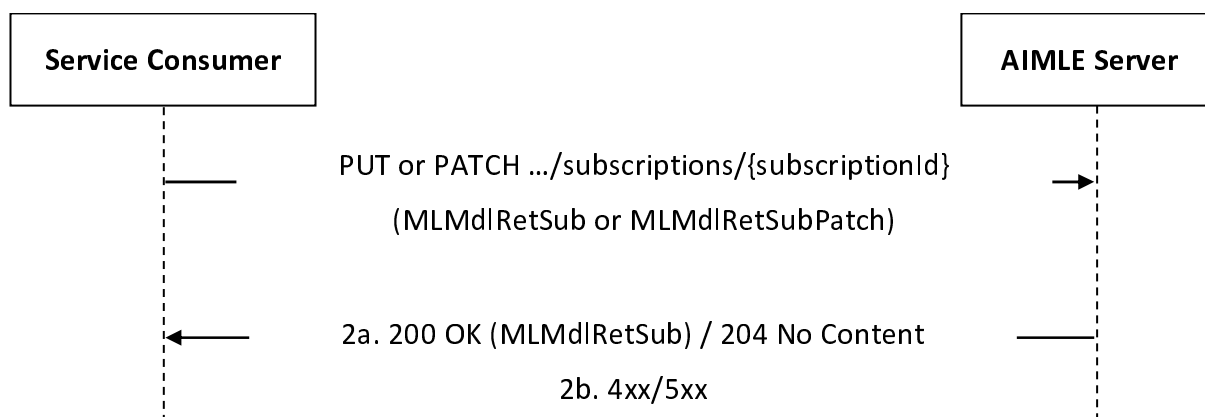


Figure 5.2.10.2.4.2-1: Procedure for AIMLE ML Model Retrieval Subscription Update

1. In order to request the update of an existing AIMLE ML Model Retrieval Subscription, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server, targeting the URI of the corresponding "Individual AIMLE ML Model Retrieval Subscription" resource, with the request body including either:
 - the updated representation of the resource within the MLMdlRetSub data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the MLMdlRetSubPatch 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 AIMLE Server shall update the targeted "AIMLE ML Model Retrieval Subscription" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE ML Model Retrieval Subscription" resource within the MLMdlRetSub data structure; or

- an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.13.7.

5.2.10.2.5 AIMLES_MLModelRetrieval_Unsubscribe

5.2.10.2.5.1 General

This service operation is used by a service consumer to request the deletion of AIMLE ML Model Retrieval Subscription at the AIMLE Server.

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

- AIMLE ML Model Retrieval Subscription Deletion.

5.2.10.2.5.2 AIMLE ML Model Retrieval Subscription Deletion

Figure 5.2.10.2.5.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to delete an existing AIMLE ML Model Retrieval Subscription (see also clause 8.2 of 3GPP TS 23.482 [9]).

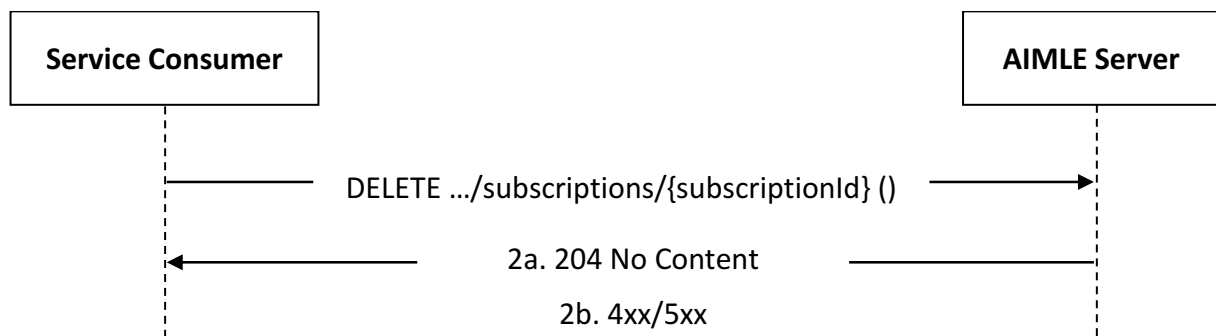


Figure 5.2.10.2.5.2-1: Procedure for AIMLE ML Model Retrieval Subscription Deletion

1. In order to request the deletion of an existing AIMLE ML Model Retrieval Subscription, the service consumer shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding "Individual AIMLE ML Model Retrieval Subscription" resource.

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

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

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.13.7.

5.2.10.2.6 AIMLES_MLModelRetrieval_Notify

5.2.10.2.6.1 General

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

- AIMLE ML Model Retrieval report(s).

The following procedures are supported by the "ML Model Retrieval_Notify" service operation:

- AIMLE ML Model Retrieval Notification.

5.2.10.2.6.2 AIMLE ML Model Retrieval Notification

Figure 5.2.10.2.6.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE ML Model Retrieval report(s) (see also clause 8.2 of 3GPP TS 23.482 [9]).

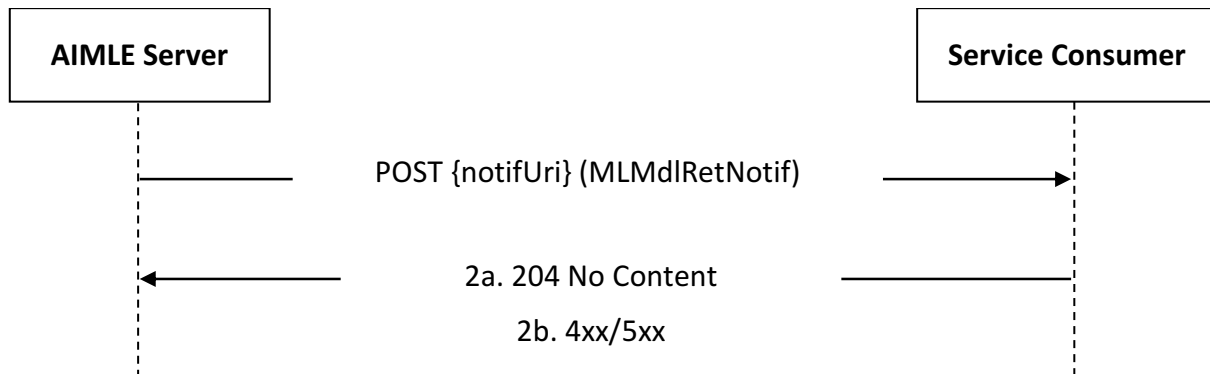


Figure 5.2.10.2.6.2-1: Procedure for AIMLE ML Model Retrieval Notification

1. In order to notify a previously subscribed service consumer on AIMLE ML Model Retrieval report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE ML Model Retrieval Subscription using the procedures defined in clauses 5.2.10.2.2, and the request body including the MLMdlRetNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.13.7.

5.2.11 AIMLES_TLModelSelectionAssistance Service

5.2.11.1 Service Description

The AIMLES_TLModelSelectionAssistance Service, exposed by the AIMLE Server, enables a service consumer to:

- request AIMLE Server to provide pre-trained ML models for a target ML task by using filter criteria.

5.2.11.2 Service Operations

5.2.11.2.1 Introduction

The service operations defined for the AIMLES_TLModelSelectionAssistance API are shown in the table 5.2.11.2.1-1.

Table 5.2.11.2.1-1: Service operations of the AIMLES_TLModelSelectionAssistance API

Service Operation Name	Description	Initiated by
AIMLES_TLModelSelectionAssistance_Request	This service operation enables a service consumer to perform an ML model training by using pre-trained models.	e.g., VAL Server

5.2.11.2.2 AIMLES_TLModelSelectionAssistance_Request

5.2.11.2.2.1 General

This service operation is used by a service consumer to perform AIMLE TL Model Selection Assistance Request at the AIMLE Server.

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

- AIMLE TL Model Selection Assistance Request.

5.2.11.2.2.2 AIMLE TL Model Selection Assistance Request

Figure 5.2.11.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE TL Model Selection Assistance (see also clause 8.16 of 3GPP TS 23.482 [9]).

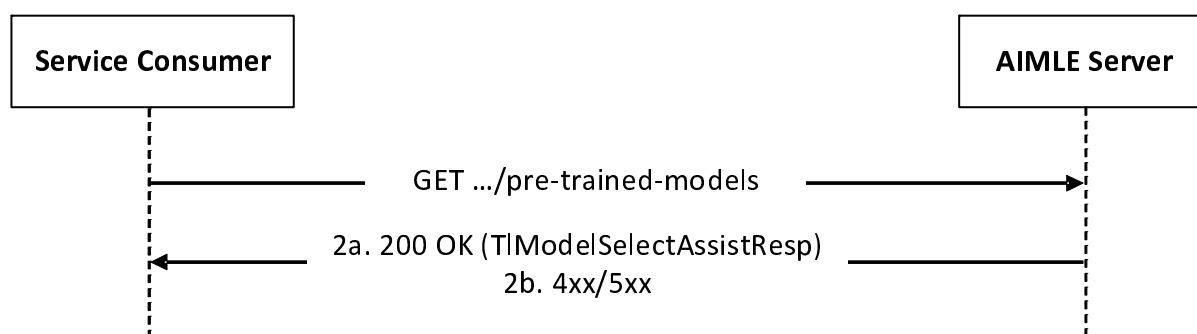


Figure 5.2.11.2.2.2-1: Procedure for AIMLE TL Model Selection Assistance Request

1. In order to request to AIMLE ML model selection assistance, the service consumer shall send an HTTP GET request to the AIMLE Server targeting the URI of the "AIMLE TL Model Selection Assistance" resource.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code with the response body containing the TlModelSelectAssistResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.1.10.7.

5.2.12 AIMLES_SplitOpNodeRegistration

5.2.12.1 Service Description

The AIMLES_SplitOpNodeRegistration service exposed by the AIMLE Server enables a service consumer to:

- request, update, and deregister for split AI/ML operation node registration.

5.2.12.2 Service Operations

5.2.12.2.1 Introduction

The service operation defined for AIMLES_SplitOpNodeRegistration API is shown in Table 5.2.12.2.1-1.

Table 5.2.12.2.1-1: AIMLES_SplitOpNodeRegistration Service Operations

Service Operation Name	Description	Initiated by
AIMLES_SplitOpNodeRegistration_Request	This service operation is used by a service consumer to request for one time split AI/ML node registration.	e.g., VAL server
AIMLES_SplitOpNodeRegistration_Update	The service operation is used by a service consumer to update split AI/ML node registration.	e.g., VAL server
AIMLES_SplitOpNodeRegistration_Deregister	The service operation is used by a service consumer to deregister split AI/ML node registration.	e.g. VAL server

5.2.12.2.2 AIMLES_SplitOpNodeRegistration_Request

5.2.12.2.2.1 General

This service operation is used by a service consumer to request AIMLE split operation node registration with the AIMLE server.

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

- AIMLE Split Operation Node Registration.

5.2.12.2.2.2 AIMLE split operation node registration request

Figure 5.2.12.2.2.2-1 depicts a scenario where a VAL server sends a request to the AIMLE Server for AIMLE Split Operation Node Registration Request (see also clause 8.14.2.4.2 of 3GPP TS 23.482 [9]).

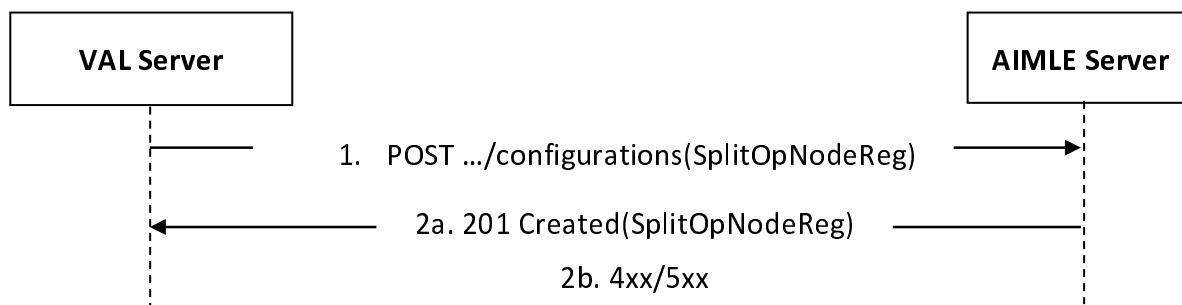


Figure 5.2.12.2.2-1: Procedure for AIMLE Split Operation Node Registration Request

1. In order to register for AIMLE Split Operation Node Registration, the VAL server shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation, with the request body including the SplitOpNodeReg data structure.

- 2a. Upon reception of the HTTP POST registration request, the AIMLE server shall perform an authentication and authorization check to determine if the service consumer is permitted to register at the AIMLE server and participate in AIML operations. If the VAL server is authorized to register at the AIMLE server, the AIMLE server shall:
- create a new "Individual AIMLE split operation node registration" resource with the received registration information; and
 - respond with an HTTP "201 Created" status code with the response body including the SplitOpNodeReg data structure and an HTTP "Location" header field containing the URI of the created resource.
- 2b. If the VAL server is not authorized to register at the AIMLE server, the AIMLE server shall take proper error handling actions, as specified in clause 6.1.14.7, and respond with an appropriate error status code.

5.2.12.2.3 AIMLES_SplitOpNodeRegistration_Update

5.2.12.2.3.1 General

The Aimles_SplitOpNodeRegistration_Update service operation is used by the VAL server to update its registration information at the AIMLE server.

5.2.12.2.3.2 AIMLE split operation node registration update

Figure 5.2.12.2.3.2-1 depicts a scenario where a VAL server sends a request to the AIMLE Server for AIMLE Split Operation Node Registration Update (see also clause 8.14.2.4.3 of 3GPP TS 23.482 [9]).

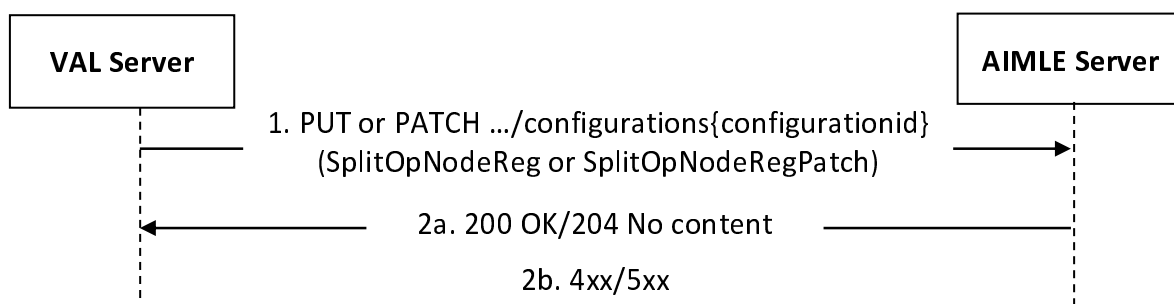


Figure 5.2.12.2.3.2-1: Procedure for AIMLE Split Operation Node Registration Update

- In order to update an Individual Registered AIMLE Split Operation Node Register, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server targeting the URI of the corresponding resource (i.e., "Individual Registered AIMLE Split Operation Node Register Configuration"), with the request body including either:
 - the updated representation of the resource within the SplitOpNodeReg data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the SplitOpNodeRegPatch data structure, in case the HTTP PATCH method is used.
- Upon reception of the HTTP PUT/PATCH request, the AIMLE server shall perform an authentication and authorization check to determine if the VAL server is permitted to update the targeted registration. If the VAL server is authorized to update the targeted registration at the AIMLE server, the AIMLE server shall:
 - accordingly update the targeted "Individual AIMLE split operation node registration" resource; and
 - respond with either:
 - an HTTP "204 No Content" status code; or
 - an HTTP "200 OK" status code with the response body including a representation of the updated resource within the SplitOpNodeReg data structure.

- 2b. If the VAL server is not authorized to update the targeted registration at the AIMLE server, the AIMLE server shall take proper error handling actions, as specified in clause 6.1.14.7, and respond with an appropriate error status code.

5.2.12.2.4 AIMLES_SplitOpNodeRegistration_Deregister service operation

5.2.12.2.4.1 General

The AIMLES_SplitOpNodeRegistration_Deregister service operation is used by the VAL server to deregister itself from the Split AI/ML operation.

5.2.12.2.4.2 AIML split operation node deregistration

Figure 5.2.12.2.4.2-1 depicts a scenario where a VAL server sends a request to the AIMLE Server for AIMLE split operation node deregistration (see also clause 8.14.2.4.4 of 3GPP TS 23.482 [9]).

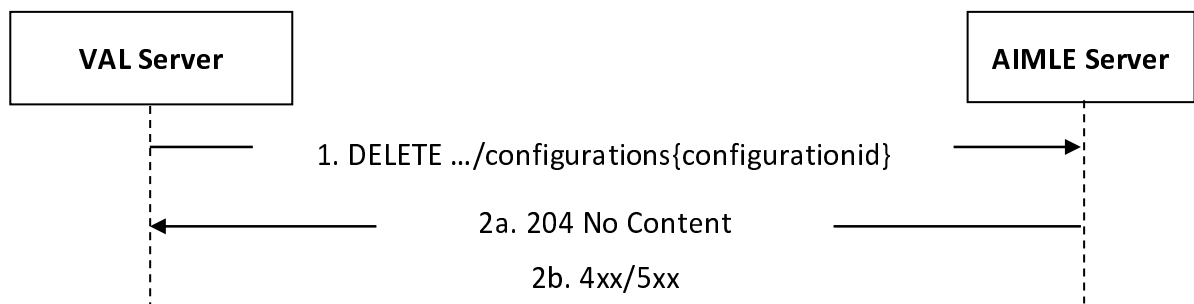


Figure 5.2.12.2.4.2-1: Procedure for AIMLE Split Operation Node Deregistration

1. To deregister itself at the AIMLE server, the VAL server shall send an HTTP DELETE request to the AIMLE server targeting the "Individual AIMLE split operation registration" resource, as specified in clause 6.1.12.3.3.2.
- 2a. Upon reception of the HTTP DELETE request, the AIMLE server shall perform an authentication and authorization check to determine if the VAL server is permitted to deregister at the AIMLE server. If the VAL server is authorized to deregister at the AIMLE server, the AIMLE server shall:
 - a) delete the corresponding "Individual AIMLE Split Operation Node registration" resource; and
 - b) respond with an HTTP "204 Not Content" status code.
- 2b. If the VAL server is not authorized to deregister at the AIMLE server, the AIMLE server shall take proper error handling actions, as specified in clause 6.1.14.7, and respond with an appropriate error status code.

5.2.13 AIMLES_MLModelUpdate Service

5.2.13.1 Service Description

The AIMLES_MLModelUpdate service exposed by the AIMLE Server enables a service consumer to:

- request ML model update to the AIMLE Server.

5.2.13.2 Service Operations

5.2.13.2.1 Introduction

The service operations defined for the AIMLES_MLModelUpdate API are shown in the table 5.2.13.2.1-1.

Table 5.2.13.2.1-1: Service operations of the AIMLES_MLModelUpdate API

Service Operation Name	Description	Initiated by
AIMLES_MLModelUpdate_Request	This service operation is used by a service consumer to request the ML model update.	e.g. VAL Server, ADAE Server

5.2.13.2.2 AIMLES_MLModelUpdate_Request

5.2.13.2.2.1 General

This service operation is used by a service consumer to request ML model update at the AIMLE server.

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

- ML Model Update Request.

5.2.13.2.2.2 ML Model Update Request

Figure 5.2.13.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request ML model update (see also clause 8.21 of 3GPP TS 23.482 [9]).

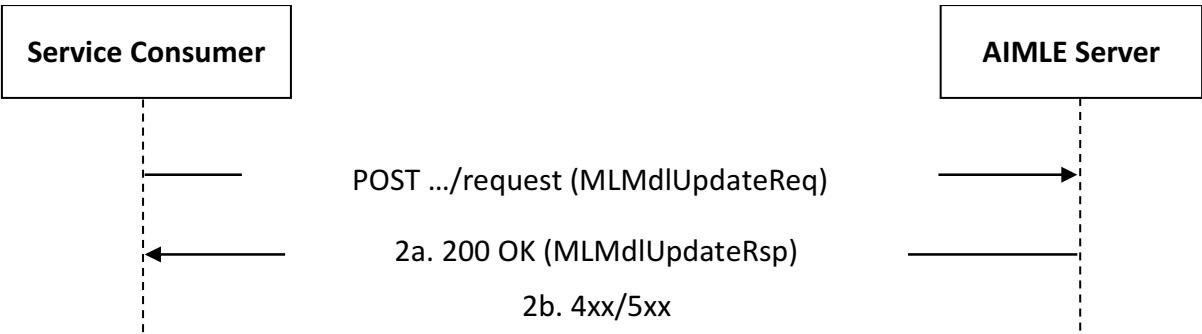


Figure 5.2.13.2.2.2-1: Procedure for ML Model Update Request

1. In order to request ML model update request, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the corresponding custom operation (i.e., "Request"), with the request body including the MLMdlUpdateReq data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code including the MLMdlUpdateRsp data type to indicate that the request is successfully received and processed.
- 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 6.1.15.7.

5.2.14 AIMLES_MLModelTraining Service

5.2.14.1 Service Description

The AIMLES_MLModelTraining Service, exposed by the AIMLE Server, enables a service consumer to:

- request the AIMLE server for the ML model training.

5.2.14.2 Service Operations

5.2.14.2.1 Introduction

The service operations defined for the AIMLES_MLModelTraining API are shown in the Table 5.2.14.2.1-1.

Table 5.2.14.2.1-1: Service operations of the AIMLES_MLModelTraining API

Service Operation Name	Description	Initiated by
AIMLES_MLModelTraining_Request	This service operation enables a service consumer to request AIMLE server for ML model training.	e.g., VAL Server
AIMLES_MLModelTraining_Notify	This service operation enables a service consumer to receive ML model training notifications.	e.g., VAL Server

5.2.14.2.2 AIMLES_MLModelTraining_Request

5.2.14.2.2.1 General

This service operation is used by a service consumer to perform AIMLE ML Model Training Request at the AIMLE Server.

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

- AIMLE ML Model Training Request.

5.2.14.2.2.2 AIMLE ML Model Training Request

Figure 5.2.14.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE ML Model Training (see also clause 8.3 of 3GPP TS 23.482 [9]).

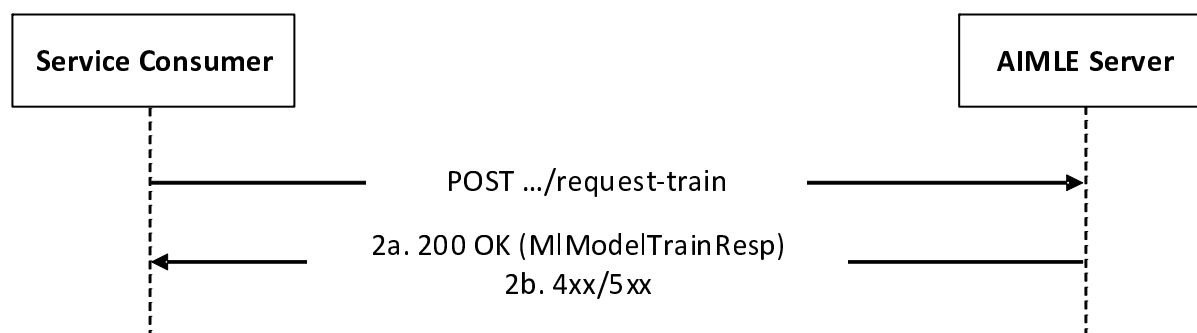


Figure 5.2.14.2.2-1: Procedure for AIMLE ML Model Training Request

1. In order to request to AIMLE ML model training, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the custom operation "RequestTrain" in "/request-train".
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "200 OK" status code with the response body containing the "MlModelTrainResp" data structure.

- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.1.8.7.

5.2.14.2.3 AIMLES_MLModelTraining_Notify

5.2.14.2.3.1 General

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

- AIMLE ML Model Training notification.

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

- AIMLE ML Model Training Notification.

5.2.14.2.3.2 AIMLE ML Model Training Notification

Figure 5.2.14.2.3.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE ML Model Training report(s) (see also clause 8.15 of 3GPP TS 23.482 [9]).

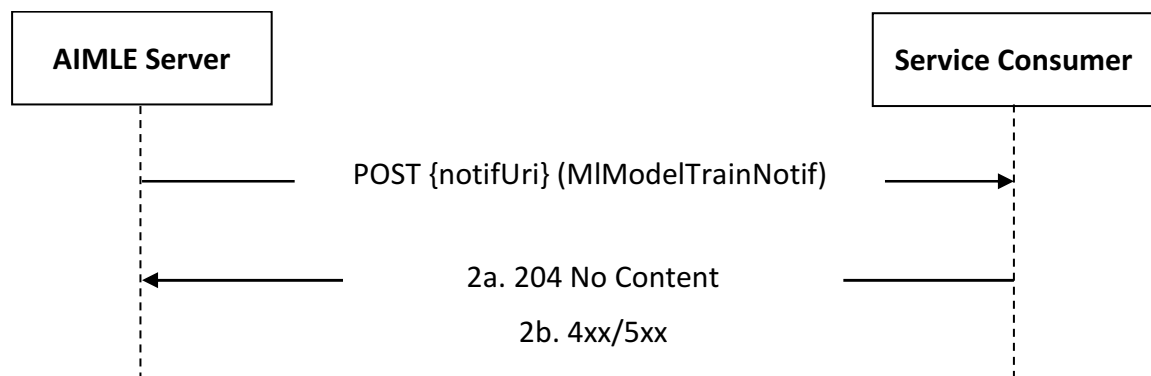


Figure 5.2.14.2.3.2-1: Procedure for AIMLE ML Model Training Notification

1. In order to notify a previously subscribed service consumer on AIMLE ML Model Training report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE ML Model Training Request using the procedures defined in clauses 5.2.14.2.3.2, and the request body including the MlModelTrainNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.8.7.

5.2.15 AIMLES_SplitOpEvent Service

5.2.15.1 Service Description

The AIMLES_SplitOpEvent Service, exposed by the AIMLE Server, enables a service consumer to:

- subscribe, unsubscribe, update subscription and receive notifications about split AI/ML operation events.

5.2.15.2 Service Operations

5.2.15.2.1 Introduction

The service operations defined for the AIMLES_SplitOpEvent API are shown in the Table 5.2.15.2.1-1.

Table 5.2.14.2.1-1: Service operations of the AIMLES_SplitOpEvent API

Service Operation Name	Description	Initiated by
AIMLES_SplitOpEvent_Subscribe	This service operation enables a service consumer to create a AIMLE split operation event subscription.	e.g., VAL Server
AIMLES_SplitOpEvent_Notify	This service operation enables a service consumer to receive AIMLE split operation event notifications.	e.g., VAL Server
AIMLES_SplitOpEvent_Update	This service operation enables a service consumer to update an existing AIMLE split operation event Subscription.	e.g., AIMLE Client, VAL Server
AIMLES_SplitOpEvent_Unsubscribe	This service operation enables a service consumer to delete an existing AIMLE split operation event Subscription.	e.g., AIMLE Client, VAL Server

5.2.15.2.2 AIMLES_SplitOpEvent_Subscribe

5.2.15.2.2.1 General

This service operation is used by a service consumer to perform AIMLE Split Operation Event Subscription at the AIMLE Server.

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

- AIMLE Split Operation Event Subscription Creation.

5.2.15.2.2.2 AIMLE Split Operation Event Subscription Creation

Figure 5.2.15.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request AIMLE Split Operation Event Subscription Creation (see also clause 8.14 of 3GPP TS 23.482 [9]).

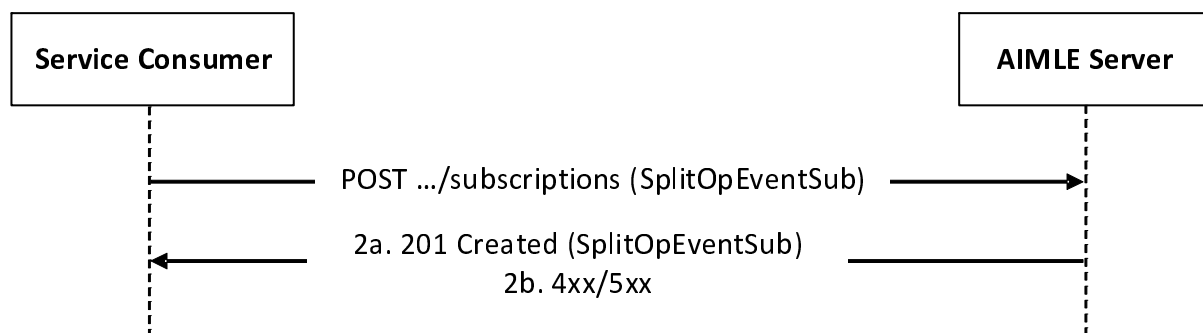


Figure 5.2.15.2.2.2-1: Procedure for AIMLE Split Operation Event Subscription Creation

1. In order to subscribe to AIMLE Split Operation Event Notification, the service consumer shall send an HTTP POST request to the AIMLE Server targeting the URI of the "AIMLE Split Operation Event Subscriptions" collection resource, with the request body including the SplitOpEventSub data structure.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual AIMLE Split Operation Event Subscription" resource within the SplitOpEventSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.12.7.

5.2.15.2.3 AIMLES_SplitOpEvent_Notify

5.2.15.2.3.1 General

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

- AIMLE Split Operation Event report(s).

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

- AIMLE Split Operation Event Notification.

5.2.15.2.3.2 AIMLE Split Operation Event Notification

Figure 5.2.15.2.3.2-1 depicts a scenario where the AIMLE Server sends a request to notify a previously subscribed service consumer on AIMLE Split Operation Event report(s) (see also clause 8.14 of 3GPP TS 23.482 [9]).

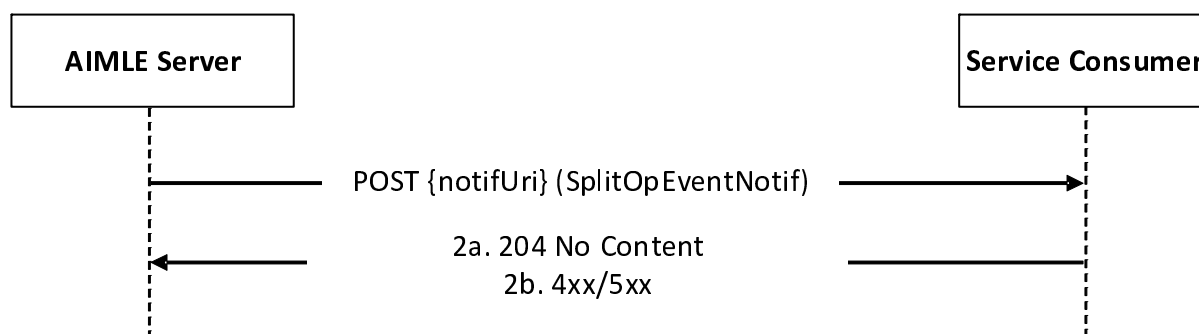


Figure 5.2.15.2.3.2-1: Procedure for AIMLE Split Operation Event Notification

1. In order to notify a previously subscribed service consumer on AIMLE Split Operation Event report(s), the AIMLE Server shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding AIMLE Split Operation Event Subscription using the procedures defined in clauses 5.2.15.2.2.2, and the request body including the SplitOpEventNotif data structure.
- 2a. Upon success, the service consumer shall respond to the AIMLE Server with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.1.12.7.

5.2.15.2.4 AIMLES_SplitOpEvent_Update

5.2.15.2.4.1 General

This service operation is used by a service consumer to request the update of a AIMLE Split Operation Event Subscription at the AIMLE server.

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

- AIMLE Split Operation Event Subscription Update.

5.2.15.2.4.2 AIMLE Split Operation Event Subscription Update

Figure 5.2.15.2.4.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to request the update of AIMLE Split Operation Event Subscription (see also clause 8.14 of 3GPP TS 23.482 [9]).

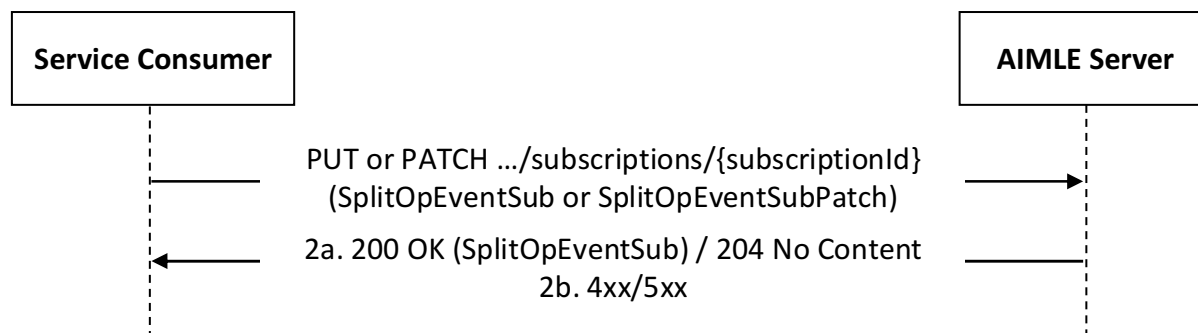


Figure 5.2.15.2.4.2-1: Procedure for AIMLE Split Operation Event Subscription Update

1. In order to request the update of an existing AIMLE Split Operation Event subscription, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Server, targeting the URI of the corresponding "Individual AIMLE Split Operation Event Subscription" resource, with the request body including either:
 - the updated representation of the resource within the SplitOpEventSub data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the SplitOpEventSubPatch data structure, in case the HTTP PATCH method is used.
- 2a. Upon success, the AIMLE Server shall update the targeted "AIMLE Split Operation Event Subscriptions" resource accordingly and respond with either:
 - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual AIMLE Split Operation Event Subscription" resource within the SplitOpEventSub data structure; or
 - an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.1.12.7.

5.2.15.2.5 AIMLES_SplitOpEvent_Unsubscribe

5.2.15.2.5.1 General

This service operation is used by a service consumer to request the deletion of AIMLE Split Operation Event Subscription at the AIMLE Server.

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

- AIMLE Split Operation Event Subscription Deletion.

5.2.15.2.5.2 AIMLE Split Operation Event Subscription Deletion

Figure 5.2.15.2.5.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Server to delete an existing AIML Split Operation Event Subscription (see also clause 8.14 of 3GPP TS 23.482 [9]).

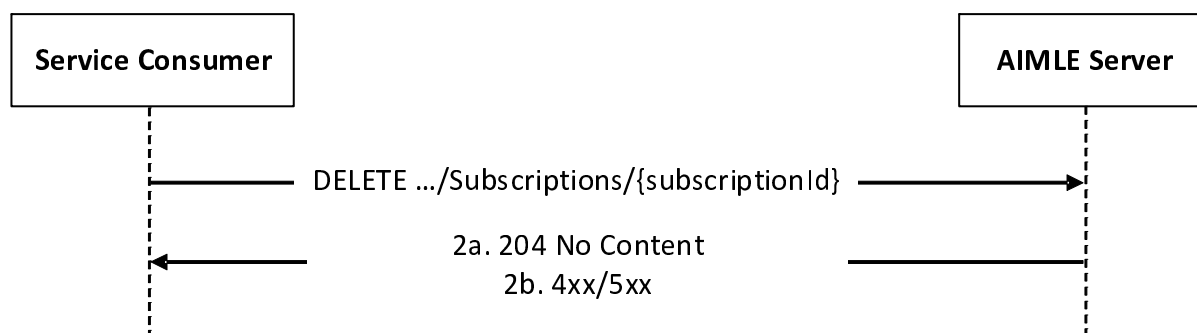


Figure 5.2.15.2.5.2-1: Procedure for AIMLE Split Operation Event Subscription Deletion

1. In order to request the deletion of an existing AIMLE Split Operation Event subscription, the service consumer shall send an HTTP DELETE request to the AIMLE Server targeting the URI of the corresponding "Individual AIMLE Split Operation Event Subscription" resource.
- 2a. Upon success, the AIMLE Server shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.1.12.7.

5.3 Services offered by the AIMLE Repository

5.3.1 MLR_MLModelManagement Service

5.3.1.1 Service Description

The MLR_MLModelManagement service exposed by the AIMLE Repository enables an NF service consumer to:

- request to create/update/delete an ML Model(s) Storage.

5.3.1.2 Service Operations

5.3.1.2.1 Introduction

The service operations defined for the MLR_MLModelManagement service are shown in table 5.3.1.2.1-1.

Table 5.3.1.2.1-1: MLR_MLModelManagement Service Operations

Service Operation Name	Description	Initiated by
MLR_MLModelManagement_Store	This service operation enables the NF service consumer to request to create/update/delete an ML Model(s) Storage.	e.g., AIMLE Server

5.3.1.2.2 MLR_MLModelManagement_Store

5.3.1.2.2.1 General

This service operation is used by a service consumer to request to create/update/delete an ML Model(s) Storage at the AIMLE Repository.

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

- ML Models Storage Creation.
- ML Models Storage Update.
- ML Models Storage Deletion.

5.3.1.2.2.2 ML Models Storage Creation

Figure 5.3.1.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to request the creation of an ML Model(s) Storage (see also clause 8.11 of 3GPP TS 23.482 [9]).

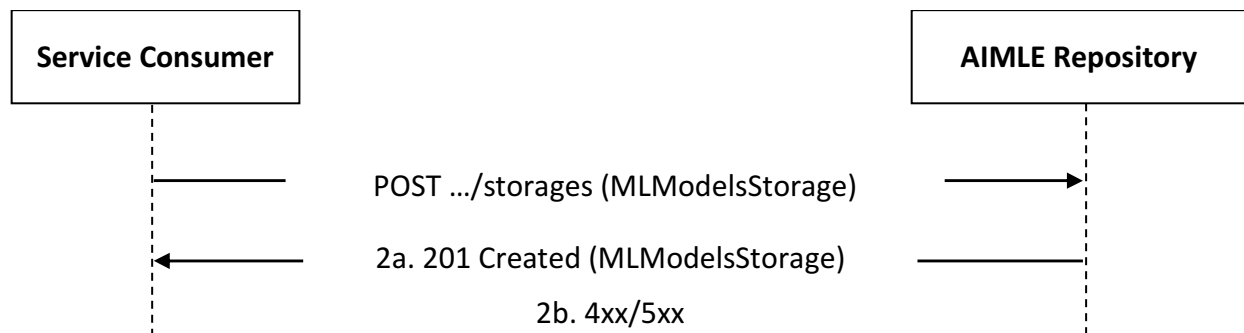


Figure 5.3.1.2.2.2-1: Procedure for ML Models Storage Creation

1. In order to create or reserve a new ML Model(s) Storage, the service consumer shall send an HTTP POST request to the AIMLE Repository targeting the URI of the "ML Models Storages" collection resource, with the request body including the MLModelsStorage data structure.
- 2a. Upon success, the AIMLE Repository shall respond with an HTTP "201 Created" status code, with the response body containing a representation of the created "Individual ML Models Storage" resource within the MLModelsStorage data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.2.1.7.

5.3.1.2.2.3 ML Models Storage Update

Figure 5.3.1.2.2.3-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to request the update of an existing ML Model(s) Storage (see also clause 8.11 of 3GPP TS 23.482 [9]).

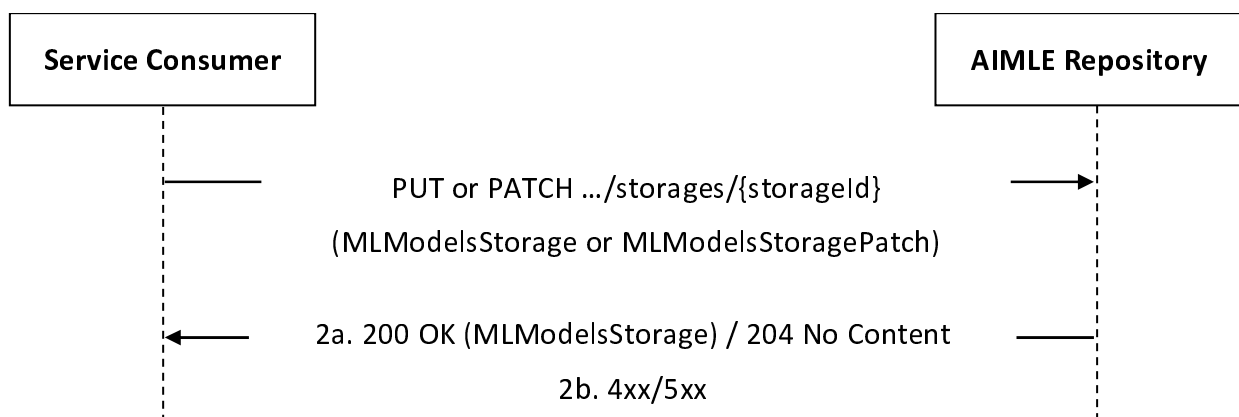


Figure 5.3.1.2.2.3-1: Procedure for ML Models Storage Update

1. In order to update an existing ML Model(s) Storage, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Repository, targeting the URI of the corresponding "Individual ML Models Storage" resource, with the request body including either:
 - the updated representation of the resource within the MLModelsStorage data structure, in case the HTTP PUT method is used; or
 - the requested modifications to the resource within the MLModelsStoragePatch 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 AIMLE Repository shall update the targeted "Individual ML Models Storage" resource accordingly and respond with either:

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

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

5.3.1.2.2.4 ML Models Storage Deletion

Figure 5.3.1.2.2.4-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to request the deletion of an existing ML Model(s) Storage (see also clause 8.11 of 3GPP TS 23.482 [9]).

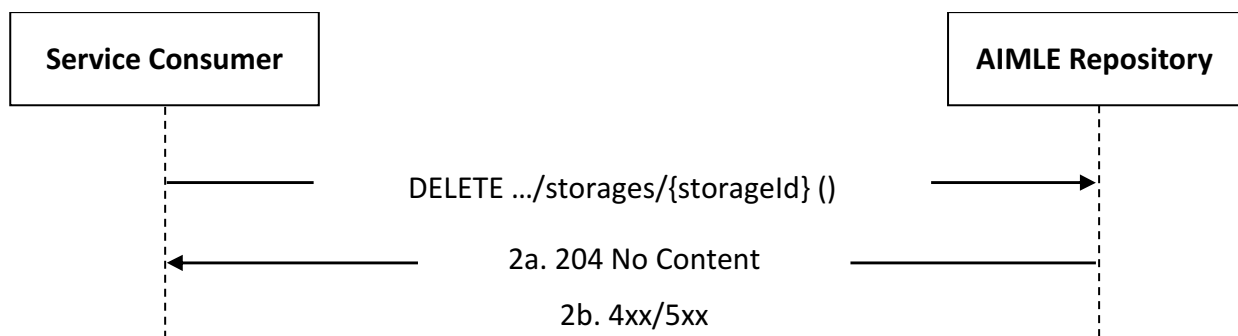


Figure 5.3.1.2.2.4-1: Procedure for ML Models Storage Deletion

1. In order to request the deletion of an existing ML Models Storage, the service consumer shall send an HTTP DELETE request to the AIMLE Repository targeting the corresponding "Individual ML Models Storage" 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 AIMLE Repository shall respond with an HTTP "204 No Content" status code.

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

5.3.2 MLR_ModelInformationDiscovery Service

5.3.2.1 Service Description

The MLR_ModelInformationDiscovery service exposed by the MLR enables a service consumer to:

- request MLR the model information discovery.

5.3.2.2 Service Operations

5.3.2.2.1 Introduction

The service operation defined for MLR_ModelInformationDiscovery API is shown in the table 5.3.2.2.1-1.

Table 5.3.2.2.1-1: MLR_ModelInformationDiscovery Service Operations

Service Operation Name	Description	Initiated by
MLR_MLModelInformationDiscovery_Request	This service operation is used by a service consumer to request the model information discovery.	AIMLE Server

5.3.2.2.2 MLR_MLModelInformationDiscovery_Request

5.3.2.2.2.1 General

This service operation is used by a service consumer to request the discovery of the ML model.

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

- ML model discovery request.

5.3.2.2.2.2 ML model discovery request

Figure 5.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the MLR to request the discovery of the ML model(s) (see also clause 8.11 of 3GPP TS 23.482 [9]).

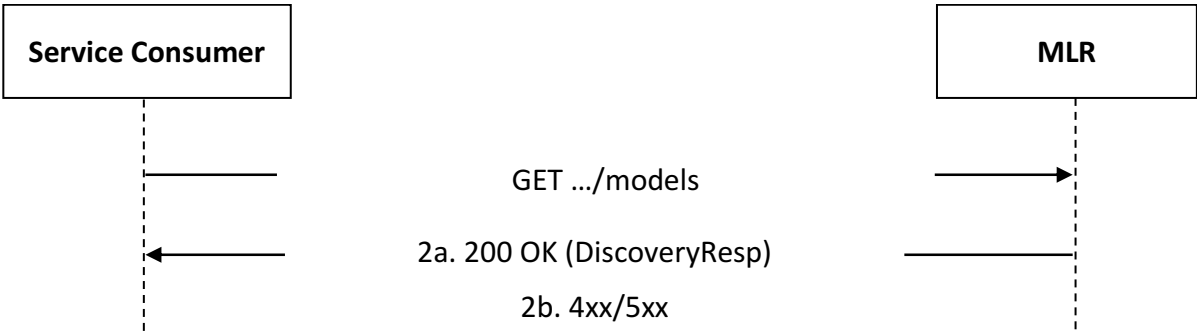


Figure 5.3.2.2.2-1: Procedure for ML model discovery request

1. In order to discover the ML model(s), the service consumer shall send an HTTP GET request to the MLR targeting the URI of the "ML Models" resource.
- 2a. Upon success, the MLR shall respond with an HTTP "200 OK" status code with the response body containing the DiscoveryResp data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.2.7.

5.3.3 MLR_FLEvents Service

5.3.3.1 Service Description

The MLR_FLEvents Service, exposed by the AIMLE Server or the VAL Server via the AIMLE Server, enables a service consumer to:

- create/update/delete an MLR FL Events Subscription; and
- receive MLR FL Events Notifications.

5.3.3.2 Service Operations

5.3.3.2.1 Introduction

The service operations defined for the MLR_FLEvents API are shown in the table 5.3.3.2.1-1.

Table 5.3.3.2.1-1: Service operations of the MLR_FLEvents API

Service Operation Name	Description	Initiated by
MLR_FLEvents_Subscribe	This service operation enables a service consumer to create an FL related event subscription.	e.g., AIMLE Server
MLR_FLEvents_Update	This service operation enables a service consumer to update an existing FL related event subscription.	e.g., AIMLE Server
MLR_FLEvents_Unsubscribe	This service operation enables a service consumer to delete an existing FL related event subscription.	e.g., AIMLE Server
MLR_FLEvents_Notify	This service operation enables a service consumer to receive FL related events notifications.	ML Repository

5.3.3.2.2 MLR_FLEvents_Subscribe

5.3.3.2.2.1 General

This service operation is used by an e.g., AIMLE Server to request the creation of an MLR FL Events Subscription at the ML Repository.

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

- MLR FL Events Subscription Creation.

This service operation is used by the analytics consumer e.g., AIMLE Server for MLR FL Events Subscription to the ML Repository.

5.3.3.2.2.2 MLR FL Events Subscription Creation

Figure 5.3.3.2.2.2-1 depicts a scenario where a service consumer sends a request to the ML Repository to request the creation of MLR FL Events Subscription (see also clause 8.5 of 3GPP TS 23.482 [9]).

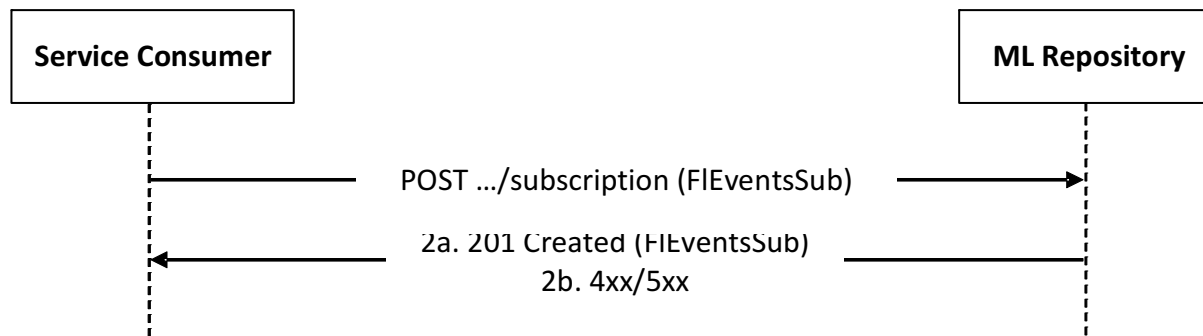


Figure 5.3.3.2.2-1: Procedure for MLR FL Events Subscription Creation

1. In order to subscribe to MLR FL events, the service consumer shall send an HTTP POST request to the ML Repository targeting the URI of the "MLR FL Events Subscriptions" collection resource, with the request body including the FLEvtsSub data structure.
- 2a. Upon success, the ML Repository shall respond with an HTTP "201 Created" status code with the response body containing a representation of the created "Individual MLR FL Events Subscription" resource within the FLEvtsSub data structure, and an HTTP "Location" header field containing the URI of the created resource.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.2.3.7.

5.3.3.2.3 MLR_FLEvents_Update

5.3.3.2.3.1 General

This service operation is used by an e.g., the AIMLE Server to request the update of an MLR FL Events Subscription at the ML Repository.

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

- MLR FL Events Subscription Update.

This service operation is used by the analytics consumer for MLR FL Events Subscription Update to the ML Repository.

5.3.3.2.3.2 MLR FL Events Subscription Update

Figure 5.3.3.2.3.2-1 depicts a scenario where a service consumer sends a request to the ML Repository to request the update of ML FL Events Subscription (see also clause 8.5 of 3GPP TS 23.482 [9]).

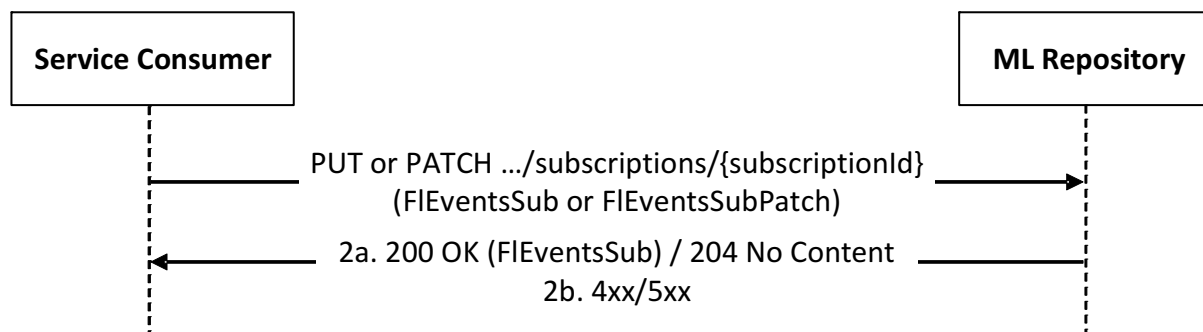


Figure 5.3.3.2.3.2-1: Procedure for MLR FL Events Subscription Update

1. In order to request the update of an existing MLR FL events subscription, the service consumer shall send an HTTP PUT/PATCH request to the ML Repository, targeting the URI of the corresponding "Individual MLR FL Events Subscriptions" resource, with the request body including either:

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

2a. Upon success, the ML Repository shall update the targeted "MLR FL Events Subscriptions" resource accordingly and respond with either:

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual MLR FL Events Subscriptions" resource within the FLEvtsSub data structure; or
- an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.2.3.7.

5.3.3.2.4 MLR_FLEvents_Unsubscribe

5.3.3.2.4.1 General

This service operation is used by an e.g., the AIMLE Server to request the deletion of MLR FL Events Subscription at the ML Repository.

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

- MLR FL Events Subscription Deletion.

5.3.3.2.4.2 MLR FL Events Subscription Deletion

Figure 5.3.3.2.4.2-1 depicts a scenario where a service consumer sends a request to the ML Repository to delete an existing MLR FL Events Subscription (see also clause 8.5 of 3GPP TS 23.482 [9]).

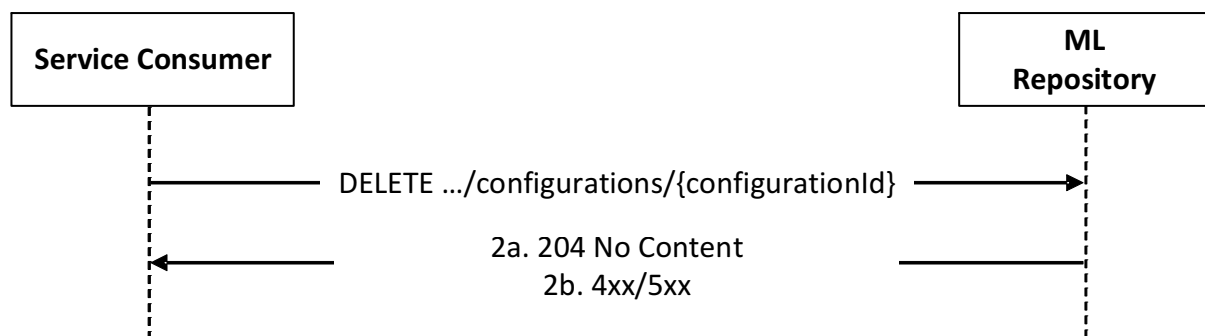


Figure 5.3.3.2.4.2-1: Procedure for MLR FL Events Subscription Deletion

1. In order to request the deletion of an existing MLR FL events subscription, the service consumer shall send an HTTP DELETE request to the ML Repository targeting the URI of the corresponding "Individual MLR FL Events Subscription" resource.
- 2a. Upon success, the ML Repository shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.2.3.7.

5.3.3.2.5 MLR_FLEvents_Notify

5.3.3.2.5.1 General

This service operation is used by an ML Repository to notify a previously subscribed service consumer on:

- MLR FL Events report(s).

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

- MLR FL Events Notification.

5.3.3.2.5.2 MLR FL Events Notification

Figure 5.3.3.2.5.2-1 depicts a scenario where the ML Repository sends a request to notify a previously subscribed service consumer on MLR FL Events report(s) (see also clause 8.5 of 3GPP TS 23.482 [9]).

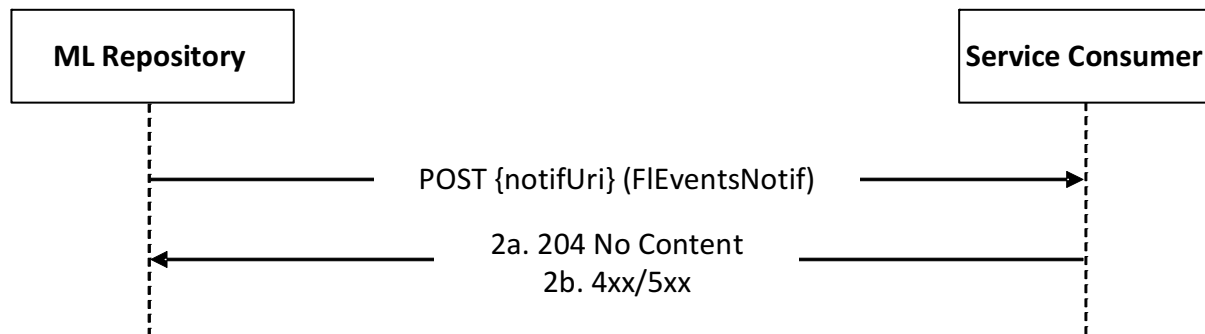


Figure 5.3.3.2.5.2-1: Procedure for MLR FL Events Notification

1. In order to notify a previously subscribed service consumer on MLR FL Events report(s), the MLR repository shall send an HTTP POST request to the service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the service consumer during the creation of the corresponding MLR FL Events Subscription using the procedures defined in clauses 5.3.3.2.2.2, and the request body including the FIEvtsNotif data structure.
- 2a. Upon success, the service consumer shall respond to the ML Repository with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.2.3.7.

5.3.4 MLR_FLMember Service

5.3.4.1 Service Description

The MLR_FLMember Service, exposed by the AIMLE Repository, enables a service consumer to:

- register/update/deregister/retrieve FL members consisting of AIMLE Clients.

5.3.4.2 Service Operations

5.3.4.2.1 Introduction

The service operations defined for MLR_FLMember API for are shown in the table 5.3.4.2.1-1.

Table 5.3.4.2.1-1: Operations for MLR_FLMember API

Service operation name	Description	Initiated by
MLR_FLMember_Register	This service operation is used to register an Individual FL Member.	e.g., AIMLE Server
MLR_FLMember_Query	This service operation is used to query for an Individual registered FL Member.	e.g., AIMLE Server
MLR_FLMember_Update	This service operation is used to update registration of an Individual registered FL Member.	e.g., AIMLE Server
MLR_FLMember_Deregister	This service operation is used to deregister an Individual registered FL Member.	e.g., AIMLE Server

5.3.4.2.2 MLR_FLMember_Register

5.3.4.2.2.1 General

This service operation is used by a service consumer to request the AIMLE Repository to register an Individual FL Member.

The following procedure is supported by the "MLR_FLMember_Register" service operation:

- MLR FL Member Register.

5.3.4.2.2.2 MLR FL Member Register

Figure 5.3.4.2.2.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to register an Individual FL Member. (see clause 8.4 of 3GPP TS 23.482 [9]).

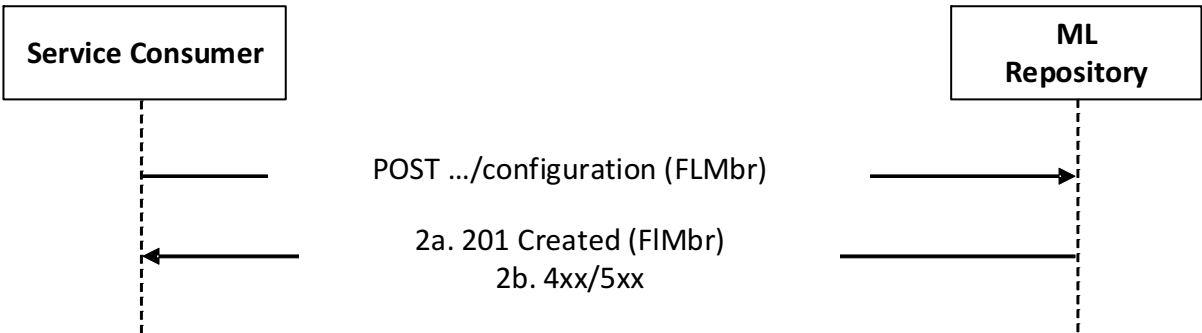


Figure 5.3.4.2.2.2-1: Procedure for MLR FL Member Register

1. In order to register an Individual FL Member, the service consumer shall send an HTTP POST request to the AIMLE Repository targeting the URI of the corresponding resource (i.e., "FL Member Configurations"), with the request body including the FIMbr data structure.

- 2a. Upon success that the request to register the Individual FL Member is successfully received and processed, the AIMLE Repository shall respond with an HTTP "201 Created" status code with the request body including the FIMbr data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP POST response body, as specified in clause 6.2.4.7.

5.3.4.2.3 MLR_FLMember_Query

5.3.4.2.3.1 General

This service operation is used by a service consumer to request the AIMLE Repository to query an Individual FL Member.

The following procedure is supported by the "MLR_FLMember_Query" service operation:

- MLR FL Member Query.

5.3.4.2.3.2 MLR FL Member Query

Figure 5.3.4.2.3.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to query an Individual FL Member. (see clause 8.4 of 3GPP TS 23.482 [9]).

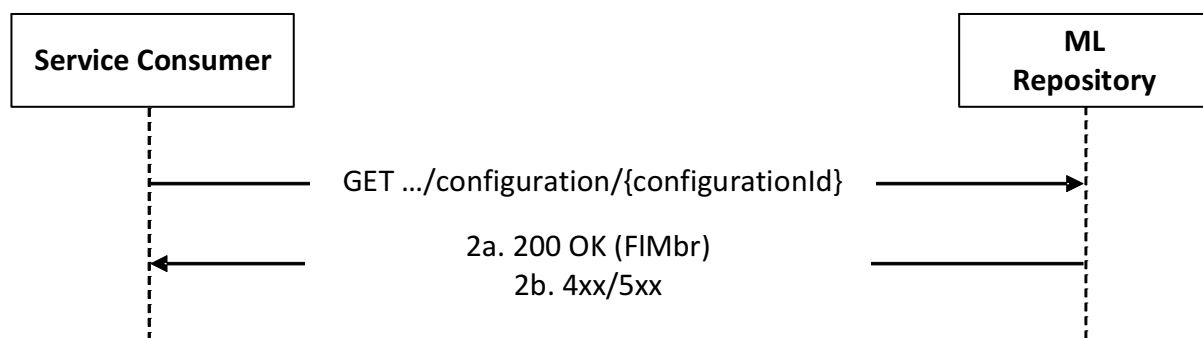


Figure 5.3.4.2.3.2-1: Procedure for MLR FL Member Query

1. In order to query an Individual Registered FL Member, the service consumer shall send an HTTP GET request to the AIMLE Repository targeting the URI of the corresponding resource (i.e., "Query Registered FL Member").
- 2a. Upon success that the request to query the Registered FL Member is successfully received and processed, the AIMLE Repository shall respond with an HTTP "200 OK" status code with the request body including the FIMbr data structure.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP GET response body, as specified in clause 6.2.4.7.

5.3.4.2.4 MLR_FLMember_Update_Register

5.3.4.2.4.1 General

This service operation is used by a service consumer to request the AIMLE Repository to update registration of an Individual Registered FL Member.

The following procedure is supported by the "MLR_FLMember_Update_Register" service operation:

- MLR FL Member Update Register.

5.3.4.2.4.2 MLR FL Member Update Register

Figure 5.3.4.2.4.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to update registration of an Individual Registered FL Member. (see clause 8.4 of 3GPP TS 23.482 [9]).

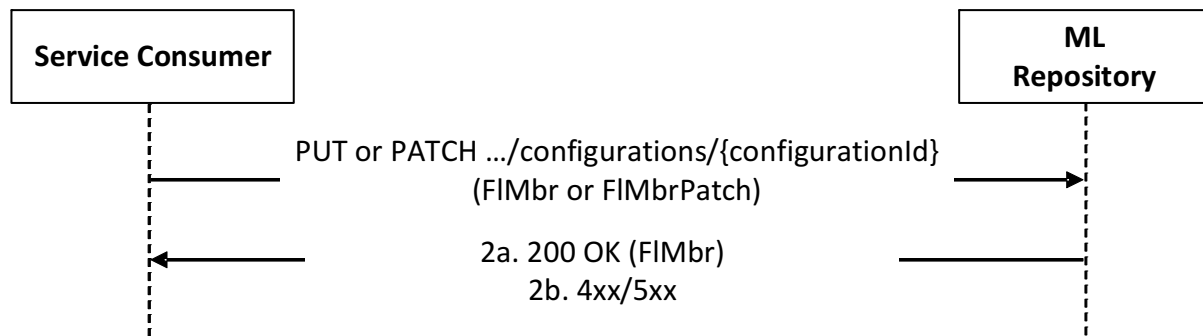


Figure 5.3.4.2.4-1: Procedure for MLRFL Member Update

1. In order to update an Individual Registered FL Member, the service consumer shall send an HTTP PUT/PATCH request to the AIMLE Repository targeting the URI of the corresponding resource (i.e., "Individual Registered FL Member Configuration"), with the request body including either:

- the updated representation of the resource within the FIMbr data structure, in case the HTTP PUT method is used; or
- the requested modifications to the resource within the FIMbrPatch 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 that the request to update the Individual Registered FL Member is successfully received and processed, the AIMLE Repository shall respond with an HTTP "200 OK" status code with the request body including the FIMbr data structure.

- an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Registered FL Member Configuration" resource within the FIMbr data structure; or
- an HTTP "204 No Content" status code.

2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP PUT/PATCH response body, as specified in clause 6.2.4.7.

5.3.4.2.5 MLR_FLMember_Deregister

5.3.4.2.5.1 General

This service operation is used by a service consumer to request the AIMLE Repository to deregister an Individual Registered FL Member.

The following procedure is supported by the "MLR_FLMember_Deregister" service operation:

- MLR FL Member Deregister.

5.3.4.2.5.2 MLR FL Member Deregister

Figure 5.3.4.2.5.2-1 depicts a scenario where a service consumer sends a request to the AIMLE Repository to deregister an Individual Registered FL Member. (see also clause 8.4 of 3GPP TS 23.482 [9]).

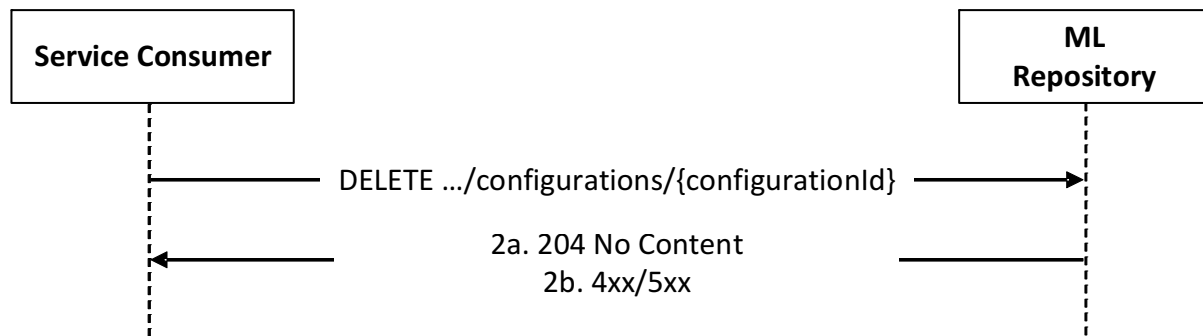


Figure 5.3.4.2.5.2-1: Procedure for MLR FL Member Deregister

1. In order to delete an Individual Registered FL Member, the service consumer shall send an HTTP DELETE request to the AIMLE Repository targeting the URI of the corresponding resource (i.e., "Individual Registered FL Member Configuration").
- 2a. Upon success that the request to delete the Individual Registered FL Member is successfully received and processed, the AIMLE Repository shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the HTTP DELETE response body, as specified in clause 6.2.4.7.

6 API Definitions

6.1 AIMLE Server APIs

6.1.1 AIMLES_ContextTransfer API

6.1.1.1 Introduction

The AIMLES_ContextTransfer service shall use the AIMLES_ContextTransfer API.

The API URI of the AIMLES_ContextTransfer API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-ct".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.1.3 and 6.1.1.4.

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

6.1.1.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_ContextTransfer API.

6.1.1.3 Resources

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

6.1.1.4 Custom Operations without associated resources

6.1.1.4.1 Overview

The structure of the custom operation URIs of the AIMLES_ContextTransfer API is shown in Figure 6.1.1.4.1-1.

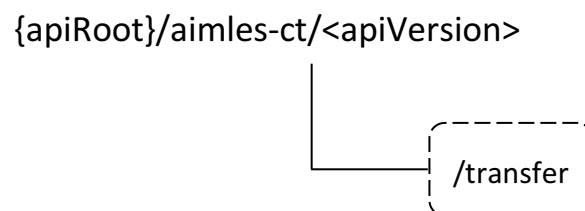


Figure 6.1.1.4.1-1: Custom operation URI structure of the AIMLES_ContextTransfer API

Table 6.1.1.4.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the AIMLES_ContextTransfer API.

Table 6.1.1.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
Transfer	/transfer	POST	Enables a service consumer to request AIMLE context information transfer to the AIMLE Server.

The custom operations shall support the URI variables defined in table 6.1.1.4.1-2.

Table 6.1.1.4.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.1.

6.1.1.4.2 Operation: Transfer

6.1.1.4.2.1 Description

The custom operation enables a service consumer to send AIMLE context transfer information to the AIMLE Server.

6.1.1.4.2.2 Operation Definition

This operation shall support the request data structures and the response data structures and response codes specified in tables 6.1.1.4.2.2-1 and 6.1.1.4.2.2-2.

Table 6.1.1.4.2.2-1: Data structures supported by the POST Request Body on this custom operation

Data type	P	Cardinality	Description
TransReq	M	1	Contains the parameters to request AIMLE context information transfer.

Table 6.1.1.4.2.2-2: Data structures supported by the POST Response Body on this custom operation

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The AIMLE Context Transfer request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.1.4.2.2-3: Headers supported by the 307 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

Table 6.1.1.4.2.2-4: Headers supported by the 308 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

6.1.1.5 Notifications

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

6.1.1.6 Data Model

6.1.1.6.1 General

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

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

Table 6.1.1.6.1-1: AIMLES_ContextTransfer API specific Data Types

Data type	Clause defined	Description	Applicability
AimleServApp	6.1.1.6.2.4	Represents the AIMLE service applicability information.	
AimleServOpStatus	6.1.1.6.3.3	Represents the AIMLE service operations status.	
AimleServStatus	6.1.1.6.2.3	Represents the AIMLE service operations status related information.	
MLContextInformation	6.1.1.6.2.5	Represents the context information related to the ML operation.	
TransReq	6.1.1.6.2.2	Represents the AIMLE context information transfer request.	

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

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

Data type	Reference	Comments	Applicability
AimlOperation	3GPP TS 24.560 [12]	Represents the type of ML task.	
DataSetRequirements	3GPP TS 24.560 [12]	Represents the requirements on data set for FL training.	
MLModelDetail	6.1.13.6.2.7	Represents the ML Model information.	
LocationArea5G	3GPP TS 29.122 [2]	Used to indicate a location area represented as list of geographic areas, civic addresses and network area.	
SplitOpProfile	6.1.12.6.2.9	Represents the split operation profile that VAL server participates to.	

6.1.1.6.2 Structured data types

6.1.1.6.2.1 Introduction

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

6.1.1.6.2.2

Type: TransReq

Table 6.1.1.6.2.2-1: Definition of type TransReq

Attribute name	Data type	P	Cardinality	Description	Applicability
clientId	AimleClientId	M	1	Contains the identifier of the AIMLE Client to which the transferred context is associated.	
currServerId	string	O	0..1	Contains the identifier of the AIMLE Server currently managing the AIMLE Client, i.e., the AIMLE Server associated with service area that the AIMLE Client (to which the transferred context is associated) is currently in.	
prevServerIds	array(string)	O	1..N	Contains the list of the identifier(s) of the AIMLE Server(s) that have previously managed the AIMLE Client (to which the transferred context is associated). This list is maintained by the AIMLE Client.	
servStatus	AimleServStatus	O	0..1	Contains the status of the AIML operations at the AIMLE Client.	
servRes	string	O	0..1	Contains the result of the AIML operations performed by the AIMLE Client.	
servApp	AimleServApp	O	0..1	Contains the applicability information of the AIML operations performed by the AIMLE Client.	
mlContextInfo	MLContextInformation	O	0..1	Contains the context information related to the ML operation that the AIMLE client is participating in or performing.	

6.1.1.6.2.3

Type: AimleServStatus

Table 6.1.1.6.2.3-1: Definition of type AimleServStatus

Attribute name	Data type	P	Cardinality	Description	Applicability
servOpStatus	AimleServOpStatus	M	1	Contains the status of the AIML operations at the AIMLE Client.	
servOpCompP er	Integer	O	0..1	Contains the percentage of completion of the AIML operations at the AIMLE Client. Minimum = 0. Maximum = 100. This attribute may be present only when the value of the " aimleServOpStatus " attribute is either "ACTIVE" or "PAUSED".	

6.1.1.6.2.4

Type: AimleServApp

Table 6.1.1.6.2.4-1: Definition of type AimleServApp

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceArea	LocationArea5G	O	0..1	Contains the service area where the AIML operations are performed by the AIMLE client.	
operationPipel ine	string	O	0..1	Contains the split operation pipeline information where the AIML operations are performed by the AIMLE client.	

6.1.1.6.2.5 Type: MLContextInformation

Table 6.1.1.6.2.5-1: Definition of type MLContextInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	O	0..1	Identifies the VAL Service, for which the request applies.	
mlModelInfo	MLModelDetail	M	1	Identifies the ML model, for which the request applies.	
mlTask	AimlOperation	O	0..1	Identifies the ML task, for which the request applies.	
dataSetInfo	DataSetRequirements	O	0..1	Identifies the data set information for training. This attribute may be present only when the mlTask attribute value is set to "MODEL_TRAINING".	
trainOpStatus	AimleServOpStatus	O	0..1	Identifies the status of the training operation at AIMLE client. This attribute may be present only when the mlTask attribute value is set to "MODEL_TRAINING".	
splitTaskInfo	SplitOpProfile	O	0..1	Identifies the split operation profile that VAL server participates to. This attribute may be present only when the mlTask attribute value is set to "MODEL_SPLIT".	

6.1.1.6.3 Simple data types and enumerations

6.1.1.6.3.1 Introduction

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

6.1.1.6.3.2 Simple data types

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

Table 6.1.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
AimleClientId	string	Represents the unique identifier of the AIMLE Client.	

6.1.1.6.3.3 Enumeration: AimleServOpStatus

The enumeration AimleServOpStatus represents the AIMLE service operation status information. It shall comply with the provisions defined in table 6.1.1.6.3.3-1.

Table 6.1.1.6.3.3-1: Enumeration AimleServOpStatus

Enumeration value	Description	Applicability
ACTIVE	Indicates that the status of the AIML operations at the AIMLE Client is active.	
PAUSED	Indicates that the status of the AIML operations at the AIMLE Client is paused.	
COMPLETED	Indicates that the status of the AIML operations at the AIMLE Client is completed.	

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

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

6.1.1.6.5 Binary data

6.1.1.6.5.1 Binary Data Types

Table 6.1.1.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.1.7 Error Handling

6.1.1.7.1 General

For the AIMLES_ContextTransfer API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.1.7.2 Protocol Errors

No specific protocol errors for the AIMLES_ContextTransfer API are specified.

6.1.1.7.3 Application Errors

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

Table 6.1.1.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.1.8 Feature negotiation

The optional features in table 6.1.1.8-1 are defined for the AIMLES_ContextTransfer API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.1.8-1: Supported Features

Feature number	Feature Name	Description

6.1.1.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_ContextTransfer API API.

6.1.2 AIMLES_DataManagement API

6.1.2.1 Introduction

The AIMLES_DataManagement service shall use the AIMLES_DataManagement API.

The API URI of the AIMLES_DataManagement API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-dm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.2.3 and 6.1.2.4.

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

6.1.2.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_DataManagement API.

6.1.2.3 Resources

6.1.2.3.1 Overview

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

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

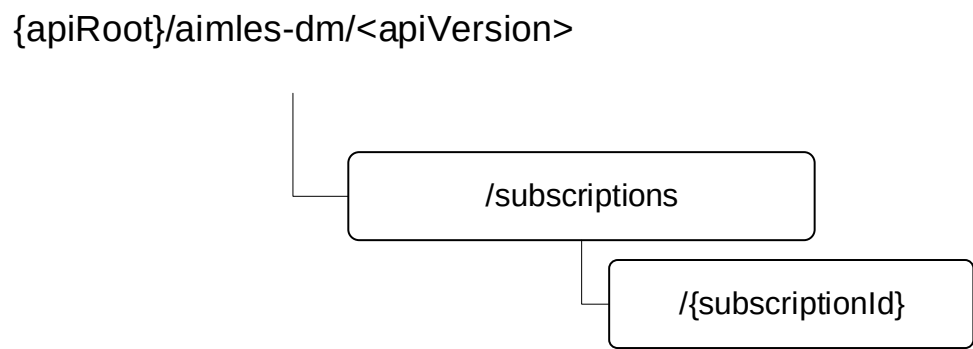


Figure 6.1.2.3.1-1: Resource URI structure of the AIMLES_DataManagement API

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

Table 6.1.2.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
AIMLE Data Management Assistance Subscriptions	/subscriptions	POST	Request the creation of an AIMLE Data Management Assistance Subscription.
Individual AIMLE Data Management Assistance Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual AIMLE Data Management Assistance Subscription" resource.
		PUT	Request the update of an existing "Individual AIMLE Data Management Assistance Subscription" resource.
		PATCH	Request the modification of an existing "Individual AIMLE Data Management Assistance Subscription" resource.
		DELETE	Request the deletion of an existing "Individual AIMLE Data Management Assistance Subscription" resource.

6.1.2.3.2 Resource: AIMLE Data Management Assistance Subscriptions

6.1.2.3.2.1 Description

This resource represents the collection of AIMLE Data Management Assistance Subscriptions managed by the AIMLE Server.

6.1.2.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-dm/<apiVersion>/subscriptions

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

Table 6.1.2.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.2.1.

6.1.2.3.2.3 Resource Standard Methods

6.1.2.3.2.3.1 POST

The HTTP POST method enables a service consumer to request the creation of a new AIMLE Data Management Assistance Subscription at the AIMLE Server.

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

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

Name	Data type	P	Cardinality	Description

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

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

Data type	P	Cardinality	Description
DataMgmtAssistSubsc	M	1	Contains the parameters to request the creation of an AIMLE Data Management Assistance Subscription.

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

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

Table 6.1.2.3.2.3.1-4: 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}/aimles-dm/<apiVersion>/subscriptions{subscriptionId}

6.1.2.3.2.4 Resource Custom Operations

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

6.1.2.3.3 Resource: Individual AIMLE Data Management Assistance Subscription

6.1.2.3.3.1 Description

This resource represents an AIMLE Data Management Assistance Subscription managed by the AIMLE Server.

6.1.2.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-dm/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.2.3.3.2-1.

Table 6.1.2.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.2.1.
subscriptionId	string	Represents the identifier of the "Individual AIMLE Data Management Assistance Subscription" resource.

6.1.2.3.3.3 Resource Standard Methods

6.1.2.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual AIMLE Data Management Assistance Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.2.3.3.3.1-1.

Table 6.1.2.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.2.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.2.3.3.3.1-3.

Table 6.1.2.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.2.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DataMgmtAssistSubsc	M	1	200 OK	Successful case. The requested "Individual AIMLE Data Management Assistance 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.3.3.3.1-4: 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 AIMLE Server.

Table 6.1.2.3.3.3.1-5: 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 AIMLE Server.

6.1.2.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual AIMLE Data Management Assistance Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.2.3.3.3.2-1.

Table 6.1.2.3.3.2-1: 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 6.1.2.3.3.2-2 and the response data structures and response codes specified in table 6.1.2.3.3.2-3.

Table 6.1.2.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
DataMgmtAssistSubsc	M	1	Represents the updated representation of the "Individual AIMLE Data Management Assistance Subscription" resource.

Table 6.1.2.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DataMgmtAssistSubsc	M	1	200 OK	Successful case. The "Individual AIMLE Data Management Assistance 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 AIMLE Data Management Assistance 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.3.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.2.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

6.1.2.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual AIMLE Data Management Assistance Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.2.3.3.3.3-1.

Table 6.1.2.3.3.3.3-1: 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 6.1.2.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.2.3.3.3.3-3.

Table 6.1.2.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
DataMgmtAssistSubscPatch	M	1	Represents the parameters to request the modification of the "Individual AIMLE Data Management Assistance Subscription" resource.

Table 6.1.2.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
DataMgmtAssistSubsc	M	1	200 OK	Successful case. The "Individual AIMLE Data Management Assistance 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 AIMLE Data Management Assistance 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.2.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

6.1.2.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual AIMLE Data Management Assistance Subscription" resource at the AIMLE Server.

Table 6.1.2.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.2.3.3.4-2 and the response data structures and response codes specified in table 6.1.2.3.3.4-3.

Table 6.1.2.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.2.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The "Individual AIMLE Data Management Assistance 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.2.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

6.1.2.3.3.4 Resource Custom Operations

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

6.1.2.4 Custom Operations without associated resources

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

6.1.2.5 Notifications

6.1.2.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.1.2.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE Data Management Assistance Notification	{notifUri}	POST	This service operation enables the AIMLE Server to notify a previously subscribed service consumer with AIML Data Management Assistance related report(s).

6.1.2.5.2 AIMLE Data Management Assistance Notification

6.1.2.5.2.1 Description

The AIMLE Data Management Assistance Notification is used by the AIMLE Server to notify a previously subscribed service consumer on AIML Data Management Assistance related report(s).

6.1.2.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.2.5.2.2-1.

Table 6.1.2.5.2.2-1: Callback URI variables

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

6.1.2.5.2.3 Standard Methods

6.1.2.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.2.5.2.3-1 and the response data structures and response codes specified in table 6.1.2.5.2.3-2.

Table 6.1.2.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
DataMgmtAssistNotif	M	1	Represents the AIMLE Data Management Assistance Notification.

Table 6.1.2.5.2.3.1-2: 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 AIMLE Data Management Assistance Notification is successfully received and acknowledged.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.2.5.2.3.1-3: 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 6.1.2.5.2.3.1-4: 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.

6.1.2.6 Data Model

6.1.2.6.1 General

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

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

Table 6.1.2.6.1-1: AIMLES_DataManagement API specific Data Types

Data type	Section defined	Description	Applicability
AggregatedDataAnaOutputs	6.1.2.6.2.9	Represents the AIMLE Aggregated Data Analysis Output.	
AggregatedDataPrepOutputs	6.1.2.6.2.7	Represents the AIMLE Aggregated Data Preparation Output.	
CategoryType	6.1.2.6.3.5	Identifies the categorical output data format.	
DataFormat	6.1.2.6.3.4	Identifies the data output data format.	
DataMgmtAssistNotif	6.1.2.6.2.3	Represents the AIMLE Data Management Assistance Notification.	
DataMgmtAssistSubsc	6.1.2.6.2.2	Represents the AIMLE Data Management Assistance Subscription.	
DataMgmtAssistSubscPatch	6.1.2.6.2.6	Represents the requested modifications to an AIMLE Data Management Assistance Subscription.	
DataMgmtOp	6.1.2.6.3.3	Represents the data management operation type.	
DataOperReqs	6.1.2.6.2.5	Represents the data operation requirements.	
DataProcessReqs	6.1.2.6.2.4	Represents the data preparation requirements.	
PreparedDataOutput	6.1.2.6.2.8	Represents the prepared data output.	
StatisticalOutput	6.1.2.6.2.10	Represents the statistical output.	

Table 6.1.2.6.1-2 specifies data types re-used by the AIMLES_DataManagement API service.

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

Data type	Reference	Comments	Applicability
AimleClientId	6.1.1.6.3.2	Represents the unique identifier of the AIMLE Client.	
Bytes	3GPP TS 29.571 [11]	Represents data in bytes.	
ClientDiscCriteria	6.1.6.6.2.2	Represents the AIMLE Client discovery criteria.	
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
Float	3GPP TS 29.571 [11]	Represents a number with the "float" format.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
Uri	3GPP TS 29.122 [2]	Represents a URI.	

6.1.2.6.2 Structured data types

6.1.2.6.2.1 Introduction

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

6.1.2.6.2.2

Type: DataMgmtAssistSubsc

Table 6.1.2.6.2.2-1: Definition of type DataMgmtAssistSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
clientList	array(AimleClientId)	C	1..N	Contains the list of the identifier(s) of the AIMLE Client(s) for which data management should be performed. (NOTE)	
selCriteria	ClientDiscCriteria	C	0..1	Contains the selection criteria for finding suitable AIMLE Clients for data management. (NOTE)	
dataMgmtOp	DataMgmtOp	M	1	Contains the requested data management operation type.	
dataPrepReqs	DataProcessReqs	C	0..1	Represents the requirement for the data preparation operation type. This attribute shall be present if the requested data management type is "DATA_PREPARATION".	
dataAnalysisReqs	DataProcessReqs	C	0..1	Represents the requirement for the data analysis operation type. This attribute shall be present if the requested data management is "DATA_ANALYSIS".	
notifUri	Uri	M	1	Contains the URI via which the notifications shall be delivered.	
expTime	DateTime	O	0..1	Contains the expiration time of the subscription. This attribute may be present only in the response to an AIMLE Data Management Assistance Subscription Creation/Update/Retrieval request.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.1.2.8. This attribute shall be present only when feature negotiation needs to take place.	
NOTE: At least one of these attributes shall be present.					

6.1.2.6.2.3

Type: DataMgmtAssistNotif

Table 6.1.2.6.2.3-1: Definition of type DataMgmtAssistNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
aggrDataPrepOutput	AggregateDataPrepOutputs	C	0..1	Contains the outputs for data preparation. This attribute shall be present if the data management operation type within the "dataMgmtOp" attribute of the corresponding subscription is "DATA_PREPARATION".	
aggrDataAnaOutput	AggregateDataAnaOutputs	C	0..1	Contains the outputs for data analysis. This attribute shall be present if the requested data management operation type within the "dataMgmtOp" attribute of the corresponding subscription is "DATA_ANALYSIS".	
timeStamp	DateTime	O	0..1	Contains the timestamp of the data management notification.	

6.1.2.6.2.4 Type: DataProcessReqs

Table 6.1.2.6.2.4-1: Definition of type DataProcessReqs

Attribute name	Data type	P	Cardinality	Description	Applicability
dataSetId	string	M	1	Contains the identifier of the dataset.	
dataOperReqs	array(DataOperReqs)	M	1..N	Contains the requirements for data operation.	

6.1.2.6.2.5 Type: DataOperReqs

Table 6.1.2.6.2.5-1: Definition of type DataOperReqs

Attribute name	Data type	P	Cardinality	Description	Applicability
dataId	string	M	1	Contains the identifier of the dataset.	
dataSetFeatId	string	M	1	Contains the identifier of the data set feature.	
dataOperFunction	string	C	0..1	Identifier of the function used for the data operation. (NOTE)	
dataOperFunction	Bytes	C	0..1	Executable with the function used for data operation. (NOTE)	

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

6.1.2.6.2.6 Type: DataMgmtAssistSubscPatch

Table 6.1.2.6.2.6-1: Definition of type DataMgmtAssistSubscPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
dataPrepReqs	DataProcessReqs	O	0..1	Contains the updated data preparation requirements.	
dataAnalysisReqs	DataProcessReqs	O	0..1	Contains the updated data analysis requirements.	
notifUri	Uri	O	0..1	Indicates the URI via which the notifications shall be delivered.	

6.1.2.6.2.7 Type: AggregatedDataPrepOutputs

Table 6.1.2.6.2.7-1: Definition of type AggregatedDataPrepOutputs

Attribute name	Data type	P	Cardinality	Description	Applicability
dataSetId	string	M	1	Contains the dataset identifier.	
preparedDataOutputs	array(PreparedDataOutput)	M	1..N	Contains the prepared data output.	

6.1.2.6.2.8

Type: PreparedDataOutput

Table 6.1.2.6.2.8-1: Definition of type PreparedDataOutput

Attribute name	Data type	P	Cardinality	Description	Applicability
featureId	string	M	1	Represents the dataset feature ID of the prepared data output.	
format	DataFormat	M	1	Identifies the data output format.	
categoryType	CategoryType	C	0..1	Identifies the categorical output format. This attribute shall be present only when the format attribute value is set to "CATEGORICAL".	
numericValues	array(integer)	C	1..N	Contains the numerical value of the data output. This attribute shall be present only when the format attribute value is set to "NUMERICAL".	
categoricValues	array(string)	C	1..N	Contains the categorical value of the data output. This attribute shall be present only when the format attribute value is set to "CATEGORICAL".	

6.1.2.6.2.9

Type: AggregatedDataAnaOutputs

Table 6.1.2.6.2.9-1: Definition of type AggregatedDataAnaOutputs

Attribute name	Data type	P	Cardinality	Description	Applicability
dataSetId	string	M	1	Contains the dataset identifier.	
statisticaOutputs	array(StatisticalOutput)	M	1..N	Contains the statistical Output for each of the features analysed.	

6.1.2.6.2.10 Type: StatisticalOutput

Table 6.1.2.6.2.10-1: Definition of type StatisticalOutput

Attribute name	Data type	P	Cardinality	Description	Applicability
featureId	string	M	1	Represents the dataset feature ID of the statistical data output.	
mean	Float	C	0..1	Arithmetic mean of numerical values. NOTE	
std	Float	C	0..1	Standard deviation of numerical values. NOTE	
min	Float	C	0..1	Minimum value in the analysed numerical data. NOTE	
max	Float	C	0..1	Maximum value in the analysed numerical data. NOTE	
outlierValues	array(Float)	C	1..N	List of detected outlier values in the analysis.	
anomalies	array(Float)	C	1..N	List of detected anomaly values in the analysis. NOTE	
featureCorrelatedInfo	string	C	0..1	Contains the feature correlation information. NOTE	
NOTE: At least one of these attributes shall be present.					

6.1.2.6.3 Simple data types and enumerations

6.1.2.6.3.1 Introduction

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

6.1.2.6.3.2 Simple data types

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

Table 6.1.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.2.6.3.3 Enumeration: DataMgmtOp

The enumeration DataMgmtOp represents the data management operation type. It shall comply with the provisions defined in table 6.1.2.6.3.3-1.

Table 6.1.2.6.3.3-1: Enumeration DataMgmtOp

Enumeration value	Description	Applicability
DATA_PREPARATION	Indicates that the data management operation type is data preparation.	
DATA_ANALYSIS	Indicates that the data management operation type is data analysis.	

6.1.2.6.3.4 Enumeration: DataFormat

The enumeration DataFormat represents the data format for aggregated output. It shall comply with the provisions defined in table 6.1.2.6.3.4-1.

Table 6.1.2.6.3.4-1: Enumeration DataFormat

Enumeration value	Description	Applicability
NUMERICAL	Indicates that the data format type is numerical.	
CATEGORICAL	Indicates that the data format type is categorical.	

6.1.2.6.3.5 Enumeration: CategoryType

The enumeration CategoryType represents the data format for categorical output. It shall comply with the provisions defined in table 6.1.2.6.3.5-1.

Table 6.1.2.6.3.5-1: Enumeration CategoryType

Enumeration value	Description	Applicability
NOMINAL	Indicates that the categorical output type is nominal.	
ORDINAL	Indicates that the categorical output type is ordinal.	

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

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

6.1.2.6.5 Binary data

6.1.2.6.5.1 Binary Data Types

Table 6.1.2.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.2.7 Error Handling

6.1.2.7.1 General

For the AIMLES_DataManagement API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.2.7.2 Protocol Errors

No specific protocol errors for the AIMLES_DataManagement API are specified.

6.1.2.7.3 Application Errors

The application errors defined for AIMLES_DataManagement API are listed in table 6.1.2.7.3-1.

Table 6.1.2.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.2.8 Feature negotiation

The optional features in table 6.1.2.8-1 are defined for the AIMLES_DataManagement API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.2.8-1: Supported Features

Feature number	Feature Name	Description

6.1.2.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_DataManagement API.

6.1.3 AIMLES_FLMemberGroupSupport API

6.1.3.1 Introduction

The AIMLES_FLMemberGroupSupport Service shall use the AIMLES_FLMemberGroupSupport API.

The API URI of the AIMLES_FLMemberGroupSupport API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-fl".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.3.3 and clause 6.1.3.4.

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

6.1.3.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_FLMemberGroupSupport API.

6.1.3.3 Resources

6.1.3.3.1 Overview

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

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

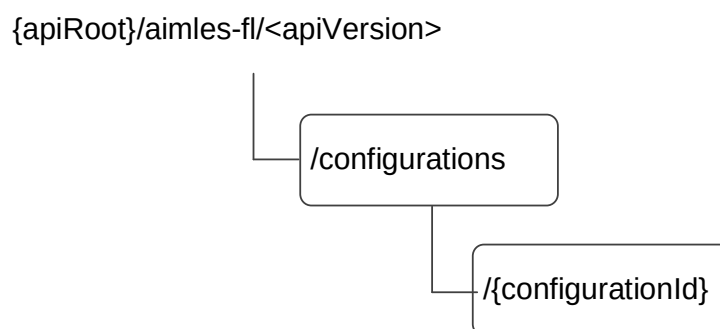


Figure 6.1.3.3.1-1: Resource URI structure of the AIMLES_FLMemberGroupSupport API

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

Table 6.1.3.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description (service operation)
FL Member Group Support Configurations	/configurations	POST	Create a new Individual FL Member Support Group resource
Individual FL Member Group Support Configuration	/configurations/{configurationId}	GET	Retrieve an existing Individual FL Member Support Group resource.
		PUT	Update an existing Individual FL Member Support Group resource.
		PATCH	Modify an existing Individual FL Member Support Group resource.
		DELETE	Delete an existing Individual FL Member Support Group resource.

6.1.3.3.2 Resource: FL Member Group Support Configurations

6.1.3.3.2.1 Description

This resource represents the FL Member Group Support Configurations resource managed by the AILME Server.

6.1.3.3.2.2 Resource Definition

Resource URI: **{apiRoot}/aimles-fl/<apiVersion>/configurations**

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

Table 6.1.3.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.3.1

6.1.3.3.2.3 Resource Standard Methods

6.1.3.3.2.3.1 POST

The HTTP POST method enables the AIMLE service consumer to create a new Individual FL Member Support Group for an FL process at the AIMLE Server.

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

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

Name	Data type	P	Cardinality	Description	Applicability
n/a					

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

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

Data type	P	Cardinality	Description
FIMBrSuppGrp	M	1	Create a new Individual FL Member Support Group for an FL process.

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

Data type	P	Cardinality	Response codes	Description
FIMbrSuppGrp	M	1	201 Created	Successful case. The creation of the new Individual FL Member Support Group for the FL process is confirmed and a representation of that resource is returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.3.3.2.3.1-4: Headers supported by the 201 Response Code on this resource

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

6.1.3.3.2.4 Resource Custom Operations

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

6.1.3.3.3 Resource: Individual FL Member Group Support Configuration

6.1.3.3.3.1 Description

This resource represents the individual FL Member Group Support Configuration resource managed by the AIMLE Server.

6.1.3.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-fl/<apiVersion>/configurations/{configurationId}

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

Table 6.1.3.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.3.1
configurationId	string	Represents the identifier of the Individual FL Member Group Support Configuration resource.

6.1.3.3.3.3 Resource Standard Methods

6.1.3.3.3.3.1 GET

The HTTP GET method enables the AIMLE service consumer to query an existing Individual FL Member Support Group for an FL process at the AIMLE Server.

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

Table 6.1.3.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
fl-member-id	string	O	0..1	ID of the FL member to be queried.	

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
FLMbrSuppGrp	M	1	200 OK	Successful case. The requested Individual FL Member Support Group for the FL process is confirmed and a representation of that resource is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] 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 AIMLE 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 AIMLE Server.

6.1.3.3.3.2 PUT

The HTTP PUT method enables the AIMLE service consumer to update an existing Individual FL Member Support Group for an FL process at the AIMLE 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 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 6.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.3.3.3.2-3.

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

Data type	P	Cardinality	Description
FIMbrSuppGrp	M	1	Represents the updated representation of an existing Individual FL Member Support Group for an FL process.

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

Data type	P	Cardinality	Response codes	Description
FIMbrSuppGrp	M	1	200 OK	Successful case. The requested update of the existing Individual FL Member Support Group for the FL process is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested update of the existing Individual FL Member Support Group for the FL process is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] 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 AIMLE 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 AIMLE Server.

6.1.3.3.3.3 PATCH

The HTTP PATCH method enables the AIMLE service consumer to modify an existing Individual FL Member Support Group for an FL process at the AIMLE Server.

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

Table 6.1.3.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.3.3.3.3-3.

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

Data type	P	Cardinality	Description
FIMbrSuppGrpPatch	M	1	Represents the parameters to modify of an existing Individual FL Member Support Group for an FL process.

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

Data type	P	Cardinality	Response codes	Description
FIMbrSuppGrp	M	1	200 OK	Successful case. The requested modification of the existing Individual FL Member Support Group for the FL process is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested modification of the existing Individual FL Member Support Group for the FL process is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

6.1.3.3.3.4 DELETE

The HTTP DELETE method enables the AIMLE service consumer to delete an existing Individual FL Member Support Group for an FL process at the AIMLE Server.

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

Table 6.1.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.4-2 and the response data structures and response codes specified in table 6.1.3.3.3.4-3.

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

Data type	P	Cardinality	Description
n/a			

Table 6.1.3.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. Deletion of the existing Individual FL Member Support Group for the FL process is confirmed.
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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.3.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.3.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

6.1.3.3.3.4 Resource Custom Operations

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

6.1.3.4 Custom Operations without associated resources

6.1.3.4.1 Overview

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

6.1.3.5 Notifications

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

6.1.3.6 Data Model

6.1.3.6.1 General

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

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

Table 6.1.3.6.1-1: AIMLES_FLMemberGroupSupport API specific Data Types

Data type	Clause defined	Description	Applicability
FIMbrStatus	6.1.3.6.3.5	Represents information on whether the FL member is a candidate or is selected.	
FIMbrSuppGrp	6.1.3.6.2.2	Create a new Individual FL Member Support Group for an FL process.	
FIMbrSuppGrpPatch	6.1.3.6.2.3	Individual FL Member Support Group to be partially modified.	
FIMbrType	6.1.3.6.3.4	Represents information on the type of the FL member.	
FLMember	6.1.3.6.2.5	Represents information on candidate FL member.	
MLTaskInfo	6.1.3.6.2.4	Represents information on the identity and type of the ML task.	
MLTaskType	6.1.3.6.3.3	Represents information on the identity of the ML model.	

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

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

Data type	Reference	Comments	Applicability
AdaeAnalyticsId	3GPP TS 29.549 [10]	Represents the ADAE analytics identifier.	
FIGroupInfo	3GPP TS 24.560 [12]	Created Individual FL Member Support Group for the FL process.	
FLMemberData	3GPP TS 24.560 [12]	FL member data e.g. FL member identifier, address.	
MLModelProfile	6.2.1.6.2.3	Represents the ML Model Profile.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	

6.1.3.6.2 Structured data types

6.1.3.6.2.1 Introduction

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

6.1.3.6.2.2

Type: FIMbrSuppGrp

Table 6.1.3.6.2.2-1: Definition of type FIMbrSuppGrp

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	C	0..1	Identifies the VAL Service, for which the request applies. (NOTE)	
mlModelId	string	C	0..1	Identifies the ML model, for which the request applies. (NOTE)	
adaeAnalyticsId	AdaeAnalyticsId	C	0..1	Identifies the ADAE analytics, for which the request applies. (NOTE)	
mlTask	MLTaskInfo	O	0..1	Identifies the ML task, for which the request applies.	
mlModelProfile	MLModelProfile	O	0..1	Identifies the ML model profile, for which the Individual FL Member Support Group is requested.	
flMembers	array(FLMember)	O	1..N	Identifies candidates or selected members of the Individual FL Member Support Group.	
flMbrSuppGrp	array(FIGroupInfo)	O	1..N	Identifies the created Individual FL Member Support Group for the FL process and ML Task.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.1.3.8. This attribute shall be provided when feature negotiation needs to take place.	
NOTE: At least one of these attributes shall be included.					

6.1.3.6.2.3

Type: FIMbrSuppGrpPatch

Table 6.1.3.6.2.3-1: Definition of type FIMbrSuppGrpPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	O	0..1	Identifies the VAL Service, for which the request applies.	
mlModelId	string	O	0..1	Identifies the ML model, for which the request applies.	
adaeAnalyticsId	AdaeAnalyticsId	O	0..1	Identifies the ADAE analytics, for which the request applies.	
mlTask	MLTaskInfo	O	0..1	Identifies the ML task, for which the request applies.	
mlModelProfile	MLModelProfile	O	0..1	Identifies the ML model profile, for which the Individual FL Member Support Group is requested.	
flMembers	array(FLMember)	O	1..N	Identifies candidates or selected members of the Individual FL Member Support Group.	

6.1.3.6.2.4

Type: MLTaskInfo

Table 6.1.3.6.2.4-1: Definition of type MLTaskInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mlTaskId	string	M	1	Identity of the ML Task.	
mlTaskType	MLTaskType	M	1	Identifies the type of the ML Task.	

6.1.3.6.2.5 Type: FLMember

Table 6.1.3.6.2.5-1: Definition of type FLMember

Attribute name	Data type	P	Cardinality	Description	Applicability
fIMbrId	string	M	1	Identifies the FL member which may be an FL client or FL server.	
fIMbrType	FIMbrType	O	0..1	Identifies the type of the FL member.	
fIMbrStatus	FIMbrStatus	O	0..1	Identifies the status of the FL member.	
availability	string	O	0..1	Contains the availability of the FL member. This attribute may be present in an HTTP POST and HTTP GET and HTTP PUT and HTTP PATCH response.	
constraints	array(string)	O	1..N	Contains the constraints of the FL member. This attribute may be present in an HTTP POST and HTTP GET and HTTP PUT and HTTP PATCH response.	

6.1.3.6.3 Simple data types and enumerations

6.1.3.6.3.1 Introduction

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

6.1.3.6.3.2 Simple data types

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

Table 6.1.3.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.3.6.3.3 Enumeration: MITaskType

The enumeration MITaskType represents information regarding the training identity or inference identity of the ML model. It shall comply with the provisions defined in table 6.1.3.6.3.3-1.

Table 6.1.3.6.3.3-1: Enumeration MITaskType

Enumeration value	Description	Applicability
FL_TRAINING	Identifies an ML model training	
FL_INFERENCE	Identifies an ML model inference	

6.1.3.6.3.4 Enumeration: FIMbrType

The enumeration FIMbrType represents information regarding the FL member being an FL server or an FL client. It shall comply with the provisions defined in table 6.1.3.6.3.4-1.

Table 6.1.3.6.3.4-1: Enumeration FIMbrType

Enumeration value	Description	Applicability
FL_SERVER	Identifies an FL server	
FL_CLIENT	Identifies an FL client	

6.1.3.6.3.5 Enumeration: FIMbrStatus

The enumeration FIMbrStatus represents information regarding the FL member being a candidate or being selected. It shall comply with the provisions defined in table 6.1.3.6.3.5-1.

Table 6.1.3.6.3.5-1: Enumeration FIMbrStatus

Enumeration value	Description	Applicability
FL_CANDIDATE	Identifies an FL member being a candidate	
FL_SELECTED	Identifies an FL member being selected	

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

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

6.1.3.6.5 Binary data

6.1.3.6.5.1 Binary Data Types

The binary data types defined for the AIMLES_FLMemberGroupSupport API are listed in Table 6.1.3.6.5.1-1.

Table 6.1.3.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.3.7 Error Handling

6.1.3.7.1 General

For the AIMLES_FLMemberGroupSupport API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.3.7.2 Protocol Errors

No specific procedures for the AIMLES_FLMemberGroupSupport API are specified.

6.1.3.7.3 Application Errors

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

Table 6.1.3.7.3-1: Application errors

Application Error	HTTP status code	Description

6.1.3.8 Feature negotiation

The optional features in table 6.1.3.8-1 are defined for the AIMLES_FLMemberGroupSupport API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.3.8-1: Supported Features

Feature number	Feature Name	Description

6.1.3.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_FLMemberGroupSupport API.

6.1.4 AIMLES_AIMLEServiceOperationsManagement API

6.1.4.1 Introduction

The AIMLES_AIMLEServiceOperationsManagement service shall use the AIMLES_AIMLEServiceOperationsManagement API.

The API URI of the AIMLES_AIMLEServiceOperationsManagement API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-opm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.4.3 and 6.1.4.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.4, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.4.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AIMLEServiceOperationsManagement API.

6.1.4.3 Resources

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

6.1.4.4 Custom Operations without associated resources

6.1.4.4.1 Overview

Table 6.1.4.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
RequestServOpMngt	/request	POST	Request AIMLE service operations management.

6.1.4.4.2 Operation: RequestServOpMngt

6.1.4.4.2.1 Description

The custom operation enables a service consumer to send AIMLE service operations control and management request to the AIMLE Server.

6.1.4.4.2.2 Operation Definition

This operation shall support the request data structures and the response data structures and response codes specified in tables 6.1.4.4.2.2-1 and 6.1.4.4.2.2-2.

Table 6.1.4.4.2.2-1: Data structures supported by the POST Request Body on this custom operation

Data type	P	Cardinality	Description
AimlServOperReq	M	1	Contains the parameters to request AIMLE service operations control and management.

Table 6.1.4.4.2.2-2: Data structures supported by the POST Response Body on this custom operation

Data type	P	Cardinality	Response codes	Description
AimlServOperResp	M	1	200 OK	Successful case. The AIMLE service operations control and management request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.4.4.2.2-3: Headers supported by the 307 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

Table 6.1.4.4.2.2-4: Headers supported by the 308 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

6.1.4.5 Notifications

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

6.1.4.6 Data Model

6.1.4.6.1 General

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

Table 6.1.4.6.1-1 specifies the data types defined for the AIMLES_AIMLEServiceOperationsManagement API.

Table 6.1.4.6.1-1: AIMLES_AIMLEServiceOperationsManagement API specific Data Types

Data type	Clause defined	Description	Applicability
AimleConfigMode	6.1.4.6.2.7	Represent the AIMLE service operation configuration mode information.	
AimleOperAssist	6.1.4.6.2.6	Represent the AIMLE service operation assistance information.	
AimleOperId	6.1.4.6.2.4	Represents the AIMLE service operation identifier.	
AimleOperInfo	6.1.4.6.2.5	Represents the AIMLE service operation information.	
AimleOperMode	6.1.4.6.3.3	Represents the AIMLE service operation mode.	
AimlServOperReq	6.1.4.6.2.2	Represents the AIMLE service operations control and management request.	
AimlServOperResp	6.1.4.6.2.3	Represents the AIMLE service operations control and management response.	
MeasurementData	6.1.4.6.2.8	Represent the measurement data for the AIMLE service operation.	
ServiceOperEvent	6.1.4.6.3.4	Represents the event that triggers a AIML service status report.	
StatReport	6.1.4.6.2.9	Represents the status report mode for the AIML service operation.	

Table 6.1.4.6.1-2 specifies data types re-used by the AIMLES_AIMLEServiceOperationsManagement API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the AIMLES_AIMLEServiceOperationsManagement API.

Table 6.1.4.6.1-2: AIMLES_AIMLEServiceOperationsManagement API re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.1.6.3.2	Represents unique identifier of a AIMLE client.	
DateTime	3GPP TS 29.122 [2]	Used to indicate a timestamp.	
DurationSec	3GPP TS 29.122 [2]	Unsigned integer identifying a period of time in units of seconds.	
MatchingDirection	3GPP TS 29.520 [16]	Defines the matching direction when crossing a threshold.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.1.4.6.2 Structured data types

6.1.4.6.2.1 Introduction

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

6.1.4.6.2.2

Type: AimlServOperReq

Table 6.1.4.6.2.2-1: Definition of type AimlServOperReq

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcId	string	O	0..1	Contains the VAL service identifier.	
clients	array(AimleClientId)	C	0..N	Contains the list of AIMLE Client IDs. (NOTE)	
setId	string	C	0..1	Contains the AIMLE Client set ID. (NOTE)	
operId	AimleOperId	O	0..1	Contains AIMLE operation ID.	
operInfo	AimleOperInfo	O	0..1	Contains AIMLE operation information.	
operMode	AimleOperMode	M	1	Contains AIMLE operation mode.	
confModes	array(AimleConfigMode)	O	1..N	Contains AIMLE operation configuration modes.	
operModeStatReport	StatReport	O	0..1	Contains AIML operation status reporting modes.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	
NOTE: Only one of these attributes shall be present.					

6.1.4.6.2.3

Type: AimlServOperResp

Table 6.1.4.6.2.3-1: Definition of type AimlServOperResp

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcId	string	O	0..1	Contains the VAL service identifier.	
operId	AimleOperId	M	1	Contains AIMLE operation ID.	
operMode	AimleOperMode	M	1	Contains AIMLE operation status.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.4.6.2.4

Type: AimleOperId

Table 6.1.4.6.2.4-1: Definition of type AimleOperId

Attribute name	Data type	P	Cardinality	Description	Applicability
trainingId	string	C	0..1	Contains the ML model training ID. (NOTE)	
taskId	string	C	0..1	Contains the ML task ID. (NOTE)	
NOTE: Only one of these attributes shall be provided.					

6.1.4.6.2.5 Type: AimleOperInfo

Table 6.1.4.6.2.5-1: Definition of type AimleOperInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
container	string	M	1	Contains the AIMLE service operation container.	
fetchUri	Uri	M	1	Contains the URI to fetch model from a repository.	
agrUri	Uri	M	1	Contains the AIMLE service aggregator URI to send model updates.	
assitInfo	AimleOperAssist	M	1	Represent the AIMLE service operation assistance information.	

6.1.4.6.2.6 Type: AimleOperAssist

Table 6.1.4.6.2.6-1: Definition of type AimleOperAssist

Attribute name	Data type	P	Cardinality	Description	Applicability
maxConvTime	DurationSec	M	1	Contains the maximum convergence time.	

6.1.4.6.2.7 Type: AimleConfigMode

Table 6.1.4.6.2.7-1: Definition of type AimleConfigMode

Name	Data type	P	Cardinality	Description	Applicability
mode	AimleOperMode	M	1	Indicated the required mode to be activated if the conditions are matched.	
measThrValues	MeasurementData	M	1	Indicates the value(s) for the measurement threshold index(es).	
thrDirection	MatchingDirection	M	1	Indicates the threshold matching direction for the measurement threshold index(es) provided in the "measThrValues" attribute.	

6.1.4.6.2.8 Type: MeasurementData

Table 6.1.4.6.2.8-1: Definition of type MeasurementData

Name	Data type	P	Cardinality	Description	Applicability
latency	UInteger	O	0..1	Indicates the latency in milliseconds.	
time	DateTime	O	0..1	Indicates the time limit.	
accuracy	integer	O	0..1	Indicates the accuracy. Min: 0, Max: 100	

6.1.4.6.2.9 Type: StatReport

Table 6.1.4.6.2.9-1: Definition of type StatReport

Attribute name	Data type	P	Cardinality	Description	Applicability
period	DurationSec	C	0..1	Contains the time interval between each AIMLE status report. (NOTE)	
servOperEvent	ServiceOperEvent	C	0..1	Contains the event that triggers a AIMLE status report. (NOTE)	

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

6.1.4.6.3 Simple data types and enumerations

6.1.4.6.3.1 Introduction

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

6.1.4.6.3.2 Simple data types

The simple data types defined in table 6.1.4.6.3.2-1 shall be supported.

Table 6.1.4.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
n/a			

6.1.4.6.3.3 Enumeration: AimleOperMode

Table 6.1.4.6.3.3-1: Enumeration AimleOperMode

Enumeration value	Description	Applicability
START	Indicates the AIMLE service operation mode is start.	
STOP	Indicates the AIMLE service operation mode is stop.	

6.1.4.6.3.4 Enumeration: ServiceOperEvent

Table 6.1.4.6.3.4-1: Enumeration ServiceOperEvent

Enumeration value	Description	Applicability
OPERATION_TRANSITION	Indicates the event is an AIMLE service operation transition.	

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

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

6.1.4.6.5 Binary data

6.1.4.6.5.1 Binary Data Types

Table 6.1.4.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.4.7 Error Handling

6.1.4.7.1 General

For the AIMLES_AIMLEServiceOperationsManagement API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.4.7.2 Protocol Errors

No specific protocol errors for the AIMLES_AIMLEServiceOperationsManagement API are specified.

6.1.4.7.3 Application Errors

The application errors defined for the AIMLES_AIMLEServiceOperationsManagement API are listed in Table 6.1.4.7.3-1.

Table 6.1.4.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.4.8 Feature negotiation

The optional features in table 6.1.4.8-1 are defined for the AIMLES_AIMLEServiceOperationsManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.4.8-1: Supported Features

Feature number	Feature Name	Description

6.1.4.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AIMLEServiceOperationsManagement API.

6.1.5 AIMLES_HierarchicalComputingAssist API

6.1.5.1 Introduction

The AIMLES_HierarchicalComputingAssist service shall use the AIMLES_HierarchicalComputingAssist API.

The API URI of the AIMLES_HierarchicalComputingAssist API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-hca".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.5.3 and 6.1.5.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.5, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.5.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_HierarchicalComputingAssist API.

6.1.5.3 Resources

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

6.1.5.4 Custom Operations without associated resources

6.1.5.4.1 Overview

Table 6.1.5.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
RequestAssistance	/assist	POST	Request the hierarchical computing assistance.

6.1.5.4.2 Operation: RequestServOpMngt

6.1.5.4.2.1 Description

The custom operation enables a service consumer to send AIMLE hierarchical computing assist request to the AIMLE Server.

6.1.5.4.2.2 Operation Definition

This operation shall support the request data structures and the response data structures and response codes specified in tables 6.1.5.4.2.2-1 and 6.1.5.4.2.2-2.

Table 6.1.5.4.2.2-1: Data structures supported by the POST Request Body on this custom operation

Data type	P	Cardinality	Description
AimlHierAssitReq	M	1	Contains the parameters to request AIMLE hierarchical computing assist.

Table 6.1.5.4.2.2-2: Data structures supported by the POST Response Body on this custom operation

Data type	P	Cardinality	Response codes	Description
AimlHierAssitResp	M	1	200 OK	Successful case. The AIMLE hierarchical computing assist request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.5.4.2.2-3: Headers supported by the 307 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

Table 6.1.5.4.2.2-4: Headers supported by the 308 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

6.1.5.5 Notifications

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

6.1.5.6 Data Model

6.1.5.6.1 General

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

Table 6.1.5.6.1-1 specifies the data types defined for the AIMLES_HierarchicalComputingAssist API.

Table 6.1.5.6.1-1: AIMLES_HierarchicalComputingAssist API specific Data Types

Data type	Clause defined	Description	Applicability
AimlHierAssitReq	6.1.5.6.2.2	Represents the AIMLE hierarchical computing assist request.	
AimlHierAssitResp	6.1.5.6.2.3	Represents the AIMLE hierarchical computing assist response.	
AssistInfo	6.1.5.6.2.5	Represents the assistance information.	
AssistInfoType	6.1.5.6.3.5	Represents the assistance information type.	
ExecutionNode	6.1.5.6.2.6	Represents the execution node information.	
RequestorId	6.1.5.6.2.4	Represents the AIMLE service operation identifier.	
Role	6.1.5.6.3.3	Represents the role of the node.	
TaskType	6.1.5.6.3.4	Represents the type of task.	

Table 6.1.5.6.1-2 specifies data types re-used by the AIMLES_HierarchicalComputingAssist API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the AIMLES_HierarchicalComputingAssist API.

Table 6.1.5.6.1-2: AIMLES_HierarchicalComputingAssist API re-used Data Types

Data type	Reference	Comments	Applicability
EasAnalytics	3GPP TS 29.549 [10]	Represents the EAS status.	
SupportedFeatures	3GPP TS 29.571 [11]	Used to negotiate the applicability of optional features.	

6.1.5.6.2 Structured data types

6.1.5.6.2.1 Introduction

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

6.1.5.6.2.2 Type: AimlHierAssitReq

Table 6.1.5.6.2.2-1: Definition of type AimlHierAssitReq

Attribute name	Data type	P	Cardinality	Description	Applicability
origReqId	RequestorId	O	0..1	Contains the original requestor identifier.	
role	Role	M	1	Contains the role of the VAL server in the hierarchical computing architecture.	
task	TaskType	M	1	Contains the type of computing task.	
assistTypes	array(AssistInfoType)	M	1..N	Represents the assistance information types, which is used to indicate the assistance information needed.	
exeNodes	array(ExecutionNode)	O	1..N	Contains the execution nodes information.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.5.6.2.3 Type: AimlHierAssitResp

Table 6.1.5.6.2.3-1: Definition of type AimlHierAssitResp

Attribute name	Data type	P	Cardinality	Description	Applicability
assistSets	array(AssitInfo)	M	1..N	Contains the assistance information.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.5.6.2.4 Type: RequestorId

Table 6.1.5.6.2.4-1: Definition of type RequestorId

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	C	0..1	Contains the VAL Server ID. (NOTE)	
easId	string	C	0..1	Contains the EAS ID. (NOTE)	
casId	string	C	0..1	Contains the CAS ID. (NOTE)	
NOTE: Only one of these attributes shall be provided.					

6.1.5.6.2.5 Type: AssitInfo

Table 6.1.5.6.2.5-1: Definition of type AssitInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
easId	string	M	1	Contains the EAS identifier.	
status	EasAnalytics	M	1	Contains the EAS status.	

6.1.5.6.2.6 Type: ExecutionNode

Table 6.1.5.6.2.6-1: Definition of type ExecutionNode

Attribute name	Data type	P	Cardinality	Description	Applicability
easId	string	O	0..1	Contains the EAS ID.	

6.1.5.6.3 Simple data types and enumerations

6.1.5.6.3.1 Introduction

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

6.1.5.6.3.2 Simple data types

The simple data types defined in table 6.1.5.6.3.2-1 shall be supported.

Table 6.1.5.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
n/a			

6.1.5.6.3.3 Enumeration: Role

Table 6.1.5.6.3.3-1: Enumeration Role

Enumeration value	Description	Applicability
ROOT_NODE	Indicates the role is root node.	
SUB_ROOT_NODE	Indicates the role is sub root node.	
LEAF_NODE	Indicates the role is leaf node.	

6.1.5.6.3.4 Enumeration: TaskType

Table 6.1.5.6.3.4-1: Enumeration TaskType

Enumeration value	Description	Applicability
VFL	Indicates the task is VFL.	
HFL	Indicates the task is HFL.	

6.1.5.6.3.5 Enumeration: AssitInfoType

Table 6.1.5.6.3.5-1: Enumeration AssitInfoType

Enumeration value	Description	Applicability
EXECUTION_NODE_LIST	Indicates the execution node list is required.	
COMPUTING_PREPARATION_STATUS	Indicates the computing preparation status is required.	

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

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

6.1.5.6.5 Binary data

6.1.5.6.5.1 Binary Data Types

Table 6.1.5.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.5.7 Error Handling

6.1.5.7.1 General

For the AIMLES_HierarchicalComputingAssist API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.5.7.2 Protocol Errors

No specific protocol errors for the AIMLES_HierarchicalComputingAssist API are specified.

6.1.5.7.3 Application Errors

The application errors defined for the AIMLES_HierarchicalComputingAssist API are listed in Table 6.1.5.7.3-1.

Table 6.1.5.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.5.8 Feature negotiation

The optional features in table 6.1.5.8-1 are defined for the AIMLES_HierarchicalComputingAssist API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.5.8-1: Supported Features

Feature number	Feature Name	Description

6.1.5.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_HierarchicalComputingAssist API.

6.1.6 AIMLES_AIMLEClientDiscovery API

6.1.6.1 Introduction

The AIMLES_AIMLEClientDiscovery service shall use the AIMLES_AIMLEClientDiscovery API.

The API URI of the AIMLES_AIMLEClientDiscovery API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-disc".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.6.3 and clause 6.1.6.4.

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

6.1.6.2 Usage of HTTP and common API related aspects

The provisions of clause 5.2.1 of 3GPP TS 29.122 [2] shall apply for the AIMLES_AIMLEClientDiscovery API.

6.1.6.3 Resources

6.1.6.3.1 Overview

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

Figure 6.1.6.3.1-1 depicts the resource URIs structure for the AIMLES_AIMLEClientDiscovery Service API.

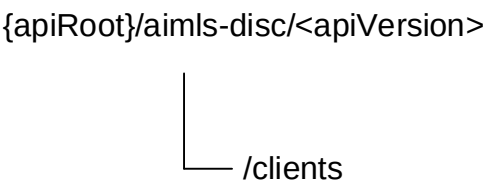


Figure 6.1.6.3.1-1: Resource URI structure of the AIMLES_AIMLEClientDiscovery Service API

Table 6.1.6.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.6.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
AIMLE Clients	/clients	GET	Discover the AIMLE Clients according to the filtering criteria.

6.1.6.3.2 Resource: AIMLE Clients

6.1.6.3.2.1 Description

The "AIMLE Clients" resource represents the AIMLE Clients.

6.1.6.3.2.2 Resource Definition

Resource URI: **{apiRoot}/aimles-disc/<apiVersion>/clients**

This resource shall support the resource URI variables defined in the table 6.1.6.3.2.2-1.

Table 6.1.6.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5 of 3GPP TS 29.549 [10].

6.1.6.3.2.3 Resource Standard Methods

6.1.6.3.2.3.1 GET

This method shall support the URI query parameters specified in table 6.1.6.3.2.3.1-1.

Table 6.1.6.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
filt-criteria	ClientDiscCriteria	M	1	Represents the AIMLE Client(s) filtering criteria.
clNumber	UInteger	O	0..1	Represents the required number of the discovered AIMLE Clients.
supported-features	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This query parameter shall be present only if feature negotiation needs to take place.

This method shall support the request data structures specified in table 6.1.6.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.6.3.2.3.1-3.

Table 6.1.6.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.6.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ClientDiscResp	M	1	200 OK	Successful case. The response body contains the result of the search over the list of AIMLE Clients.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.6.3.2.3.1-4: 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 AIMLE Server.

Table 6.1.6.3.2.3.1-5: 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 AIMLE Server.

6.1.6.3.2.4 Resource Custom Operations

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

6.1.6.4 Custom Operations without associated resources

There are no custom operations without associated resources in the present release of the document.

6.1.6.5 Notifications

There are no notifications in the present release of the document.

6.1.6.6 Data Model

6.1.6.6.1 General

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

Table 6.1.6.6.1-1 specifies the data types defined for the AIMLES_AIMLEClientDiscovery API.

Table 6.1.6.6.1-1: AIMLES_AIMLEClientDiscovery API specific Data Types

Data type	Section defined	Description	Applicability
AimlOperationRole	6.1.6.6.3.5	Represents the AIMLE operation role.	
ClientAppCapability	6.1.6.6.2.4	Represents the AIMLE Client Application layer capabilities.	
ClientDiscCriteria	6.1.6.6.2.2	Represents the AIMLE Client discovery criteria.	
ClientDiscResp	6.1.6.6.2.9	Represents the AIMLE Client discovery response.	
ClientTaskCapability	6.1.6.6.2.8	Represents the AIMLE Client task capability information.	
ClientVelocity	6.1.6.6.3.10	Represents the AIMLE Client velocity level.	
ComputeCapability	6.1.6.6.3.9	Represents the AIMLE Client compute capability type.	
DataType	6.1.6.6.3.7	Represents the type of the collected data.	
DatasetAvailability	6.1.6.6.2.6	Represents the dataset availability information.	
DatasetCapability	6.1.6.6.2.7	Represents the dataset capability information.	
DatasetRequirement	6.1.6.6.2.5	Represents the dataset requirements.	
MLAppType	6.1.6.6.3.6	Represents the ML application type.	
MLModelType	6.1.6.6.3.4	Represents the ML model type.	
PerformanceCapability	6.1.6.6.3.8	Represents the performance capabilities.	
ServicePermLevel	6.1.6.6.3.3	Represents the service permission level.	
ServiceRequirement	6.1.6.6.2.3	Represents the AIMLE service requirements.	

Table 6.1.6.6.1-2 specifies data types re-used by the AIMLES_AIMLEClientDiscovery API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the AIMLES_AIMLEClientDiscovery API.

Table 6.1.6.6.1-2: AIMLES_AIMLEClientDiscovery API Re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.1.6.3.2	Represents unique identifier of a AIMLE client.	
DateTime	3GPP TS 29.122 [2]	Used to indicate a timestamp.	
LocationArea5G	3GPP TS 29.122 [2]	Represents the location.	
ScheduledCommunicationTime	3GPP TS 29.122 [2]	Represents an offered scheduled communication time.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
TransQualMeasCriteriaSet	3GPP TS 29.548 [17]	Represents QoS criteria.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	

6.1.6.6.2 Structured data types

6.1.6.6.2.1 Introduction

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

6.1.6.6.2.2 Type: ClientDiscCriteria

Table 6.1.6.6.2.2-1: Definition of type ClientDiscCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
serviceReq	ServiceRequirement	M	1	Represents the service requirements.	
mlModelTypes	array(MlModelType)	O	1..N	Represents the requested ML model types.	
aimlOps	array(AimlOperationRole)	M	1..N	Represents the roles for AI/ML operations.	
clientAppCap	ClientAppCapability	M	1	Represents the AIMLE Client application layer capabilities.	
datasetReq	DatasetRequirement	O	0..1	Represents the dataset requirements.	
clientTaskCap	ClientTaskCapability	O	0..1	Represents the AIMLE Client task capabilities.	
clientVel	ClientVelocity	O	0..1	Represents the AIMLE Client velocity.	
location	LocationArea5G	O	0..1	Represents the location information for the AIMLE Client discovery.	
clientQosReqs	array(TransQualMeasCriteriaSet)	O	1..N	Represents the requirements on AIMLE Client QoS for discovery.	

6.1.6.6.2.3 Type: ServiceRequirement

Table 6.1.6.6.2.3-1: Definition of type ServiceRequirement

Attribute name	Data type	P	Cardinality	Description	Applicability
valServId	string	M	1	Represents the VAL Service identifier.	
permLevel	ServicePermLevel	O	0..1	Represents the service permission level.	

6.1.6.6.2.4 Type: ClientAppCapability

Table 6.1.6.6.2.4-1: Definition of type ClientAppCapability

Attribute name	Data type	P	Cardinality	Description	Applicability
appType	MlAppType	M	1	Represents the ML application identifier.	
avail	array(ScheduledCommunicationTime)	O	1..N	Represents the availability of AIMLE Client to support operations.	
dropOfRate	integer	O	0..1	Represents the drop off rate in percent. Minumum: 0 Maximum: 100	

6.1.6.6.2.5 Type: DatasetRequirement

Table 6.1.6.6.2.5-1: Definition of type DatasetRequirement

Attribute name	Data type	P	Cardinality	Description	Applicability
avail	DatasetAvailability	O	0..1	Represents the dataset availability information.	
cap	DatasetCapability	O	0..1	Represents the dataset capability information.	

6.1.6.6.2.6 Type: DatasetAvailability

Table 6.1.6.6.2.6-1: Definition of type DatasetAvailability

Attribute name	Data type	P	Cardinality	Description	Applicability
ids	array(string)	O	1..N	Represents the list dataset identifiers.	
age	DateTime	O	0..1	Represents the age of the dataset, i.e., when the data set was created.	
size	UInteger	O	0..1	Represents the dataset size in bytes.	
features	array(string)	O	1..N	Represents the list of dataset features identifiers.	

6.1.6.6.2.7 Type: DatasetCapability

Table 6.1.6.6.2.7-1: Definition of type DatasetCapability

Attribute name	Data type	P	Cardinality	Description	Applicability
dataType	DataType	O	0..1	Represents the type of data.	
functions	array(string)	O	1..N	Represents the list of the exploratory data analysis functions.	

6.1.6.6.2.8 Type: ClientTaskCapability

Table 6.1.6.6.2.8-1: Definition of type ClientTaskCapability

Attribute name	Data type	P	Cardinality	Description	Applicability
compCap	ComputeCapability	O	0..1	Represents the compute capabilities.	
perfCap	PerformanceCapability	O	0..1	Represents the performance capabilities.	

6.1.6.6.2.9 Type: ClientDiscResp

Table 6.1.6.6.2.9-1: Definition of type ClientDiscResp

Attribute name	Data type	P	Cardinality	Description	Applicability
clients	array(AimleClientId)	M	1..N	Represents the AIMLE client identifiers that matches the discovery criteria.	
suppTasks	array(ClientTaskCapability)	O	1..N	Represents the supported AIML tasks.	
suppFeats	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This query parameter shall be present only if feature negotiation needs to take place.	

6.1.6.6.3 Simple data types and enumerations

6.1.6.6.3.1 Introduction

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

6.1.6.6.3.2 Simple data types

None.

6.1.6.6.3.3 Enumeration: ServicePermLevel

The enumeration ServicePermLevel represents the service permission level requested. It shall comply with the provisions defined in table 6.1.6.6.3.3-1.

Table 6.1.6.6.3.3-1: Enumeration ServicePermLevel

Enumeration value	Description	Applicability
PREMIUM	Indicates that the service permission level is premium.	
STANDARD	Indicates that the service permission level is standard.	
LIMITED	Indicates that the service permission level is limited.	

6.1.6.6.3.4 Enumeration: MIModelType

The enumeration MIModelType represents the ML model type requested. It shall comply with the provisions defined in table 6.1.6.6.3.4-1.

Table 6.1.6.6.3.4-1: Enumeration MIModelType

Enumeration value	Description	Applicability
DECISION_TREES	Indicates that the ML model type is decision trees.	
LINEAR_REGRESSION	Indicates that the ML model type is linear regression.	
NEURAL_NETWORKS	Indicates that the ML model type is neural networks.	

6.1.6.6.3.5 Enumeration: AimlOperationRole

The enumeration AimlOperationRole represents the AIML operation role requested. It shall comply with the provisions defined in table 6.1.6.6.3.5-1.

Table 6.1.6.6.3.5-1: Enumeration AimlOperationRole

Enumeration value	Description	Applicability
MODEL_TRAINING	Indicates that the supported AIML operation role is model training.	
MODEL_TRANSFER	Indicates that the supported AIML operation role is model transfer.	
MODEL_INFERENCE	Indicates that the supported AIML operation role is model inference.	
MODEL_OFFLOAD	Indicates that the supported AIML operation role is model offload.	
MODEL_SPLIT	Indicates that the supported AIML operation role is model split.	

6.1.6.6.3.6 Enumeration: MIAppType

The enumeration MIAppType represents the ML application type requested. It shall comply with the provisions defined in table 6.1.6.6.3.6-1.

Table 6.1.6.6.3.6-1: Enumeration MIAppType

Enumeration value	Description	Applicability
FL	Indicates that the supported ML application type is Federated Learning.	
TL	Indicates that the supported ML application type is Transfer Learning.	
SL	Indicates that the supported ML application type is Split Learning.	

6.1.6.6.3.7 Enumeration: DataType

The enumeration DataType represents the type of collected data requested. It shall comply with the provisions defined in table 6.1.6.6.3.7-1.

Table 6.1.6.6.3.7-1: Enumeration DataType

Enumeration value	Description	Applicability
RAW	Indicates that the type of the collected data is raw.	
PROCESSED	Indicates that the type of the collected data is processed.	

6.1.6.6.3.8 Enumeration: PerformanceCapability

The enumeration PerformanceCapability represents the performance capability requested. It shall comply with the provisions defined in table 6.1.6.6.3.8-1.

Table 6.1.6.6.3.8-1: Enumeration PerformanceCapability

Enumeration value	Description	Applicability
GREEN_TASK	Indicates that the performance capability is green task.	
ENERGY_EFFICIENT	Indicates that the performance capability is energy-efficient.	
LOW_COSTS	Indicates that the performance capability is low costs.	

6.1.6.6.3.9 Enumeration: ComputeCapability

The enumeration ComputeCapability represents the compute capability requested. It shall comply with the provisions defined in table 6.1.6.6.3.9-1.

Table 6.1.6.6.3.9-1: Enumeration ComputeCapability

Enumeration value	Description	Applicability
LOW	Indicates that the compute capability is low.	
HIGH	Indicates that the compute capability is high.	

6.1.6.6.3.10 Enumeration: ClientVelocity

The enumeration ClientVelocity represents the AIMLE Client velocity requested. It shall comply with the provisions defined in table 6.1.6.6.3.10-1.

Table 6.1.6.6.3.10-1: Enumeration ClientVelocity

Enumeration value	Description	Applicability
MOBILE_LOW	Indicates that the AIMLE Client is mobile with low velocity.	
MOBILE_HIGH	Indicates that the AIMLE Client is mobile with high velocity.	
STATIC	Indicates that the AIMLE Client is static.	

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

There are no data types describing alternative data types and combinations of data types in this release of the specification.

6.1.6.6.5 Binary data

There are no binary data defined in this release of the specification.

6.1.6.7 Error Handling

6.1.6.7.1 General

For the AIMLES_AIMLEClientDiscovery API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.6.7.2 Protocol Errors

No specific procedures for the AIMLES_AIMLEClientDiscovery API are specified.

6.1.6.7.3 Application Errors

The application errors defined for AIMLES_AIMLEClientDiscovery API are listed in table 6.1.6.7.3-1.

Table 6.1.6.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.6.8 Feature Negotiation

The optional features in table 6.1.6.8-1 are defined for the AIMLES_AIMLEClientDiscovery API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.6.8-1: Supported Features

Feature number	Feature Name	Description

6.1.6.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AIMLEClientDiscovery API.

6.1.7 AIMLES_AIMLEClientSelection API

6.1.7.1 Introduction

The AIMLES_AIMLEClientSelection service shall use the AIMLES_AIMLEClientSelection API.

The API URI of the AIMLES_AIMLEClientSelection API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-sel".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.7.3 and clause 6.1.7.4.

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

6.1.7.2 Usage of HTTP and common API related aspects

The provisions of clause 5.2.1 of 3GPP TS 29.122 [2] shall apply for the AIMLES_AIMLEClientSelection API.

6.1.7.3 Resources

6.1.7.3.1 Overview

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

Figure 6.1.7.3.1-1 depicts the resource URIs structure for the AIMLES_AIMLEClientSelection API.

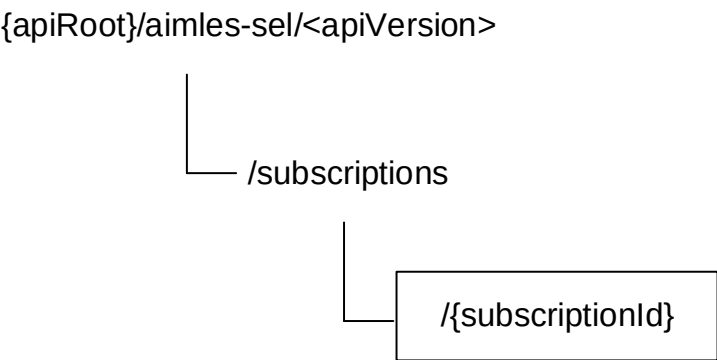


Figure 6.1.7.3.1-1: Resource URI structure of the AIMLES_AIMLEClientSelection API

Table 6.1.7.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.7.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
AIMLE Client Selection Subscriptions	/subscriptions	POST	Create a new "Individual AIMLE Client Selection Subscription" resource.
Individual AIMLE Client Selection Subscription	/subscriptions/{subscriptionId}	GET	Read "Individual AIMLE Client Selection Subscription" resource.
		PUT	Update "Individual AIMLE Client Selection Subscription" resource.
		PATCH	Modify "Individual AIMLE Client Selection Subscription" resource.
		DELETE	Delete "Individual AIMLE Client Selection Subscription" resource.

6.1.7.3.2 Resource: AIMLE Client Selection Subscriptions

6.1.7.3.2.1 Description

This resource represents the collection of AIMLE Client Selection Subscriptions managed by the AIMLE Server.

6.1.7.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-sel/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.1.7.3.2.2-1.

Table 6.1.7.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.7.1.

6.1.7.3.2.3 Resource Standard Methods

6.1.7.3.2.3.1 POST

The HTTP POST method enables a AIMLE service consumer to request the creation of a new Individual AIMLE Client Selection Subscription at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.7.3.2.3.1-1.

Table 6.1.7.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 6.1.7.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.7.3.2.3.1-3.

Table 6.1.7.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ClientSelSub	M	1	Create a new Individual AIMLE Client Selection Subscription resource.

Table 6.1.7.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

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

Table 6.1.7.3.2.3.1-4: 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}/aimles-sel/<apiVersion>/subscriptions/{subscriptionId}

6.1.7.3.2.4 Resource Custom Operations

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

6.1.7.3.3 Resource: Individual AIMLE Client Selection Subscription

6.1.7.3.3.1 Description

6.1.7.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-sel/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.7.3.3.2-1.

Table 6.1.7.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.7.1
subscriptionId	string	Represents the identifier of an "Individual AIMLE Client Selection Subscription" resource.

6.1.7.3.3.3 Resource Standard Methods

6.1.7.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual AIMLE Client Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.7.3.3.3.1-1.

Table 6.1.7.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.7.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.7.3.3.3.1-3.

Table 6.1.7.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.7.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ClientSelSub	M	1	200 OK	Successful case. The requested "Individual AIMLE Client Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.3.3.1-4: 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 AIMLE Server.

Table 6.1.7.3.3.1-5: 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 AIMLE Server.

6.1.7.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual AIMLE Client Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.7.3.3.2-1.

Table 6.1.7.3.3.2-1: 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 6.1.7.3.3.2-2 and the response data structures and response codes specified in table 6.1.7.3.3.2-3.

Table 6.1.7.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
ClientSelSub	M	1	Represents the updated representation of the "Individual AIMLE Client Selection Subscription" resource.

Table 6.1.7.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ClientSelSub	M	1	200 OK	Successful case. The "Individual AIMLE Client Selection 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 AIMLE Client Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.3.3.2-4: 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 AIMLE Server.

Table 6.1.7.3.3.2-5: 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 AIMLE Server.

6.1.7.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual AIMLE Client Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.7.3.3.3-1.

Table 6.1.7.3.3.3-1: 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 6.1.7.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.7.3.3.3.3-3.

Table 6.1.7.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
ClientSelSubPatch	M	1	Represents the parameters to request the modification of the "Individual AIMLE Client Selection Subscription" resource.

Table 6.1.7.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ClientSelSub	M	1	200 OK	Successful case. The "Individual AIMLE Client Selection 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 AIMLE Client Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.7.3.3.3.3-5: 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 AIMLE Server.

6.1.7.3.3.3.4 DELETE

The HTTP DELETE method allows a AIMLE service consumer to request the deletion of an existing "Individual AIMLE Client Selection Subscription" resource.

Table 6.1.7.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.7.3.3.3.4-2 and the response data structures and response codes specified in table 6.1.7.3.3.3.4-3.

Table 6.1.7.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.7.3.3.3.4-3: 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 AIMLE Client Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.3.3.3.4-4: 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 AIMLE Server.

Table 6.1.7.3.3.3.4-5: 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 AIMLE Server.

6.1.7.3.3.4 Resource Custom Operations

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

6.1.7.4 Custom Operations without associated resources

6.1.7.4.1 Overview

Table 6.1.7.4.1-1: Custom operations without associated resources

Custom operation URI	Mapped HTTP method	Description
/select	POST	Select AIMLE Clients according to the provided criteria.

6.1.7.4.2 Operation: Select

6.1.7.4.2.1 Description

The custom operation enables a service consumer to select AIMLE Clients according to the provided criteria.

6.1.7.4.2.2 Operation Definition

This operation shall support the request data structures and the response data structures and response codes specified in tables 6.1.7.4.2.2-1 and 6.1.7.4.2.2-2.

Table 6.1.7.4.2.2-1: Data structures supported by the POST Request Body on this custom operation

Data type	P	Cardinality	Description
ClientSelReq	M	1	Contains the parameters to request AIMLE Client selection.

Table 6.1.7.4.2.2-2: Data structures supported by the POST Response Body on this custom operation

Data type	P	Cardinality	Response codes	Description
ClientSelReq	M	1	200 OK	Successful case. The AIMLE Client selection request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.4.2.2-3: Headers supported by the 307 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

Table 6.1.7.4.2.2-4: Headers supported by the 308 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

6.1.7.5 Notifications

6.1.7.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.1.7.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE Client Selection Event Notification	{notifUri}	POST	This service operation enables an AIMLE Server to notify a previously subscribed service consumer on AIMLE Client selection related event(s).

6.1.7.5.2 AIMLE Client Selection Event Notification

6.1.7.5.2.1 Description

The AIMLE Client Selection Event Notification is used by the AIMLE Server to notify a previously subscribed AIMLE service consumer on AIMLE Client selection related event(s).

6.1.7.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.7.5.2.2-1.

Table 6.1.7.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The notification Uri is assigned within the Individual AIMLE Client Selection Subscription and described within the ClientSelSub type

6.1.7.5.2.3 Standard Methods

6.1.7.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.7.5.2.3-1 and the response data structures and response codes specified in table 6.1.7.5.2.3-2.

Table 6.1.7.5.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ClientSelNotif	M	1	Represents the AIMLE Client Selection Event Notification.

Table 6.1.7.5.2.3-2: 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 AIMLE Client Selection Event 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 AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.7.5.2.3-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.1.7.5.2.3-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.1.7.6 Data Model

6.1.7.6.1 General

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

Table 6.1.7.6.1-1 specifies the data types defined for the AIMLES_AIMLEClientSelection API.

Table 6.1.7.6.1-1: AIMLES_AIMLEClientSelection API specific Data Types

Data type	Section defined	Description	Applicability
ClientSelNotif	6.1.7.6.2.3	Represents the AIMLE Client selection notification.	
ClientSelSub	6.1.7.6.2.2	Represents the AIMLE Client selection subscription information.	
ClientSelSubPatch	6.1.7.6.2.4	Represents the requested modifications to a AIMLE Client selection subscription information.	
ClientSelReq	6.1.7.6.2.5	Represents the AIMLE Client selection request.	
ClientSelResp	6.1.7.6.2.6	Represents the AIMLE Client selection response.	
SelUpdate	6.1.7.6.2.7	Represents the update of the selected client.	

Table 6.1.7.6.1-2 specifies data types re-used by the AIMLES_AIMLEClientSelection API service.

Table 6.1.7.6.1-2: AIMLES_AIMLEClientSelection API re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.1.6.3.2	Represents unique identifier of a AIMLE client.	
ClientDiscCriteria	6.1.6.6.2.2	Represents the AIMLE Client discovery criteria.	
DateTime	3GPP TS 29.122 [2]	Used to indicate a timestamp.	
SupportedFeatures	3GPP TS 29.571 [11]	Used to negotiate the applicability of optional features.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.1.7.6.2 Structured data types

6.1.7.6.2.1 Introduction

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

6.1.7.6.2.2 Type: ClientSelSub

Table 6.1.7.6.2.2-1: Definition of type ClientSelSub

Attribute name	Data type	P	Cardinality	Description	Applicability
selCriteria	ClientDiscCriteria	M	1	Represents the selection criteria for finding suitable AIMLE clients.	
reqNum	UInteger	O	0..1	Represents the requested number of the selected clients.	
notifUri	Uri	M	1	Indicates the URI towards which the notification should be delivered.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	
expTime	DateTime	O	0..1	Contains the expiration time of the subscription.	

6.1.7.6.2.3

Type: ClientSelNotif

Table 6.1.7.6.2.3-1: Definition of type ClientSelNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
reports	array(SelUpdate)	M	1..N	Contains the AIMLE Client selection update reports.	
timeStamp	DateTime	O	0..1	Contains the timestamp of the data management notification.	

6.1.7.6.2.4

Type: ClientSelSubPatch

Table 6.1.7.6.2.4-1: Definition of type ClientSelSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
selCriteria	ClientDiscCriteria	O	0..1	Represents the selection criteria for finding suitable AIMLE clients for data management operations.	
reqNum	UInteger	O	0..1	Represents the requested number of the selected clients.	
notifUri	Uri	O	0..1	Indicates the URI towards which the notification should be delivered.	

6.1.7.6.2.5

Type: ClientSelReq

Table 6.1.7.6.2.5-1: Definition of type ClientSelReq

Attribute name	Data type	P	Cardinality	Description	Applicability
valSvcId	string	O	0..1	Represents the VAL service identifier.	
clients	array(AimleClientId)	C	1..N	Represents the list of AIMLE Client IDs. (NOTE 1)	
selCriteria	ClientDiscCriteria	C	0..1	Represents the selection criteria for finding suitable AIMLE clients for data management operations. (NOTE 1)	
reqNum	UInteger	O	0..1	Represents the required number of the selected clients. (NOTE 2)	
minNum	UInteger	O	0..1	Represents the minimal number of the selected clients. (NOTE 2)	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	
NOTE 1: These attributes are mutual exclusive and only one shall be provided.					
NOTE 2: This attribute may only be present if the "selCriteria" attribute is present.					

6.1.7.6.2.6 Type: ClientSelResp

Table 6.1.7.6.2.6-1: Definition of type ClientSelResp

Attribute name	Data type	P	Cardinality	Description	Applicability
clients	array(Aimle ClientId)	O	1..N	Represents the list of selected AIMLE Client IDs.	
clientSet	string	O	1..N	Represents the selected AIMLE Client set identifier.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.7.6.2.7 Type: SelUpdate

Table 6.1.7.6.2.7-1: Definition of type SelUpdate

Attribute name	Data type	P	Cardinality	Description	Applicability
replaced	string	M	1	Represents the replaced AIMLE Client ID.	
selected	string	M	1	Represents the newly selected AIMLE Client ID instead of the replaced one.	

6.1.7.6.3 Simple data types and enumerations

6.1.7.6.3.1 Introduction

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

6.1.7.6.3.2 Simple data types

The simple data types defined in table 6.1.7.6.3.2-1 shall be supported.

Table 6.1.7.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

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

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

6.1.7.6.5 Binary data

6.1.7.6.5.1 Binary Data Types

Table 6.1.7.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.7.7 Error Handling

6.1.7.7.1 General

For the AIMLES_AIMLEClientSelection API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.7.7.2 Protocol Errors

No specific protocol errors for the AIMLES_AIMLEClientSelection API are specified.

6.1.7.7.3 Application Errors

The application errors defined for AIMLES_AIMLEClientSelection API are listed in table 6.1.7.7.3-1.

Table 6.1.7.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.7.8 Feature negotiation

The optional features in table 6.1.7.8-1 are defined for the AIMLES_AIMLEClientSelection API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.7.8-1: Supported Features

Feature number	Feature Name	Description

6.1.7.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AIMLEClientSelection API.

6.1.8 AIMLES_MLModelTraining API

6.1.8.1 Introduction

The ML model training service shall use the AIMLES_MLModelTraining API.

The API URI of the AIMLES_MLModelTraining API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 5.2.1.4 of 3GPP TS 29.122 [2], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-trn".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.8.3 and clause 6.1.8.4.

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

6.1.8.2 Usage of HTTP and common API related aspects

The provisions of clause 5.2.1 of 3GPP TS 29.122 [2] shall apply for the AIMLES_MLModelTraining API.

6.1.8.3 Resources

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

6.1.8.4 Custom Operations without associated resources

6.1.8.4.1 Overview

The structure of the custom operation URIs of the AIMLES_ContextTransfer API is shown in Figure 6.1.8.4.1-1.

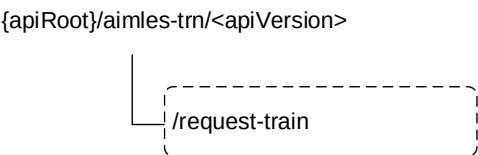


Figure 6.1.8.4.1-1: Custom operation URI structure of the AIMLES_MLModelTraining API

Table 6.1.8.4.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the AIMLES_MLModelTraining API.

Table 6.1.8.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
RequestTrain	/request-train	POST	Enables a service consumer to send AIMLE ML Model training request to the AIMLE server.

The custom operations shall support the URI variables defined in table 6.1.8.4.1-2.

Table 6.1.8.4.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 6.1.8.

6.1.8.4.2 Operation: RequestTrain

6.1.8.4.2.1 Description

The custom operation enables a service consumer to send AIMLE ML Model training request to the AIMLE server.

6.1.8.4.2.2 Operation Definition

This operation shall support the response data structures and response codes specified in tables 6.1.8.4.2.2-1 and 6.1.8.4.2.2-2.

Table 6.1.8.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
TrainRequest	M	1	Contains the parameters to request AIMLE ML Model training.

Table 6.1.8.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MlModelTrainResp	M	1	200 OK	Successful case. The ML Model training request is successfully received and processed. The identifier of the ML model selected by AIMLE server for training and the ML model training identifier shall be included in the response message.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative target AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative target AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] also apply.				

6.1.8.5 Notifications

6.1.8.5.1 General

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

Table 6.1.8.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
ML Model Training Notification	{notifUri}	POST	Notification about the ML Model training.

6.1.8.5.2 ML Model Training Notification

6.1.8.5.2.1 Description

The Event Notification is used by the service producer to report the ML Model Training events to the service consumer that has subscribed to such Notifications.

6.1.8.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.8.5.2.2-1.

Table 6.1.8.5.2.2-1: Callback URI variables

Name	Definition
notifUri	String formatted as URI with the Callback Uri

6.1.8.5.2.3 Standard Methods

6.1.8.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.8.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.8.5.2.3.1-1.

Table 6.1.8.5.2.3.1-2: Data structures supported by the POST Request Body

Data type	P	Cardinality	Description
MIModelTrainNotif	M	1	Notification information on the ML Model Training events.

Table 6.1.8.5.2.3.1-3: Data structures supported by the POST Response Body

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Notification is acknowledged.
n/a			307 Temporary Redirect	Temporary redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection, during notification. The response shall include a Location header field containing an alternative URI representing the end point of an alternative notification destination where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] also apply.				

6.1.8.6 Data Model

6.1.8.6.1 General

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

Table 6.1.8.6.1-1 specifies the data types defined for the AIMLES_MLModelTraining API.

Table 6.1.8.6.1-1: AIMLES_MLModelTraining API specific Data Types

Data type	Clause defined	Description	Applicability
CommonId	6.1.8.6.2.12	Represents the common features information.	
EarlyStopCri	6.1.8.6.2.10	Represents the early stopping criteria.	
FeatureList	6.1.8.6.2.13	Represents the feature list of an AIMLE client.	
MemberInfo	6.1.8.6.2.6	Represents the list of AIMLE clients selected or de-selected for the ML model training.	
MemberSelCriteria	6.1.8.6.2.4	Represents the criteria to be continuously monitored for selecting the member clients.	
MLModelInfo	6.1.8.6.2.5	Represents the ML model information.	
MLModelTrainNotif	6.1.8.6.2.3	Represents the ML Model training notification	
MLModelTrainResp	6.1.8.6.2.8	Represents the ML model training response.	
PerfParams	6.1.8.6.2.7	Represents the output of training, e.g., ML model performance parameters for the training.	
TrainingErr	6.1.8.6.3.4	Represents the error encountered during training.	
TrainRequest	6.1.8.6.2.2	Represents the ML Model training request	
TrainingObj	6.1.8.6.2.9	Represents the termination condition for ML model training.	
TrainingType	6.1.8.6.3.3	Represents the training type.	
VFLParam	6.1.8.6.2.11	Represents the VFL parameters.	

Table 6.1.8.6.1-2 specifies data types re-used by the AIMLES_MLModelTraining API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the AIMLES_MLModelTraining API.

Table 6.1.8.6.1-2: AIMLES_MLModelTraining API re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.1.6.3.2	Represents unique identifier of a AIMLE client.	
ClientCapability	3GPP TS 24.560 [12]	Represents the client capability information.	
EndPoint	3GPP TS 29.558 [15]	Represents the endpoint information.	
Float	3GPP TS 29.571 [11]	Used to represent the fractional part of the proximity range in the reference UE details.	
LocationArea5G	3GPP TS 29.122 [2]	Used to indicate a location area represented as list of geographic areas, civic addresses and network area.	
MLModel	6.2.1.6.2.4	Represents the ML model that has to be distributed to the selected member clients for training.	
PerformanceMetric	6.1.11.6.3.3	Represents the performance metric for training the ML model.	
TimeWindow	3GPP TS 29.122 [2]	Indicates the time window.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Represent an URI, used to indicate the notification URI.	

6.1.8.6.2 Structured data types

6.1.8.6.2.1 Introduction

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

6.1.8.6.2.2

Type: TrainRequest

Table 6.1.8.6.2.2-1: Definition of type TrainRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
trnType	TrainingType	M	1	Contains the type of training to be performed.	
members	array(AimleClientId)	C	1..N	Contains the list of member clients to be utilized for training the ML model. (NOTE 1)	
clientSetId	string	C	0..1	Contains the AIMLE client set identifier. (NOTE 1)	
memSelCrit	MemberSelCriteria	C	0..1	Contains the criteria that needs to be continuously monitored for selecting the member clients. (NOTE 1)	
numReqClients	UInteger	O	0..1	Contains the requested number of AIML clients to be selected based on member selection criteria.	
modelInf	MIModelInfo	C	0..1	Contains the ML model that has to be distributed to the selected member clients for training. (NOTE 2)	
modelReq	MLModel	C	0..1	Contains the requirement for selecting a model to be trained and the filtering criteria for selecting the model. (NOTE 2)	
trainObj	TrainingObj	O	0..1	Contains the termination condition for the ML model training.	
datasetId	array(string)	M	1..N	Contains the identifiers for dataset used for HFL or VFL training. For VFL, multiple dataset identifiers can be specified.	
dataSamples	UInteger	O	0..1	Contains the number of data samples required for one round of HFL or VFL training.	
opSchedule	string	O	0..1	Contains the schedule for when training is to occur.	
vflParam	VFLParam	C	0..1	Contains the parameters specific to VFL training. This IE shall be present for VFL training.	
memUpdNotif	boolean	O	0..1	Indicates whether the requestor needs to be notified whenever there is update related to new member clients selected or de-selected. Set to "true" to indicate that requestor needs to be notified whenever there is update related to new member clients selected or de-selected. Default value is "false" if omitted.	
notifUri	Uri	C	0..1	Contains the notification URI where notifications should be sent. This attribute shall be present when the attribute "memUpdNotif" is set to "true".	
NOTE 1: At least one of these attributes shall be present.					
NOTE 2: At least one of these attributes shall be present.					

6.1.8.6.2.3

Type: MIModelTrainNotif

Table 6.1.8.6.2.3-1: Definition of type MIModelTrainNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
trainingID	string	C	0..1	Contains an identifier for ML model training request.	
members	array(MemberInfo)	C	1..N	Contains the list of AIMLE clients selected or de-selected for the ML model training. (NOTE)	
trainOut	PerfParams	C	0..1	Contains the output of training, e.g., ML model parameters for the training. (NOTE)	
percentageComp	integer	C	0..1	Contains the completion percentage for the training. Minimum: 0, maximum: 100.	
trainErr	TrainingErr	C	0..1	Contains the list of errors, if any, encountered during training process. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.1.8.6.2.4

Type: MemberSelCriteria

Table 6.1.8.6.2.4-1: Definition of type MemberSelCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
clientLoc	LocationArea5G	C	0..1	Contains the location of the AIMLE client for the AIML service that needs to be monitored.	
clientAvailability	TimeWindow	C	0..1	Contains the required availability duration of the AIMLE client.	
clientCapability	ClientCapability	C	0..1	Contains the required client capability information.	
NOTE: At least one of these attributes shall be present.					

6.1.8.6.2.5

Type: MIModelInfo

Table 6.1.8.6.2.5-1: Definition of type MIModelInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
mIModelId	string	C	0..1	Contains the identifier for ML model.	
mIModelLoc	EndPoint	C	0..1	Contains the URI, fqdn or address that maps to the resource where ML model is stored.	
NOTE: At least one of these attributes shall be present.					

6.1.8.6.2.6

Type: MemberInfo

Table 6.1.8.6.2.6-1: Definition of type MemberInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
clientSel	boolean	C	0..1	Indicates whether the AIMLE client is selected or not. 0 represents the client is not selected. 1 represents the client is selected.	
clientUri	Uri	C	0..1	Contains the URI information of the AIMLE clients.	
NOTE: At least one of these attributes shall be present.					

6.1.8.6.2.7

Type: PerfParams

Table 6.1.8.6.2.7-1: Definition of type PerfParams

Attribute name	Data type	P	Cardinality	Description	Applicability
modelAccuracy	integer	C	0..1	Indicates the achieved ML model accuracy, expressed as a percentage. Minimum: 0, maximum: 100.	
modelPrecision	Float	C	0..1	Represents the accuracy for the positive predictions made by the model. Minimum: 0, maximum: 1.	
modelRecall	Float	C	0..1	Represents model's ability to identify all the actual positive instances within a dataset. Minimum: 0, maximum: 1.	
modelF1Score	Float	C	0..1	Represents the combined metric for precision and recall. Minimum: 0, maximum: 1.	
errorMeanSquare	Float	C	0..1	Represents the mean squared error between predicted values and actual values.	
errorMeanAbs	Float	C	0..1	Represents the mean absolute error between predicted values and actual values.	
NOTE: At least one of these attributes shall be present.					

6.1.8.6.2.8

Type: MIModelTrainResp

Table 6.1.8.6.2.8-1: Definition of type MIModelTrainResp

Attribute name	Data type	P	Cardinality	Description	Applicability
trainingId	string	M	1	Contains an identifier for ML model training request.	
modelId	string	O	0..1	Contains the identifier for the ML model selected by AIMLE server.	

6.1.8.6.2.9 Type: TrainingObj

Table 6.1.8.6.2.9-1: Definition of type TrainingObj

Attribute name	Data type	P	Cardinality	Description	Applicability
objType	PerformanceMetric	M	1	Contains the metric to be optimized by the ML model (e.g., accuracy).	
targetValue	Float	O	0..1	Contains the threshold to be reached for the objective type.	
earlyStopCri	EarlyStopCri	O	0..1	Contains the metric to be used for early stopping.	
maxEpochs	UInteger	O	0..1	Contains the maximum number of training epochs.	
accTrainingErr	Float	O	0..1	Contains the maximum acceptable training error.	
inferenceLatency	Float	O	0..1	Contains the inference latency requirements for the trained model.	

6.1.8.6.2.10 Type: EarlyStopCri

Table 6.1.8.6.2.10-1: Definition of type EarlyStopCri

Attribute name	Data type	P	Cardinality	Description	Applicability
minDelta	Float	O	0..1	Contains the threshold to consider as improvement.	
patience	UInteger	O	0..1	Contains the number of epochs without improvement to stop the training.	

6.1.8.6.2.11 Type: VFLParam

Table 6.1.8.6.2.11-1: Definition of type VFLParam

Attribute name	Data type	P	Cardinality	Description	Applicability
datasetComm	array(CommonId)	O	1..N	Contains the list of one or more common features required for VFL training. (E.g., UE ID, AIMLE client ID, Group ID, VAL service ID, etc)	
featureList	array(FeatureList)	O	1..N	Contains the list of features for each data domain of the dataset at the client.	
featureAlign	array(FeatureList)	O	1..N	Contains the information to align features from dataset of different domains for VFL training.	
dataLabels	array(string)	O	1..N	Contains the ground truth data for VFL training.	

6.1.8.6.2.12 Type: CommonId

Table 6.1.8.6.2.12-1: Definition of type CommonId

Attribute name	Data type	P	Cardinality	Description	Applicability
featureType	string	O	0..1	Contains the type of common features that can be UE identifiers, AIMLE client identifiers, group identifier, VAL service identifier, area of interest, and VAL service area.	
featureId	string	O	0..1	Contains the common identifier for the given feature type.	

6.1.8.6.2.13 Type: FeatureList

Table 6.1.8.6.2.13-1: Definition of type FeatureList

Attribute name	Data type	P	Cardinality	Description	Applicability
clientId	AimleClientId	O	0..1	Contains the identifier for the AIMLE clients participating in the VFL training.	
list	array(string)	O	1..N	Contains the list of all the features for dataset at the AIMLE clients.	

6.1.8.6.3 Simple data types and enumerations

6.1.8.6.3.1 Introduction

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

6.1.8.6.3.2 Simple data types

The simple data types defined in table 6.1.8.6.3.2-1 shall be supported.

Table 6.1.8.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
AimleModelId	string	Represents the ML model identifier.	

6.1.8.6.3.3 Enumeration: TrainingType

The enumeration TrainingType represents the type training requested. It shall comply with the provisions defined in table 6.1.8.6.3.3-1.

Table 6.1.8.6.3.3-1: Enumeration TrainingType

Enumeration value	Description	Applicability
TRAIN_VFL	Indicates that the training type is horizontal federated learning	
TRAIN_HFL	Indicates that the training type is vertical federated learning	

6.1.8.6.3.4 Enumeration: TrainingErr

The enumeration TrainingErr represents the training error encountered during ML model training. It shall comply with the provisions defined in table 6.1.8.6.3.4-1.

Table 6.1.8.6.3.4-1: Enumeration TrainingErr

Enumeration value	Description	Applicability
UNDERFITTING	Indicates that the trained model is underfitting the training data.	
OVERFITTING	Indicates that the trained mode is overfitting the training data.	
PERFORMANCE_ERRORS	Indicates that the trained model is unable to meet the desired performance.	
DATA_LEAKAGE	Indicates that there is data leakage from evaluation data set to the training data.	

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

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

6.1.8.6.5 Binary data

6.1.8.6.5.1 Binary Data Types

Table 6.1.8.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.8.7 Error Handling

6.1.8.7.1 General

For the AIMLES_MLModelTraining API, HTTP error responses shall be supported as specified in clause 5.2.1.6 of 3GPP TS 29.122 [2]. Protocol errors and application errors specified in clause 5.2.1.6 of 3GPP TS 29.122 [2] shall be supported for the HTTP status codes specified in table 5.2.1.6-1 of 3GPP TS 29.122 [2].

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

6.1.8.7.2 Protocol Errors

No specific procedures for the AIMLES_MLModelTraining API are specified.

6.1.8.7.3 Application Errors

The application errors defined for the AIMLES_MLModelTraining API are listed in Table 6.1.8.7.3-1.

Table 6.1.8.7.3-1: Application errors

Application Error	HTTP status code	Description

6.1.8.8 Feature negotiation

The optional features in table 6.1.8.8-1 are defined for the AIMLES_MLModelTraining API. They shall be negotiated using the extensibility mechanism defined in clause 5.2.1.7 of 3GPP TS 29.122 [2].

Table 6.1.8.8-1: Supported Features

Feature number	Feature Name	Description

6.1.8.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [2] shall apply for the AIMLES_MLModelTraining API.

6.1.9 AIMLES_MLModelPerfMonitor API

6.1.9.1 Introduction

The AIMLES_MLModelPerfMonitor Service shall use the AIMLES_MLModelPerfMonitor API.

The API URI of the AIMLES_MLModelPerfMonitor API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-mlmpm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.9.3 and clause 6.1.9.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.9, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.9.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelPerfMonitor API.

6.1.9.3 Resources

6.1.9.3.1 Overview

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

Figure 6.1.9.3.1-1 depicts the resource URIs structure for the AIMLES_MLModelPerfMonitor API.

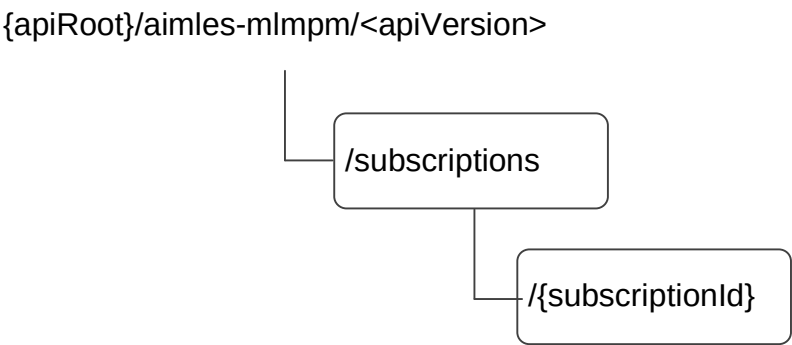


Figure 6.1.9.3.1-1: Resource URI structure of the AIMLES_MLModelPerfMonitor API

Table 6.1.9.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.9.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
AIMLE ML Model Performance Monitor Subscriptions	/subscriptions	POST	Request the creation of an AIMLE ML Model Performance Monitor Subscription resource.
Individual AIMLE ML Model Performance Monitor Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource.
		PUT	Request the update of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource.
		PATCH	Request the modification of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource.
		DELETE	Request the deletion of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource.

6.1.9.3.2 Resource: AIMLE ML Model Performance Monitor Subscriptions

6.1.9.3.2.1 Description

This resource represents the collection of AIMLE ML Model Performance Monitor Subscriptions managed by the AIMLE Server.

6.1.9.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-mlmpm/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.1.9.3.2.2-1.

Table 6.1.9.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.9.1.

6.1.9.3.2.3 Resource Standard Methods

6.1.9.3.2.3.1 POST

The HTTP POST method enables a AIMLE service consumer to request the creation of a new Individual AIMLE ML Model Performance Monitor Subscription at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.9.3.2.3.1-1.

Table 6.1.9.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 6.1.9.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.9.3.2.3.1-3.

Table 6.1.9.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MIMdIPerfMonitSub	M	1	Create a new Individual AIMLE ML Model Performance Monitor Subscription resource.

Table 6.1.9.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

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

Table 6.1.9.3.2.3.1-4: 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}/aimles-mlmpm/<apiVersion>/subscriptions{subscriptionId}

6.1.9.3.2.4 Resource Custom Operations

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

6.1.9.3.3 Resource: Individual AIMLE ML Model Performance Monitor Subscription

6.1.9.3.3.1 Description

6.1.9.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-mlmpm/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.9.3.3.2-1.

Table 6.1.9.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.9.1
subscriptionId	string	Represents the identifier of an "Individual AIMLE ML Model Performance Monitor Subscription" resource.

6.1.9.3.3.3 Resource Standard Methods

6.1.9.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.9.3.3.3.1-1.

Table 6.1.9.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.9.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.9.3.3.3.1-3.

Table 6.1.9.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.9.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MIMdIPerfMonitSub	M	1	200 OK	Successful case. The requested "Individual AIMLE ML Model Performance Monitor 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.9.3.3.3.1-4: 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 AIMLE Server.

Table 6.1.9.3.3.3.1-5: 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 AIMLE Server.

6.1.9.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.9.3.3.3.2-1.

Table 6.1.9.3.3.2-1: 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 6.1.9.3.3.2-2 and the response data structures and response codes specified in table 6.1.9.3.3.2-3.

Table 6.1.9.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MIMdIPerfMonitSub	M	1	Represents the updated representation of the "Individual AIMLE ML Model Performance Monitor Subscription" resource.

Table 6.1.9.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MIMdIPerfMonitSub	M	1	200 OK	Successful case. The "Individual AIMLE ML Model Performance Monitor 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 AIMLE ML Model Performance Monitor 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.9.3.3.2-4: 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 AIMLE Server.

Table 6.1.9.3.3.2-5: 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 AIMLE Server.

6.1.9.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.9.3.3.3.3-1.

Table 6.1.9.3.3.3.3-1: 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 6.1.9.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.9.3.3.3.3-3.

Table 6.1.9.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MIMdIPerfMonitSub Patch	M	1	Represents the parameters to request the modification of the "Individual AIMLE ML Model Performance Monitor Subscription" resource.

Table 6.1.9.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MIMdIPerfMonitSub	M	1	200 OK	Successful case. The "Individual AIMLE ML Model Performance Monitor 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 AIMLE ML Model Performance Monitor 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.9.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.9.3.3.3-5: 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 AIMLE Server.

6.1.9.3.3.4 DELETE

The HTTP DELETE method allows a AIMLE service consumer to request the deletion of an existing "Individual AIMLE ML Model Performance Monitor Subscription" resource.

Table 6.1.9.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.9.3.3.4-2 and the response data structures and response codes specified in table 6.1.9.3.3.4-3.

Table 6.1.9.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.9.3.3.4-3: 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 AIMLE ML Model Performance Monitor 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.9.3.3.4-4: 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 AIMLE Server.

Table 6.1.9.3.3.4-5: 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 AIMLE Server.

6.1.9.3.3.4 Resource Custom Operations

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

6.1.9.4 Custom Operations without associated resources

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

6.1.9.5 Notifications

6.1.9.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.1.9.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE ML Model Performance Monitor Event Notification	{notifUri}	POST	This service operation enables an AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML ML Model Performance Monitor related event(s).

6.1.9.5.2 AIMLE ML Model Performance Monitor Event Notification

6.1.9.5.2.1 Description

The AIMLE ML Model Performance Monitor Event Notification is used by the AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML ML Model Performance Monitor related event(s).

6.1.9.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.9.5.2.2-1.

Table 6.1.9.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The Notification URI is assigned within the Individual AIMLE ML Model Performance Monitor Subscription and described within the MIMdIPerfMonitSub type

6.1.9.5.2.3 Standard Methods

6.1.9.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.9.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.9.5.2.3.1-2.

Table 6.1.9.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MIMdIPerfMonitNotif	M	1	Represents the AIMLE ML Model Performance Monitor Event Notification.

Table 6.1.9.5.2.3.1-2: 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 AIMLE ML Model Performance Monitor Event 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 AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.9.5.2.3.1-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.1.9.5.2.3.1-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.1.9.6 Data Model

6.1.9.6.1 General

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

Table 6.1.9.6.1-1 specifies the data types defined for the AIMLES_MLModelPerfMonitor API.

Table 6.1.9.6.1-1: AIMLES_MLModelPerfMonitor API specific Data Types

Data type	Section defined	Description	Applicability
AimlOperInfo	6.1.9.6.2.6	Represents the information on the AIML operation.	
AimlOperType	6.1.9.6.3.3	Represents the AIML operation type.	
MIMdIDegraded	6.1.9.6.2.7	Represents the metrics of the degraded ML model.	
MIMdIDegradedParam	6.1.9.6.3.6	Represents the parameters of the degraded ML model.	
MIMdIPerfMonitSub	6.1.9.6.2.2	Represents the AIMLE ML Model Performance Monitor subscription information.	
MIMdIPerfMonitSubNotif	6.1.9.6.2.4	Represents the AIMLE ML Model Performance Monitor notification.	
MIMdIPerfMonitSubPatch	6.1.9.6.2.3	Represents the requested modifications to the AIMLE ML Model Performance Monitor subscription information.	
MontReportConfig	6.1.9.6.2.5	Represents the configuration of the monitoring report.	
ReportType	6.1.9.6.3.4	Represents the type of the monitoring report.	
ServPerfKpi	6.1.9.6.2.8	Represents the key performance indicators for the AIMLE service performance.	
TrigActReqType	6.1.9.6.3.5	Represents the types of the trigger action requirements on the monitoring event.	

Table 6.1.9.6.1-2 specifies data types re-used by the AIMLES_MLModelPerfMonitor API service.

Table 6.1.9.6.1-2: AIMLES_MLModelPerfMonitor API re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.2.6.3.2	Represents unique identifier of a AIMLE client.	
GeographicArea	3GPP TS 29.572 [14]	Identifies the geographical information of the FL member.	
QosMonitoringInformation	3GPP TS 29.122 [2]	Identifies the QoS monitoring information.	
SupportedFeatures	3GPP TS 29.571 [11]	Used to negotiate the applicability of optional features.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.1.9.6.2 Structured data types

6.1.9.6.2.1 Introduction

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

6.1.9.6.2.2

Type: MIMdIPerfMonitSub

Table 6.1.9.6.2.2-1: Definition of type MIMdIPerfMonitSub

Attribute name	Data type	P	Cardinality	Description	Applicability
mIMdId	string	M	1	Identifies the ML model, for which the request applies.	
notifUri	Uri	M	1	Identifies the URI, towards which the notification should be delivered.	
montReportConfig	MontReportConfig	M	1	Configuration of the monitoring report, for which the request applies.	
aimlOperInfo	AimlOperInfo	O	0..1	Information on the AIML operation, for which the ML model is used.	
trigActReq	array(TrigActReqType)	O	1..N	Identifies the requirement for triggering an action on the monitoring event.	
areaValidity	GeographicArea	O	0..1	Identifies the coordinate of the area of interest, for which the request applies.	
timeValidity	TimeWindow	O	0..1	Identifies the time of interest, for which the request applies.	
suppFeat	SupportedFeatures	C	0..1	Identifies the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.9.6.2.3

Type: MIMdIPerfMonitSubPatch

Table 6.1.9.6.2.3-1: Definition of type MIMdIPerfMonitSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	O	0..1	Identifies the URI, towards which the notification should be delivered.	
montReportConfig	MontReportConfig	O	0..1	Configuration of the monitoring report, for which the request applies.	
aimlOperInfo	AimlOperInfo	O	0..1	Information on the AIML operation, for which the ML model is used.	
trigActReq	array(TrigActReqType)	O	1..N	Identifies the requirements for triggering an action on the monitoring event.	
areaValidity	GeographicArea	O	0..1	Identifies the coordinate of the area of interest, for which the request applies.	
timeValidity	TimeWindow	O	0..1	Identifies the time of interest, for which the request applies.	

6.1.9.6.2.4

Type: MIMdIPerfMonitNotif

Table 6.1.9.6.2.4-1: Definition of type MIMdIPerfMonitNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
mIMdIDegraded	MIMdIDegraded	M	1	Identifies the type of degradation of the ML Model performance	
trigActReq	TrigActReqType	O	0..1	Identifies the requirement for triggering an action on the monitoring event.	

6.1.9.6.2.5

Type: MontReportConfig

Table 6.1.9.6.2.5-1: Definition of type MontReportConfig

Attribute name	Data type	P	Cardinality	Description	Applicability
reportType	ReportType	M	1	Identifies the type of the report.	
delay	UInteger	C	0..1	Identifies delay time in units of micro seconds, that triggers the monitoring event. This parameter shall be present when the attribute "reportType" is set to "EVENT_TRIGGERED".	
minAccuracy	UInteger	C	0..1	Identifies an unsigned integer between 0 and 100 representing the percentage of minimum accuracy, that triggers the monitoring event. This parameter shall be present when the attribute "reportType" is set to "EVENT_TRIGGERED".	
period	UInteger	C	0..1	Identifies an unsigned integer, that represents the time interval in seconds. This parameter shall be present when the attribute "reportType" is set to "PERIODIC".	

6.1.9.6.2.6

Type: AimlOperInfo

Table 6.1.9.6.2.6-1: Definition of type AimlOperInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
aimlOper	AimlOperType	M	1	Identifies the type of the AIML operation.	
servId	string	M	1	Identifies the AIMLE service using the ML model.	
clientList	array(AimleClientId)	M	1..N	Identifies the list of AIMLE client identifiers for training ML Model.	
servPerfKpi	ServPerfKpi	M	1	Identifies the key performance indicators for the AIMLE service performance.	

6.1.9.6.2.7

Type: MlMdlDegraded

Table 6.1.9.6.2.7-1: Definition of type MlMdlDegraded

Attribute name	Data type	P	Cardinality	Description	Applicability
mlMdlDegraded	boolean	M	1	Identifies whether the ML model has degraded (TRUE) or not (FALSE).	
mlMdlDegradedParam	array(MlMdlDegradedParam)	O	1..N	Identifies the ML model metrics that have degraded.	
mlMdlDegradedCause	string	O	0..1	Identifies the cause for the ML model degradation.	

6.1.9.6.2.8

Type: ServPerfKpi

Table 6.1.9.6.2.8-1: Definition of type ServPerfKpi

Attribute name	Data type	P	Cardinality	Description	Applicability
latency	UInteger	M	1	Identifies a period of time in units of micro seconds.	
accuracy	UInteger	M	1	Identifies an unsigned integer between 0 and 100 representing the percentage of accuracy.	
qos	QosMonitoringInformation	M	1	Identifies the QoS Monitoring information	

6.1.9.6.2.9

Type: MIMdIDegradedParam

Table 6.1.9.6.2.9-1: Definition of type MIMdIDegradedParam

Attribute name	Data type	P	Cardinality	Description	Applicability
recall	UInteger	M	1	Identifies an unsigned integer between 0 and 100 representing the percentage of recall.	
precision	UInteger	M	1	Identifies an unsigned integer between 0 and 100 representing the percentage of precision.	
accuracy	UInteger	M	1	Identifies an unsigned integer between 0 and 100 representing the percentage of accuracy.	

6.1.9.6.3

Simple data types and enumerations

6.1.9.6.3.1

Introduction

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

6.1.9.6.3.2

Simple data types

The simple data types defined in table 6.1.9.6.3.2-1 shall be supported.

Table 6.1.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.9.6.3.3

Enumeration: AimlOperType

Table 6.1.9.6.3.3-1: Enumeration AimlOperType

Enumeration value	Description	Applicability
ML_MODEL	Identifies that AIML operation is ML model training.	
HFL	Identifies that AIML operation is Horizontal Federated Learning (HFL) training.	
VFL	Identifies that AIML operation is Vertical Federated Learning (VFL) training.	
TL	Identifies that AIML operation is Transfer Learning (TL) training.	

6.1.9.6.3.4 Enumeration: ReportType

Table 6.1.9.6.3.4-1: Enumeration ReportType

Enumeration value	Description	Applicability
ONE_TIME	Identifies the report is of one time type.	
PERIODIC	Identifies the report is of periodic type.	
EVENT_TRIGGERED	Identifies the report is of event triggered type.	

6.1.9.6.3.5 Enumeration: TrigActReqType

Table 6.1.9.6.3.4-1: Enumeration TrigActReqType

Enumeration value	Description	Applicability
ADAPTATION	Identifies the trigger action requirement is training of a new ML model for the AIMLE service by the same or a new AIMLE client.	
RETRAINING	Identifies the trigger action requirement is retraining of the existing ML model for the AIMLE service by the same or a new AIMLE client.	
TERMINATION	Identifies the trigger action requirement is terminating of the existing ML model for AIMLE service and initiating to train a new ML model by the same or a new AIMLE client.	

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

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

6.1.9.6.5 Binary data

6.1.9.6.5.1 Binary Data Types

Table 6.1.9.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.9.7 Error Handling

6.1.9.7.1 General

For the AIMLES_MLModelPerfMonitor API, HTTP error responses shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.9.7.2 Protocol Errors

No specific protocol errors for the AIMLES_MLModelPerfMonitor API are specified.

6.1.9.7.3 Application Errors

The application errors defined for AIMLES_MLModelPerfMonitor API are listed in table 6.1.9.7.3-1.

Table 6.1.9.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.9.8 Feature negotiation

The optional features in table 6.1.9.8-1 are defined for the AIMLES_MLModelPerfMonitor API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.9.8-1: Supported Features

Feature number	Feature Name	Description

6.1.9.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelPerfMonitor API.

6.1.10 AIMLES_TLModelSelectionAssistance API

6.1.10.1 Introduction

The AIMLES_TLModelSelectionAssistance service shall use the AIMLES_TLModelSelectionAssistance API.

The API URI of the AIMLES_TLModelSelectionAssistance API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-tlmsa".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.10.3 and clause 6.1.10.4.

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

6.1.10.2 Usage of HTTP and common API related aspects

The provisions of clause 5.2.1 of 3GPP TS 29.122 [2] shall apply for the AIMLES_TLModelSelectionAssistance API.

6.1.10.3 Resources

6.1.10.3.1 Overview

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

Figure 6.1.10.3.1-1 depicts the resource URIs structure for the AIMLES_TLModelSelectionAssistance Service API.

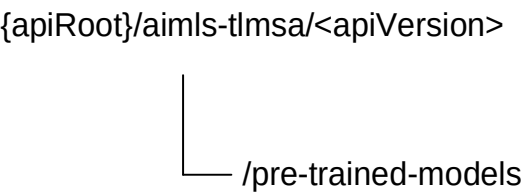


Figure 6.1.10.3.1-1: Resource URI structure of the AIMLES_TLModelSelectionAssistance Service API

Table 6.1.10.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.10.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
AIMLE TL Model Selection Assistance	/pre-trained-models	GET	Request the AIMLE TL Model Selection Assistance according to the filtering criteria.

6.1.10.3.2 Resource: AIMLE TL Model Selection Assistance

6.1.10.3.2.1 Description

The "AIMLE TL Model Selection Assistance" resource represents the AIMLE TL Model Selection Assistance.

6.1.10.3.2.2 Resource Definition

Resource URI: **{apiRoot}/aimles-tlmsa/<apiVersion>/pre-trained-models**

This resource shall support the resource URI variables defined in the table 6.1.10.3.2.2-1.

Table 6.1.10.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5 of 3GPP TS 29.549 [10].

6.1.10.3.2.3 Resource Standard Methods

6.1.10.3.2.3.1 GET

This method shall support the URI query parameters specified in table 6.1.10.3.2.3.1-1.

Table 6.1.10.3.2.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
filt-criteria	TIModelSelectAssistReq	M	1	Represents the AIMLE Model Selection Assistance filtering criteria.
supported-features	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This query parameter shall be present only if feature negotiation needs to take place.

This method shall support the request data structures specified in table 6.1.10.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.10.3.2.3.1-3.

Table 6.1.10.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.10.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
TIModelSelectAssistResp	M	1	200 OK	Successful case. The response body contains one or more pre-trained ML models for the target ML task.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.10.3.2.3.1-4: 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 AIMLE Server.

Table 6.1.10.3.2.3.1-5: 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 AIMLE Server.

6.1.10.3.2.4 Resource Custom Operations

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

6.1.10.4 Custom Operations without associated resources

There are no custom operations without associated resources in the present release of the document.

6.1.10.5 Notifications

There are no notifications in the present release of the document.

6.1.10.6 Data Model

6.1.10.6.1 General

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

Table 6.1.10.6.1-1 specifies the data types defined for the AIMLES_TLModelSelectionAssistance API.

Table 6.1.10.6.1-1: AIMLES_TLModelSelectionAssistance API specific Data Types

Data type	Section defined	Description	Applicability
		.	

Table 6.1.10.6.1-2 specifies data types re-used by the AIMLES_TLModelSelectionAssistance API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the AIMLES_TLModelSelectionAssistance API.

Table 6.1.10.6.1-2: AIMLES_TLModelSelectionAssistance API Re-used Data Types

Data type	Reference	Comments	Applicability
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
TlModelSelectAssistReq	3GPP TS 24.560 [12]	Represents the filter criteria.	
TlModelSelectAssistResp	3GPP TS 24.560 [12]	Represents the pre-trained models for the target ML task.	

6.1.10.6.2 Structured data types

6.1.10.6.2.1 Introduction

There is not any structure to be used in resource representations.

6.1.10.6.3 Simple data types and enumerations

6.1.10.6.3.1 Introduction

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

6.1.10.6.3.2 Simple data types

The simple data types defined in table 6.1.10.6.3.2-1 shall be supported.

Table 6.1.10.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

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

There are no data types describing alternative data types and combinations of data types in this release of the specification.

6.1.10.6.5 Binary data

There are no binary data defined in this release of the specification.

6.1.10.7 Error Handling

6.1.10.7.1 General

For the AIMLES_TLModelSelectionAssistance API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.10.7.2 Protocol Errors

No specific procedures for the AIMLES_TLModelSelectionAssistance API are specified.

6.1.10.7.3 Application Errors

The application errors defined for AIMLES_TLModelSelectionAssistance API are listed in table 6.1.10.7.3-1.

Table 6.1.10.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.10.8 Feature Negotiation

The optional features in table 6.1.10.8-1 are defined for the AIMLES_TLModelSelectionAssistance API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.10.8-1: Supported Features

Feature number	Feature Name	Description

6.1.10.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_TLModelSelectionAssistance API.

6.1.11 AIMLES_AssistedMLModelSelection API

6.1.11.1 Introduction

The AIMLES_AssistedMLModelSelection service shall use the AIMLES_AssistedMLModelSelection API.

The API URI of the AIMLES_AssistedMLModelSelection API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-amlmsel".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.11.3 and 6.1.11.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.11, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.11.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AssistedMLModelSelection API.

6.1.11.3 Resources

6.1.11.3.1 Overview

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

Figure 6.1.11.3.1-1 depicts the resource URIs structure for the AIMLES_AssistedMLModelSelection API.

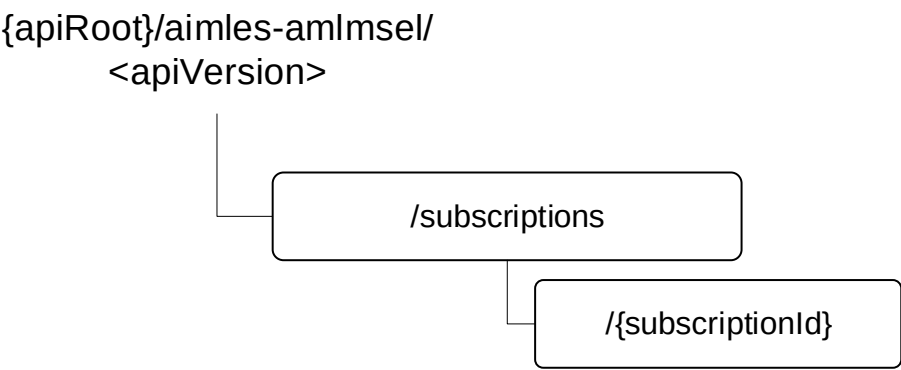


Figure 6.1.11.3.1-1: Resource URI structure of the AIMLES_AssistedMLModelSelection API

Table 6.1.11.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.11.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
AIMLE Assisted ML Model Selection Subscriptions	/subscriptions	POST	Request the creation of a AIMLE Assisted ML Model Selection Subscription resource.
Individual AIMLE Assisted ML Model Selection Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource.
		PUT	Request the update of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource.
		PATCH	Request the modification of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource.
		DELETE	Request the deletion of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource.

6.1.11.3.2 Resource: AIMLE Assisted ML Model Selection Subscriptions

6.1.11.3.2.1 Description

This resource represents the collection of AIMLE Assisted ML Model Selection Subscriptions managed by the AIMLE Server.

6.1.11.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-amlmsel/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.1.11.3.2.2-1.

Table 6.1.11.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.11.1.

6.1.11.3.2.3 Resource Standard Methods

6.1.11.3.2.3.1 POST

The HTTP POST method enables a AIMLE service consumer to request the creation of a new Individual AIMLE Assisted ML Model Selection Subscription at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.11.3.2.3.1-1.

Table 6.1.11.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 6.1.11.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.11.3.2.3.1-3.

Table 6.1.11.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AssistMLMdlSelSubsc	M	1	Create a new Individual AIMLE Assisted ML Model Selection Subscription resource.

Table 6.1.11.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AssistMLMdlSelSubsc	M	1	201 Created	Successful case. The creation of an Individual AIMLE Assisted ML Model Selection Subscription resource is confirmed and a representation of that resource is returned in the response body. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.3.2.3.1-4: 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}/aimles-amlmsel/<apiVersion>/subscriptions/{subscriptionId}

6.1.11.3.2.4 Resource Custom Operations

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

6.1.11.3.3 Resource: Individual AIMLE Assisted ML Model Selection Subscription

6.1.11.3.3.1 Description

6.1.11.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-amlmsel/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.11.3.3.2-1.

Table 6.1.11.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.11.1
subscriptionId	string	Represents the identifier of an "Individual AIMLE Assisted ML Model Selection Subscription" resource.

6.1.11.3.3.3 Resource Standard Methods

6.1.11.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.11.3.3.3.1-1.

Table 6.1.11.3.3.3.1-1: 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 6.1.11.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.11.3.3.3.1-3.

Table 6.1.11.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.11.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AssistMLMdlSelSubsc	M	1	200 OK	Successful case. The requested "Individual AIMLE Assisted ML Model Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.3.3.3.1-4: 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 AIMLE Server.

Table 6.1.11.3.3.3.1-5: 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 AIMLE Server.

6.1.11.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.11.3.3.3.2-1.

Table 6.1.11.3.3.3.2-1: 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 6.1.11.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.11.3.3.3.2-3.

Table 6.1.11.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
AssistMLMdlSelSubsc	M	1	Represents the updated representation of the "Individual AIMLE Assisted ML Model Selection Subscription" resource.

Table 6.1.11.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AssistMLMdlSelSubsc	M	1	200 OK	Successful case. The "Individual AIMLE Assisted ML Model Selection 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 AIMLE Assisted ML Model Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.3.3.3.2-4: 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 AIMLE Server.

Table 6.1.11.3.3.3.2-5: 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 AIMLE Server.

6.1.11.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.11.3.3.3.3-1.

Table 6.1.11.3.3.3.3-1: 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 6.1.11.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.11.3.3.3.3-3.

Table 6.1.11.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
AssistMLMdlSelSubscPatch	M	1	Represents the parameters to request the modification of the "Individual AIMLE Assisted ML Model Selection Subscription" resource.

Table 6.1.11.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
AssistMLMdlSelSubsc	M	1	200 OK	Successful case. The "Individual AIMLE Assisted ML Model Selection 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 AIMLE Assisted ML Model Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.11.3.3.3-5: 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 AIMLE Server.

6.1.11.3.3.4 DELETE

The HTTP DELETE method allows a AIMLE service consumer to request the deletion of an existing "Individual AIMLE Assisted ML Model Selection Subscription" resource.

Table 6.1.11.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.11.3.3.4-2 and the response data structures and response codes specified in table 6.1.11.3.3.4-3.

Table 6.1.11.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.11.3.3.4-3: 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 AIMLE Assisted ML Model Selection 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.3.3.4-4: 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 AIMLE Server.

Table 6.1.11.3.3.4-5: 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 AIMLE Server.

6.1.11.3.3.4 Resource Custom Operations

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

6.1.11.4 Custom Operations without associated resources

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

6.1.11.5 Notifications

6.1.11.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.1.11.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE Assisted ML Model Selection Event Notification	{notifUri}	POST	This service operation enables an AIMLE Server to notify a previously subscribed service consumer on AIML Assisted ML Model Selection related event(s).

6.1.11.5.2 AIMLE Assisted ML Model Selection Event Notification

6.1.11.5.2.1 Description

The AIMLE Assisted ML Model Selection Event Notification is used by the AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML Assisted ML Model Selection related event(s).

6.1.11.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.11.5.2.2-1.

Table 6.1.11.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The Notification Uri is assigned within the Individual AIMLE Assisted ML Model Selection Subscription and described within the AssistMLMdlSelSubsc type

6.1.11.5.2.3 Standard Methods

6.1.11.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.11.5.2.3-1 and the response data structures and response codes specified in table 6.1.11.5.2.3-2.

Table 6.1.11.5.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
AssistMLMdlSelNotif	M	1	Represents the AIMLE Assisted ML Model Selection Event Notification.

Table 6.1.11.5.2.3-2: 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 AIMLE Assisted ML Model Selection Event 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 AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.11.5.2.3-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.1.11.5.2.3-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.1.11.6 Data Model

6.1.11.6.1 General

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

Table 6.1.11.6.1-1 specifies the data types defined for the AIMLES_AssistedMLModelSelection API.

Table 6.1.11.6.1-1: AIMLES_AssistedMLModelSelection API specific Data Types

Data type	Section defined	Description	Applicability
AimlProfile	6.1.11.6.2.4	Represents the ML model selection operation.	
AssistMLMdlSelNotif	6.1.11.6.2.3	Represents the AIMLE Assisted ML Selection notification.	
AssistMLMdlSelSubsc	6.1.11.6.2.2	Represents the AIMLE Assisted ML Selection subscription information.	
AssistMLMdlSelSubscPatch	6.1.11.6.2.7	Represents the requested modifications to a AIMLE Assisted ML Selection subscription information.	
CandMLMdl	6.1.11.6.2.9	Contains the candidate ML model selection information.	
PerformanceMetric	6.1.11.6.3.3	Represents the performance metric for training the ML model.	
PerformanceRequirement	6.1.11.6.2.6	Represents the performance requirements for ML model selection.	
ReportingInformation	6.1.11.6.2.8	Represents the reporting requirements for ML model selection.	
TrainingRequirement	6.1.11.6.2.5	Represents the training requirements for ML model selection.	

Table 6.1.11.6.1-2 specifies data types re-used by the AIMLES_AssistedMLModelSelection API service.

Table 6.1.11.6.1-2: AIMLES_AssistedMLModelSelection API re-used Data Types

Data type	Reference	Comments	Applicability
AimleClientId	6.1.2.6.3.2	Represents unique identifier of a AIMLE client.	
ClientDiscCriteria	6.1.6.6.2.2	Represents the AIMLE Client selection criteria.	
DataMgmtOp	6.1.2.6.3.3	Represents the data management operation type.	
DateTime	3GPP TS 29.122 [2]	Represents a date and a time.	
DurationSec	3GPP TS 29.122 [2]	Unsigned integer identifying a period of time in units of seconds.	
MLModel	6.2.1.6.2.4	Represents the ML model information.	
MLModelTrainingInfo	6.2.1.6.2.9	Represents the ML Model training information.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.1.11.6.2 Structured data types

6.1.11.6.2.1 Introduction

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

6.1.11.6.2.2 Type: AssistMLMdlSelSubsc

Table 6.1.11.6.2.2-1: Definition of type AssistMLMdlSelSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
aimlProfile	AimlProfile	M	1	Contains the requirements for the ML model selection operation.	
notifUri	Uri	O	0..1	Indicates the URI towards which the notification should be delivered.	
replInfo	ReportingInformation	C	0..1	Contains the type of reporting that the subscription requires. Shall be provided if the "notifUri" attribute is present.	
suppFeat	SupportedFeatures	C	0..1	Represents the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.11.6.2.3 Type: AssistMLMdlSelNotif

Table 6.1.11.6.2.3-1: Definition of type AssistMLMdlSelNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
opStatus	DataMgmtOp	M	1	Contains the received data management operation type.	
trainMLModel	MLModelTrainingInfo	M	1	Contains the result of the ML model training.	
elapsedTime	DurationSec	O	0..1	Contains the duration of elapsed time in seconds for the ML model selection operation.	
timeStamp	DateTime	O	0..1	Contains the timestamp of the AIMLE assisted ML model selection notification.	

6.1.11.6.2.4

Type: AimlProfile

Table 6.1.11.6.2.4-1: Definition of type AimlProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
candMLMds	array(CandMLMdl)	M	1..N	Contains the list of candidate ML models and initial model parameters for training.	
mlMdlReq	MLModel	O	0..1	Contains ML model requirements that AIMLE server can use for selecting additional candidate ML models for training.	
dataSetIds	array(string)	M	1..N	Represents the list dataset identifiers.	
trainReq	array(TrainingRequirement)	M	1..N	Contains the parameters for training requirements.	
clientList	array(AimleClientId)	C	1..N	Contains the list of AIMLE client set identifier to train the ML model. (NOTE)	
clientSelCriteria	ClientDiscCriteria	C	0..1	Contains the selection criteria for finding suitable AIMLE clients for training the ML model. (NOTE)	
clNumber	UInteger	C	0..1	Represents the required number of the AIMLE Clients for training the ML model. This attribute shall be provided if the "clientSelCriteria" attribute is present.	
NOTE: At least one of the information elements shall be provided.					

6.1.11.6.2.5

Type: TrainingRequirement

Table 6.1.11.6.2.5-1: Definition of type TrainingRequirement

Attribute name	Data type	P	Cardinality	Description	Applicability
perfReq	array(PerformanceRequirement)	M	1..N	Identifies the performance metrics to evaluate ML model training.	
trainCount	UInteger	M	1	Contains number of training rounds for the ML training.	
sampleCount	UInteger	M	1	Contains number of data samples for the ML training.	

6.1.11.6.2.6

Type: PerformanceRequirement

Table 6.1.11.6.2.6-1: Definition of type PerformanceRequirement

Attribute name	Data type	P	Cardinality	Description	Applicability
perfMetric	PerformanceMetric	M	1	Identifies the performance metrics to evaluate ML model training.	
perfTarget	UInteger	O	0..1	Indicates the target value acceptable performance is reached and training can be stopped. Identifies an unsigned integer between 0 and 100 representing the target value.	

6.1.11.6.2.7 Type: AssistMLMdlSelSubscPatch

Table 6.1.11.6.2.7-1: Definition of type AssistMLMdlSelSubscPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
mlMdlReq	MLModel	O	0..1	Contains the additional list of candidate ML models for training.	
trainReq	array(TrainingRequirement)	O	0..N	Contains the parameters for training requirements.	
notifUri	Uri	O	0..1	Indicates the URI towards which the notification should be delivered.	

6.1.11.6.2.8 Type: ReportingInformation

Table 6.1.11.6.2.8-1: Definition of type ReportingInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
notifMethod	Notification Method	O	0..1	Represents the type of notification method. If "notifMethod" attribute is not supplied, the default value "ON_EVENT_DETECTION" applies.	
jobPercentage	UInteger	O	0..1	Represents the requirement job percentage completion. Identifies an unsigned integer between 0 and 100 representing the percentage of accuracy. Shall be provided if the notification method is set to "ON_JOB_COMPLETION".	
timeWindow	TimeWindow	O	0..1	Identifies the starting and ending reporting time period for the event. Shall be provided if the notification method is set to "PERIODIC".	

6.1.11.6.2.9 Type: CandMLMdl

Table 6.1.11.6.2.9-1: Definition of type CandMLMdl

Attribute name	Data type	P	Cardinality	Description	Applicability
mlMdlId	string	M	1	Identifies the ML model to train.	
mlMdlParam	string	M	1	Indicates the initial model parameters to train.	

6.1.11.6.3 Simple data types and enumerations

6.1.11.6.3.1 Introduction

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

6.1.11.6.3.2 Simple data types

The simple data types defined in table 6.1.11.6.3.2-1 shall be supported.

Table 6.1.11.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.11.6.3.3 Enumeration: PerformanceMetric

Table 6.1.11.6.3.3-1: Enumeration PerformanceMetric

Enumeration value	Description	Applicability
ACCURACY	Indicates the performance metric is accuracy.	
PRECISION	Indicates the performance metric is precision.	
RECALL	Indicates the performance metric is recall.	
MEAN_SQUARED_ERROR	Indicates the performance metric is mean squared error.	
MEAN_ABSOLUTE_ERROR	Indicates the performance metric is mean absolute error.	

6.1.11.6.3.4 Enumeration: NotificationMethod

Table 6.1.11.6.3.4-1: Enumeration NotificationMethod

Enumeration value	Description	Applicability
PERIODIC	The notification of the ML model status is periodically sent.	
ON_JOB_COMPLETION	The notification is sent only after the entire ML model selection job is completed.	
ON_PCT_COMPLETION	The notification is sent after the certain job percentage completion.	
ON_EVENT_DETECTION	The notification is sent each time the event is detected.	

6.1.11.6.4 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.

6.1.11.6.5 Binary data

6.1.11.6.5.1 Binary Data Types

Table 6.1.11.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.11.7 Error Handling

6.1.11.7.1 General

For the AIMLES_AssistedMLModelSelection API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.11.7.2 Protocol Errors

No specific protocol errors for the AIMLES_AssistedMLModelSelection API are specified.

6.1.11.7.3 Application Errors

The application errors defined for AIMLES_AssistedMLModelSelection API are listed in table 6.1.11.7.3-1.

Table 6.1.11.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.11.8 Feature negotiation

The optional features in table 6.1.11.8-1 are defined for the AIMLES_AssistedMLModelSelection API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.11.8-1: Supported Features

Feature number	Feature Name	Description

6.1.11.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_AssistedMLModelSelection API.

6.1.12 AIMLES_SplitOpEvent API

6.1.12.1 Introduction

The AIMLES_SplitOpEvent Service shall use the AIMLES_SplitOpEvent API.

The API URI of the AIMLES_SplitOpEvent 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 [2], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-splitopevent".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.12.3 and clause 6.1.12.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.12, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.12.2 Usage of HTTP

The provisions of clause 5.2 of 3GPP TS 29.122 [2] shall apply for the AIMLES_SplitOpEvent API.

6.1.12.3 Resources

6.1.12.3.1 Overview

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

Figure 6.1.12.3.1-1 depicts the resource URIs structure for the AIMLES_SplitOpEvent API.

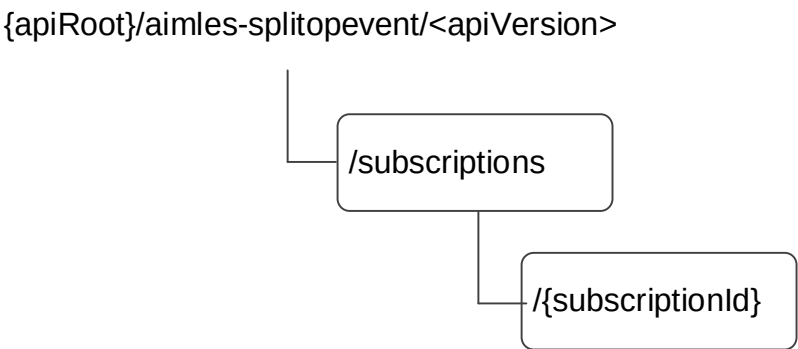


Figure 6.1.12.3.1-1: Resource URI structure of the AIMLES_SplitOpEvent API

Table 6.1.12.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.12.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
AIMLE Split Operation Event Subscriptions	/subscriptions	POST	Request the creation of an AIMLE Split Operation Event Subscription resource.
Individual AIMLE Split Operation Event Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual AIMLE Split Operation Event" resource.
		PUT	Request the update of an existing "Individual AIMLE Split Operation Event" resource.
		PATCH	Modifies an "Individual AIMLE Split Operation Event" Subscription resource.
		DELETE	Request the deletion of an existing "Individual AIMLE Split Operation Event Subscription" resource.

6.1.12.3.2 Resource: AIMLE Split Operation Event Subscriptions

6.1.12.3.2.1 Description

This resource represents the collection of AIMLE Split Operation Event Subscriptions managed by the AIMLE Server.

6.1.12.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-splitopevent/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in Table 6.1.12.3.2.2-1.

Table 6.1.12.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.12.1.

6.1.12.3.2.3 Resource Standard Methods

6.1.12.3.2.3.1 POST

The HTTP POST method enables an AIMLE service consumer to request the creation of a new Individual AIMLE Split Operation Event Subscription at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.12.3.2.3.1-1.

Table 6.1.12.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 6.1.12.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.12.3.2.3.1-3.

Table 6.1.12.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SplitOpEventSub	M	1	Create a new Individual AIMLE Split Operation Event Subscription resource.

Table 6.1.12.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

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

Table 6.1.12.3.2.3.1-4: 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}/aimles-mlmpm/<apiVersion>/subscriptions/{subscriptionId}

6.1.12.3.2.4 Resource Custom Operations

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

6.1.12.3.3 Resource: Individual AIMLE Split Operation Event Subscription

6.1.12.3.3.1 Description

The Individual Split Operation Event Subscription resource represents an individual event subscription of VAL server or AIMLE client.

6.1.12.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-splitoperevent/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in Table 6.1.12.3.3.2-1.

Table 6.1.12.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.12.1
subscriptionId	string	Represents the identifier of an "Individual AIMLE Split Operation Event Subscription" resource.

6.1.12.3.3.3 Resource Standard Methods

6.1.12.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual Split Operation Event Subscription" resource at the AIMLE server.

This method shall support the URI query parameters specified in table 6.1.12.3.3.3.1-1.

Table 6.1.12.3.3.3.1-1: 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 6.1.12.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.12.3.3.3.1-3.

Table 6.1.12.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.12.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpEventSub	M	1	200 OK	Successful case. The requested "Individual Split Operation Event 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 AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.12.3.3.3.1-4: 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 AIMLE server.

Table 6.1.12.3.3.3.1-5: 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 AIMLE server.

6.1.12.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual Split Operation Event Subscription" resource at the AIMLE server.

This method shall support the URI query parameters specified in table 6.1.12.3.3.3.2-1.

Table 6.1.12.3.3.3.2-1: 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 6.1.12.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.12.3.3.3.2-3.

Table 6.1.12.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SplitOpEventSub	M	1	Represents the updated representation of the "Individual Split Operation Event Subscription" resource.

Table 6.1.12.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpEventSub	M	1	200 OK	Successful case. The "Individual Split Operation Event 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 Split Operation Event 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 AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.12.3.3.3.2-4: 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 AIMLE server.

Table 6.1.12.3.3.3.2-5: 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 AIMLE server.

6.1.12.3.3.3.3 PATCH

This method shall support the URI query parameters specified in table 6.1.12.3.3.3.3-1.

Table 6.1.12.3.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.12.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.12.3.3.3.3-3.

Table 6.1.12.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SplitOpEventSub Patch	M	1	Contains the modifications to be applied to the Split Operation Event subscription resource.

Table 6.1.12.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpEventSub	M	1	200 OK	Split Operation Events Subscription resource is modified successfully and the representation of the modified Split Operation Event subscription is returned.
n/a			204 No Content	The Split Operation Events Subscription is updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SEAL server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.12.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.12.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

6.1.12.3.3.3.4 DELETE

The HTTP DELETE method allows an AIMLE service consumer to request the deletion of an existing "Individual AIMLE Split Operation Event Subscription" resource.

Table 6.1.12.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in Table 6.1.12.3.3.3.4-2 and the response data structures and response codes specified in Table 6.1.12.3.3.3.4-3.

Table 6.1.12.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.12.3.3.3.4-3: 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 AIMLE Split Operation Event 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.12.3.3.3.4-4: 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 AIMLE Server.

Table 6.1.12.3.3.3.4-5: 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 AIMLE Server.

6.1.12.3.3.4 Resource Custom Operations

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

6.1.12.4 Custom Operations without associated resources

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

6.1.12.5 Notifications

6.1.12.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.122 [2].

Table 6.1.12.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE Split Operation Event Notification	{notifUri}	POST	This service operation enables an AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML Split Operation related event(s).

6.1.12.5.2 AIMLE Split Operation Event Notification

6.1.12.5.2.1 Description

The AIMLE Split Operation Event Notification is used by the AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML Split Operation related event(s).

6.1.12.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.12.5.2.2-1.

Table 6.1.12.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The Notification URI is assigned within the Individual AIMLE Split Operation Event Subscription and described within the SplitOpEventSub type

6.1.12.5.2.3 Standard Methods

6.1.12.5.2.3.1 POST

This method shall support the request data structures specified in Table 6.1.12.5.2.3-1 and the response data structures and response codes specified in Table 6.1.12.5.2.3-2.

Table 6.1.12.5.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SplitOpEventNotif	M	1	Represents the AIMLE Split Operation Event Notification.

Table 6.1.12.5.2.3-2: 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 AIMLE Split Operation Event 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 endpoint of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the endpoint of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.12.5.2.3-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.1.12.5.2.3-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.1.12.6 Data Model

6.1.12.6.1 General

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

Table 6.1.12.6.1-1 specifies the data types defined for the AIMLES_SplitOpEvent API.

Table 6.1.12.6.1-1: AIMLES_SplitOpEvent API specific Data Types

Data type	Section defined	Description	Applicability
AssistanceInfo	6.1.12.6.2.7	Represents the split operation assistance information.	
AvailabilityInfo	6.1.12.6.2.8	Represents the split operation availability information.	
DiscFilters	6.1.12.6.2.5	Represents the discovery filters to determine matching split operation profile or nodes.	
SplitOpEventSub	6.1.12.6.2.2	Represents the AIMLE Split Operation Event subscription information.	
SplitOpEventSubNotif	6.1.12.6.2.4	Represents the AIMLE Split Operation Event notification.	
SplitOpEventSubPatch	6.1.12.6.2.3	Represents the requested modifications to the AIMLE Split Operation Event subscription information.	
SplitOpPipelineInfo	6.1.12.6.2.6	Represents split operation pipeline information.	
SplitOpProfile	6.1.12.6.2.9	Represents the split operation profile that VAL server participates to.	
StageInfo	6.1.12.6.2.10	Represents the information related to each stage in split operation pipeline.	

Table 6.1.12.6.1-2 specifies data types re-used by the AIMLES_SplitOpEvent API service.

Table 6.1.12.6.1-2: AIMLES_SplitOpEvent API re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.122 [2]	Represents the subscription duration.	
EndPoint	3GPP TS 29.558 [15]	Represent the endpoint information of a node.	
ReportingInformation	6.1.11.6.2.8	Represents the reporting requirements for ML model selection.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	
UsageInformation	6.1.12.6.2.6	Represents the usage information for the split AI/ML model.	

6.1.12.6.2 Structured data types

6.1.12.6.2.1 Introduction

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

6.1.12.6.2.2 Type: SplitOpEventSub

Table 6.1.12.6.2.2-1: Definition of type SplitOpEventSub

Attribute name	Data type	P	Cardinality	Description	Applicability
splitOpPipelineId	string	M	1	Contains the identifier for split operation pipeline.	
notifUri	Uri	M	1	Contains the URI, towards which the notification should be delivered.	
reportReq	ReportingInformation	O	0..1	Contains the reporting requirements of the subscription.	
splitOpEventId	SplitOpEventId	M	1	Contains the event identifier for subscription.	
discFilters	DiscFilters	O	0..1	Contains the set of characteristics to determine matching split operation profiles or nodes.	
assistInfo	AssistanceInfo	O	0..1	Contains the assistance information for subscription.	
expTime	DateTime	O	0..1	Contains the proposed expiration time of the subscription.	
suppFeat	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This attribute shall be present only if feature negotiation needs to take place.	

6.1.12.6.2.3 Type: SplitOpEventSubPatch

Table 6.1.12.6.2.3-1: Definition of type SplitOpEventSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	O	0..1	Contains the URI, towards which the notification should be delivered.	
reportReq	ReportingInformation	O	0..1	Contains the updated reporting requirements of the subscription.	
splitOpEventId	SplitOpEventId	O	0..1	Contains the event identifier for subscription.	
discFilters	DiscFilters	O	0..1	Contains the set of characteristics to determine matching split operation profiles or nodes.	
expTime	DateTime	O	0..1	Contains the proposed expiration time of the subscription.	

6.1.12.6.2.4 Type: SplitOpEventNotif

Table 6.1.12.6.2.4-1: Definition of type SplitOpEventNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
splitOpEventId	SplitOpEventId	M	1	Contains the event identifier for subscription.	
availabilityInfo	AvailabilityInfo	C	0..1	Contains the availability information. This shall be present for SPLIT_OP_AVAILABILITY event.	
splitOpPipelineInfo	SplitOpPipelineInfo	C	0..1	Contains split operation pipeline information. This shall be present for SPLIT_OP_PIPELINE_INFO event.	
assistanceInfo	AssistanceInfo	C	0..1	Contains split operation assistance information. This shall be present for SPLIT_OP_ASSISTANCE_INFO event.	

6.1.12.6.2.5 Type: DiscFilters

Table 6.1.12.6.2.5-1: Definition of type DiscFilters

Attribute name	Data type	P	Cardinality	Description	Applicability
stageInfo	array(StageInfo)	M	N	Contains information about split operation stages.	
usageInfo	UsageInformation	O	0..1	Contains information about planned usage of the split operation.	
minNodes	string	O	0..1	Contains information about minimum number of nodes required to support AIMI operation splitting.	

6.1.12.6.2.6 Type: SplitOpPipelineInfo

Table 6.1.12.6.2.6-1: Definition of type SplitOpPipelineInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
splitOpProfile	SplitOpProfile	O	0..1	Contains the split operation profile that service consumer participates to.	
subEventId	SubEventId	O	0..1	Indicates the sub event.	

6.1.12.6.2.7 Type: AssistanceInfo

Table 6.1.12.6.2.7-1: Definition of type AssistanceInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
deliveryTime	TimeWindow	O	0..1	Contains the time to deliver the task or data for the split operation.	
achievableQoS	string	O	0..1	Contains the achievable QoS for the current configuration for the task or data delivery.	
qosSuggestion	string	O	0..1	Contains the suggestion of QoS for the task or data delivery.	

6.1.12.6.2.8 Type: AvailabilityInfo

Table 6.1.12.6.2.8-1: Definition of type AvailabilityInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
splitOpProfile	array(SplitOpProfile)	O	0..N	The list of newly available split operation profiles.	
availableNodes	string	O	0..1	The list of newly available nodes.	

6.1.12.6.2.9 Type: SplitOpProfile

Table 6.1.12.6.2.9-1: Definition of type SplitOpProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
splitOpPipelineId	string	M	1	Contains the identifier for split operation pipeline.	
headEp	EndPoint	M	1	Contains the endpoint information of the head node.	
tailEp	EndPoint	M	1	Contains the endpoint information of the tail node.	
usageInfo	UsageInformation	O	0..1	Contains the usage information of the AI/ML split operation.	
stageInfo	array(StageInfo)	M	1..N	Contains the stage information for each stage in the split operation pipeline.	

6.1.12.6.2.10 Type: StageInfo

Table 6.1.12.6.2.10-1: Definition of type StageInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
stageId	string	M	1	Contains the identifier of the stage in split operation pipeline.	
numNodes	string	O	0..1	Contains the number of nodes included in the stage.	
headEp	EndPoint	M	1	Contains the endpoint of the head node for providing initial inference data.	
tailEp	EndPoint	M	1	Contains the endpoint of the tail node for obtaining inference results.	
nodeOrder	array(EndPoint)	M	1..N	Contains the order of nodes in the AI/ML split operation.	
mlModelId	string	M	1	Contains ML model information used in the stage.	

6.1.12.6.3 Simple data types and enumerations

6.1.12.6.3.1 Introduction

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

6.1.12.6.3.2 Simple data types

The simple data types defined in table 6.1.12.6.3.2-1 shall be supported.

Table 6.1.12.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.12.6.3.3 Enumeration: SplitOpEventId

Table 6.1.12.6.3.3-1: Enumeration SplitOpEventId

Enumeration value	Description	Applicability
SPLIT_OP_AVAILABILITY	Indicates split operation availability event	
SPLIT_OP_PIPELINE_INFO	Indicates split operation pipeline information event.	
SPLIT_OP_ASSISTANCE_INFO	Indicates split operation assistance information event.	

6.1.12.6.3.4 Enumeration: SubEventId

Table 6.1.12.6.3.4-1: Enumeration SubEventId

Enumeration value	Description	Applicability
CREATED	Indicates that a new split operation profile is created.	
UPDATED	Indicates that an existing split operation profile is updated.	
DELETED	Indicates that an existing split operation profile is deleted.	

6.1.12.6.4 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.

6.1.12.6.5 Binary data

6.1.12.6.5.1 Binary Data Types

Table 6.1.12.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.12.7 Error Handling

6.1.12.7.1 General

For the AIMLES_SplitOpEvent API, HTTP error responses shall be supported as specified in clause 5.2.1.6 of 3GPP TS 29.122 [2]. Protocol errors and application errors specified in clause 5.2.1.6 of 3GPP TS 29.122 [2] shall be supported for the HTTP status codes specified in table 5.2.1.6-1 of 3GPP TS 29.122 [2].

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

6.1.12.7.2 Protocol Errors

No specific protocol errors for the AIMLES_SplitOpEvent API are specified.

6.1.12.7.3 Application Errors

The application errors defined for AIMLES_SplitOpEvent API are listed in table 6.1.12.7.3-1.

Table 6.1.12.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.12.8 Feature negotiation

The optional features in table 6.1.12.8-1 are defined for the AIMLES_SplitOpEvent API. They shall be negotiated using the extensibility mechanism defined clause 5.2.1.7 of 3GPP TS 29.122 [2].

Table 6.1.12.8-1: Supported Features

Feature number	Feature Name	Description

6.1.12.9 Security

The provisions of clause 6 of 3GPP TS 29.122 [2] shall apply for the AIMLES_SplitOpEvent API.

6.1.13 AIMLES_MLModelRetrieval API

6.1.13.1 Introduction

The AIMLES_MLModelRetrieval Service shall use the AIMLES_MLModelRetrieval API.

The API URI of the AIMLES_MLModelRetrieval API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-mlmr".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.13.3 and clause 6.1.13.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.13, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.13.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelRetrieval API.

6.1.13.3 Resources

6.1.13.3.1 Overview

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

Figure 6.1.13.3.1-1 depicts the resource URIs structure for the AIMLES_MLModelRetrieval API.

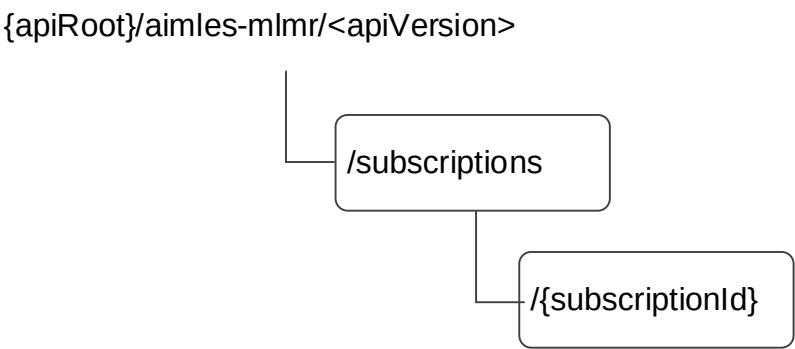


Figure 6.1.13.3.1-1: Resource URI structure of the AIMLES_MLModelRetrieval API

Table 6.1.13.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.13.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
AIMLE ML Model Retrieval Subscriptions	/subscriptions	POST	Request the creation of an AIMLE ML Model Retrieval Subscription resource.
Individual AIMLE ML Model Retrieval Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual AIMLE ML Model Retrieval Subscription" resource.
		PUT	Request the update of an existing "Individual AIMLE ML Model Retrieval Subscription" resource.
		PATCH	Request the modification of an existing "Individual AIMLE ML Model Retrieval Subscription" resource.
		DELETE	Request the deletion of an existing "Individual AIMLE ML Model Retrieval Subscription" resource.

6.1.13.3.2 Resource: AIMLE ML Model Retrieval Subscriptions

6.1.13.3.2.1 Description

This resource represents the collection of AIMLE ML Model Retrieval Subscriptions managed by the AIMLE Server.

6.1.13.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-mlmr/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.1.13.3.2.2-1.

Table 6.1.13.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.13.1.

6.1.13.3.2.3 Resource Standard Methods

6.1.13.3.2.3.1 POST

The HTTP POST method enables a AIMLE service consumer to request the creation of a new Individual AIMLE ML Model Retrieval Subscription at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.13.3.2.3.1-1.

Table 6.1.13.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description

This method shall support the request data structures specified in table 6.1.13.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.13.3.2.3.1-3.

Table 6.1.13.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MLMdlRetSub	M	1	Create a new Individual AIMLE ML Model Retrieval Subscription resource.

Table 6.1.13.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

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

Table 6.1.13.3.2.3.1-4: 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}/aimles-mlmr/<apiVersion>/subscriptions/{subscriptionId}

6.1.13.3.2.4 Resource Custom Operations

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

6.1.13.3.3 Resource: Individual AIMLE ML Model Retrieval Subscription

6.1.13.3.3.1 Description

6.1.13.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimles-mlmr/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.1.13.3.3.2-1.

Table 6.1.13.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.1.13.1
subscriptionId	string	Represents the identifier of an "Individual AIMLE ML Model Retrieval Subscription" resource.

6.1.13.3.3.3 Resource Standard Methods

6.1.13.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing " Individual AIMLE ML Model Retrieval Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.13.3.3.3.1-1.

Table 6.1.13.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.13.3.3.1-2 and the response data structures and response codes specified in table 6.1.13.3.3.1-3.

Table 6.1.13.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.13.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MLMdlRetSub	M	1	200 OK	Successful case. The requested "Individual AIMLE ML Model Retrieval 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.13.3.3.1-4: 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 AIMLE Server.

Table 6.1.13.3.3.1-5: 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 AIMLE Server.

6.1.13.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual AIMLE ML Model Retrieval Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.13.3.3.2-1.

Table 6.1.13.3.3.2-1: 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 6.1.13.3.3.2-2 and the response data structures and response codes specified in table 6.1.13.3.3.2-3.

Table 6.1.13.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MLMdlRetSub	M	1	Represents the updated representation of the "Individual AIMLE ML Model Retrieval Subscription" resource.

Table 6.1.13.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MLMdlRetSub	M	1	200 OK	Successful case. The "Individual AIMLE ML Model Retrieval 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 AIMLE ML Model Retrieval 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.13.3.3.2-4: 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 AIMLE Server.

Table 6.1.13.3.3.2-5: 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 AIMLE Server.

6.1.13.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual AIMLE ML Model Retrieval Subscription" resource at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.13.3.3.3.3-1.

Table 6.1.13.3.3.3.3-1: 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 6.1.13.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.13.3.3.3.3-3.

Table 6.1.13.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MLMdlRetSubPatch	M	1	Represents the parameters to request the modification of the "Individual AIMLE ML Model Retrieval Subscription" resource.

Table 6.1.13.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MLMdlRetSub	M	1	200 OK	Successful case. The "Individual AIMLE ML Model Retrieval 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 AIMLE ML Model Retrieval 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.13.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.13.3.3.3.3-5: 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 AIMLE Server.

6.1.13.3.3.4 DELETE

The HTTP DELETE method allows a AIMLE service consumer to request the deletion of an existing "Individual AIMLE ML Model Retrieval Subscription" resource.

Table 6.1.13.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.1.13.3.3.4-2 and the response data structures and response codes specified in table 6.1.13.3.3.4-3.

Table 6.1.13.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.13.3.3.4-3: 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 AIMLE ML Model Retrieval 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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.13.3.3.4-4: 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 AIMLE Server.

Table 6.1.13.3.3.4-5: 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 AIMLE Server.

6.1.13.3.4 Resource Custom Operations

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

6.1.13.4 Custom Operations without associated resources

6.1.13.4.1 Overview

The structure of the custom operation URIs of the AIMLES_MLModelRetrieval API is shown in Figure 6.1.13.4.1-1.

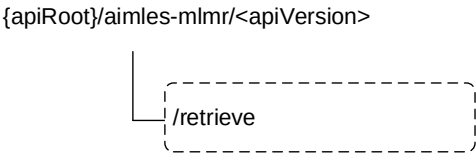


Figure 6.1.13.4.1-1: Custom operation URI structure of the AIMLES_MLModelRetrieval API

Table 6.1.13.4.1-1 provides an overview of the custom operations and applicable HTTP methods defined for the AIMLES_MLModelRetrieval API.

Table 6.1.13.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
Retrieve	/retrieve	POST	Enables a service consumer to send AIMLE ML Model retrieval request to the AIMLE server.

The custom operations shall support the URI variables defined in table 6.1.13.4.1-2.

Table 6.1.13.4.1-2: URI variables for this custom operation

Name	Data type	Definition
apiRoot	string	See clause 6.1.8.

6.1.13.4.2 Operation: Retrieve

6.1.13.4.2.1 Description

The custom operation enables a service consumer to send AIMLE ML Model retrieval request to the AIMLE server.

6.1.13.4.2.2 Operation Definition

This operation shall support the response data structures and response codes specified in tables 6.1.13.4.2.2-1 and 6.1.13.4.2.2-2.

Table 6.1.13.4.2.2-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MLMdlRetReq	M	1	Contains the parameters to request AIMLE ML Model retrieval.

Table 6.1.13.4.2.2-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MLMdlRetRsp	M	1	200 OK	Successful case. The ML Model retrieval request is successfully received and processed. The identifier of the ML model selected by AIMLE server for retrieval shall be included in the response message.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative target AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative target AIMLE server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the <e.g. HTTP POST> method listed in table 5.2.1.6-1 of 3GPP TS 29.122 [2] also apply.				

6.1.13.5 Notifications

6.1.13.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.1.13.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
AIMLE ML Model Retrieval Notification	{notifUri}	POST	This service operation enables an AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML ML Model Retrieval report(s).

6.1.13.5.2 AIMLE ML Model Retrieval Notification

6.1.13.5.2.1 Description

The AIMLE ML Model Retrieval Event Notification is used by the AIMLE Server to notify a previously subscribed AIMLE service consumer on AIML ML Model Retrieval report(s).

6.1.13.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.13.5.2.2-1.

Table 6.1.13.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The Notification URI is assigned within the Individual AIMLE ML Model Retrieval Subscription and described within the MLMdlRetSub type

6.1.13.5.2.3 Standard Methods

6.1.13.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.13.5.2.3-1 and the response data structures and response codes specified in table 6.1.13.5.2.3-2.

Table 6.1.13.5.2.3-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MIMdlRetNotif	M	1	Represents the AIMLE ML Model Retrieval Notification.

Table 6.1.13.5.2.3-2: 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 AIMLE ML Model Retrieval 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 AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.13.5.2.3-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.1.13.5.2.3-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.1.13.6 Data Model

6.1.13.6.1 General

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

Table 6.1.13.6.1-1 specifies the data types defined for the AIMLES_MLModelRetrieval API.

Table 6.1.13.6.1-1: AIMLES_MLModelRetrieval API specific Data Types

Data type	Section defined	Description	Applicability
MLMdlRetNotif	6.1.13.6.2.4	Represents the AIMLE ML Model Retrieval notification.	
MLMdlRetReq	6.1.13.6.2.5	Represents the AIMLE ML Model Retrieval request information.	
MLMdlRetRsp	6.1.13.6.2.6	Represents the AIMLE ML Model Retrieval response information.	
MLMdlRetSub	6.1.13.6.2.2	Represents the AIMLE ML Model Retrieval subscription information.	
MLMdlRetSubPatch	6.1.13.6.2.3	Represents the requested modifications to the AIMLE ML Model Retrieval subscription information.	
MLModelDetail	6.1.13.6.2.7	Represents the ML Model information.	

Table 6.1.13.6.1-2 specifies data types re-used by the AIMLES_MLModelRetrieval API service.

Table 6.1.13.6.1-2: AIMLES_MLModelRetrieval API re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.571 [11]	Represents data in bytes.	
DateTime	3GPP TS 29.571 [11]	Represents a date and a time.	
EndPoint	3GPP TS 29.558 [15]	Represents the endpoint information.	
MLModel	6.2.1.6.2.4	Represents a ML Model.	
SupportedFeatures	3GPP TS 29.571 [11]	Used to negotiate the applicability of optional features.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.1.13.6.2 Structured data types

6.1.13.6.2.1 Introduction

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

6.1.13.6.2.2

Type: MLMdlRetSub

Table 6.1.13.6.2.2-1: Definition of type MLMdlRetSub

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Identifies the URI, towards which the notification should be delivered.	
modelSelCrit	MLModel	O	0..1	Contains the filtering criteria for selecting the ML model information. It may be included in a subscription request.	
expTime	DateTime	O	0..1	Identifies the expiration time for the subscription, after which the AIMLE Server shall not send any notifications and the subscription becomes invalid. It may be included in a subscription request and may be included in a subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription.	
suppFeat	SupportedFeatures	C	0..1	Identifies the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.13.6.2.3

Type: MLMdlRetSubPatch

Table 6.1.13.6.2.3-1: Definition of type MLMdlRetSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	O	0..1	Identifies the URI, towards which the notification should be delivered.	
modelSelCrit	MLModel	O	0..1	Contains the filtering criteria for selecting the ML model information. It may be included in a subscription request.	
expTime	DateTime	O	0..1	Identifies the expiration time for the subscription, after which the AIMLE Server shall not send any notifications and the subscription becomes invalid. It may be included in a subscription request and may be included in a subscription response based on operator policies. If an expiry time was included in the request, then the expiry time returned in the response should be less than or equal to that value. If the expiry time is not included in the response, the NF service consumer shall not associate an expiry time for the subscription.	

6.1.13.6.2.4 Type: MIMdRetNotif

Table 6.1.13.6.2.4-1: Definition of type MIMdRetNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subId	string	M	0..1	Represents a unique identifier corresponding to the subscription	
mlModels	array(MLModelDetail)	O	1..N	Identifies the type of the retrieved ML Model.	

6.1.13.6.2.5 Type: MLMdRetReq

Table 6.1.13.6.2.5-1: Definition of type MLMdRetReq

Attribute name	Data type	P	Cardinality	Description	Applicability
modelSelCrit	MIModel	O	0..1	Contains the filtering criteria for selecting the ML model information. It may be included in a subscription request.	
suppFeat	SupportedFeatures	C	0..1	Identifies the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.13.6.2.6 Type: MLMdRetRsp

Table 6.1.13.6.2.6-1: Definition of type MLMdRetRsp

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModels	array(MLModelDetail)	M	1..N	Contains the list of ML models.	
suppFeat	SupportedFeatures	C	0..1	Identifies the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.1.13.6.2.7 Type: MLModelDetail

Table 6.1.13.6.2.7-1: Definition of type MLModelDetail

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelId	string	M	1	Represents the ML model identifier.	
mlMdEndpoint	EndPoint	C	0..1	Represents the ML model endpoint. (NOTE)	
mlModel	Bytes	C	0..1	Represents the ML model. (NOTE)	
NOTE: At least one of these attributes shall be included.					

6.1.13.6.3 Simple data types and enumerations

6.1.13.6.3.1 Introduction

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

6.1.13.6.3.2 Simple data types

The simple data types defined in table 6.1.13.6.3.2-1 shall be supported.

Table 6.1.13.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

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

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

6.1.13.6.5 Binary data

6.1.13.6.5.1 Binary Data Types

Table 6.1.13.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.13.7 Error Handling

6.1.13.7.1 General

For the AIMLES_MLModelRetrieval API, HTTP error responses shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.13.7.2 Protocol Errors

No specific protocol errors for the AIMLES_MLModelRetrieval API are specified.

6.1.13.7.3 Application Errors

The application errors defined for AIMLES_MLModelRetrieval API are listed in table 6.1.13.7.3-1.

Table 6.1.13.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.13.8 Feature negotiation

The optional features in table 6.1.13.8-1 are defined for the AIMLES_MLModelRetrieval API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.13.8-1: Supported Features

Feature number	Feature Name	Description

6.1.13.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelRetrieval API.

6.1.14 AIMLES_SplitOpNodeRegistration API

6.1.14.1 Introduction

The AIMLES_SplitOpNodeRegistration Service shall use the AIMLES_SplitOpNodeRegistration API.

The API URI of the AIMLES_SplitOpNodeRegistration API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-sonreg".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.1.14.3 and clause 6.1.14.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.14, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.14.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_SplitOpNodeRegistration API.

6.1.14.3 Resources

6.1.14.3.1 Overview

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

Figure 6.1.14.3.1-1 depicts the resource URIs structure for the AIMLES_SplitOpNodeRegistration API.

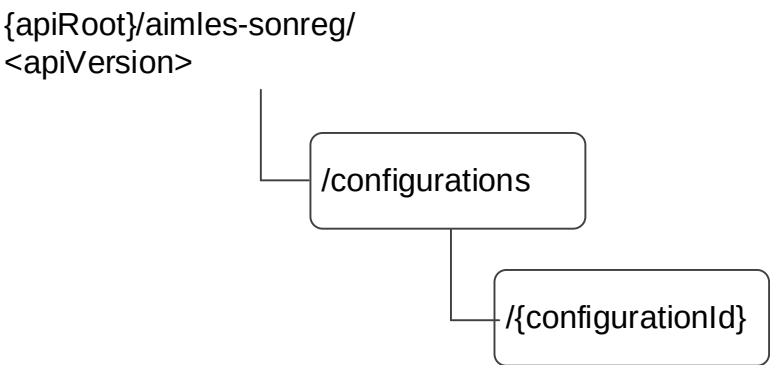


Figure 6.1.14.3.1-1: Resource URI structure of the AIMLES_SplitOpNodeRegistration API

Table 6.1.14.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.14.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description (service operation)
AIMLE Split Operation Node Register Configurations	/configurations	POST	Register a new Individual AIMLE Split Operation Node Register resource
Individual AIMLE Split Operation Node Register Configuration	/configurations/{configurationId}	GET	Query an Individual Registered AIMLE Split Operation Node Register resource.
		PUT	Update an Individual Registered AIMLE Split Operation Node Register resource.
		PATCH	Modify an Individual Registered AIMLE Split Operation Node Register resource.
		DELETE	Deregister an Individual Registered AIMLE Split Operation Node Register resource.

6.1.14.3.2 Resource: AIMLE Split Operation Node Register Configurations

6.1.14.3.2.1 Description

This resource represents the AIMLE Split Operation Node Register Configurations resource managed by the AIMLE Server.

6.1.14.3.2.2 Resource Definition

Resource URI: {apiRoot}/aimles-sonreg/<apiVersion>/configurations

This resource shall support the resource URI variables defined in table 6.1.14.3.2.2-1.

Table 6.1.14.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.14.1

6.1.14.3.2.3 Resource Standard Methods

6.1.14.3.2.3.1 POST

The HTTP POST method enables the service consumer to register a AIMLE Split Operation Node Register at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.14.3.2.3.1-1.

Table 6.1.14.3.2.3.1-1: 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 6.1.14.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.14.3.2.3.1-3.

Table 6.1.14.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
SplitOpNodeReg	M	1	Register a new Individual AIMLE Split Operation Node Register.

Table 6.1.14.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpNodeReg	M	1	201 Created	Successful case. The registration of the new Individual AIMLE Split Operation Node Register is confirmed and a representation of that resource is returned. An HTTP "Location" header that contains the URI of the created resource shall also be included.
NOTE: The mandatory HTTP error status code for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.14.3.2.3.1-4: 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}/aimless-sonreg/<apiVersion>/configurations/{configurationId}

6.1.14.3.2.4 Resource Custom Operations

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

6.1.14.3.3 Resource: Individual AIMLE Split Operation Node Register Configuration

6.1.14.3.3.1 Description

This resource represents the individual AIMLE Split Operation Node Register Configuration resource managed by the AIMLE Server.

6.1.14.3.3.2 Resource Definition

Resource URI: {apiRoot}/aimless-sonreg/<apiVersion>/configurations/{configurationId}

This resource shall support the resource URI variables defined in table 6.1.14.3.3.2-1.

Table 6.1.14.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.1.14.1
configurationId	string	Represents the identifier of the Individual AIMLE Split Operation Node Register Configuration resource.

6.1.14.3.3.3 Resource Standard Methods

6.1.14.3.3.3.1 GET

The HTTP GET method enables the service consumer e.g., the VAL Server to query an Individual Registered AIMLE Split Operation Node Register at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.14.3.3.3.1-1.

Table 6.1.14.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.14.3.3.1-2 and the response data structures and response codes specified in table 6.1.14.3.3.1-3.

Table 6.1.14.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.14.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpNodeReg	M	1	200 OK	Successful case. The requested information on the Individual Resgietered AIMLE Split Operation Node Register is confirmed and a representation of that resource is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The manadatory HTTP error status code for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.14.3.3.1-4: 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 AIMLE Server.

Table 6.1.14.3.3.1-5: 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 AIMLE Server.

6.1.14.3.3.2 PUT

The HTTP PUT method enables the service consumer e.g., the VAL Server to update an Individual Registered AIMLE Split Operation Node Register at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.14.3.3.2-1.

Table 6.1.14.3.3.3.2-1: 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 6.1.14.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.14.3.3.3.2-3.

Table 6.1.14.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
SplitOpNodeReg	M	1	Represents the updated representation of an Individual Registered AIMLE Split Operation Node Register.

Table 6.1.14.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpNodeReg	M	1	200 OK	Successful case. The requested update of the Individual Registered AIMLE Split Operation Node Register is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested update of the Individual Registered AIMLE Split Operation Node Register is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.14.3.3.3.2-4: 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 AIMLE Server.

Table 6.1.14.3.3.3.2-5: 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 AIMLE Server.

6.1.14.3.3.3.3 PATCH

The HTTP PATCH method enables the service consumer e.g., the VAL Server to modify an Individual Registered AIMLE Split Operation Node Register at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.14.3.3.3.3-1.

Table 6.1.14.3.3.3.3-1: 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 6.1.14.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.14.3.3.3.3-3.

Table 6.1.14.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
SplitOpNodeReg Patch	M	1	Represents the parameters to modify of an Individual Registered AIMLE Split Operation Node Register.

Table 6.1.14.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
SplitOpNodeReg	M	1	200 OK	Successful case. The requested modification of the Individual Registered AIMLE Split Operation Node Register is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested modification of the Individual Registered AIMLE Split Operation Node Register is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.14.3.3.3.3-4: 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 AIMLE Server.

Table 6.1.14.3.3.3.3-5: 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 AIMLE Server.

6.1.14.3.3.4 DELETE

The HTTP DELETE method enables the service consumer e.g., VAL Server to deregister an Individual Registered AIMLE Split Operation Node Register at the AIMLE Server.

This method shall support the URI query parameters specified in table 6.1.14.3.3.4-1.

Table 6.1.14.3.3.4-1: 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 6.1.14.3.3.4-2 and the response data structures and response codes specified in table 6.1.14.3.3.4-3.

Table 6.1.14.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.1.14.3.3.4-3: 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. Deregistration of the Individual Registered AIMLE Split Operation Node Register is confirmed.
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 AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.1.14.3.3.4-4: 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 AIMLE Server.

Table 6.1.14.3.3.4-5: 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 AIMLE Server.

6.1.14.3.3.4 Resource Custom Operations

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

6.1.14.4 Custom Operations without associated resources

There is not any custom operation defined for the AIMLES_SplitOpNodeRegistration API in this release of the specification.

6.1.14.5 Notifications

6.1.14.5.1 General

There is not any notification defined for the AIMLES_SplitOpNodeRegistration API in this release of the specification.

6.1.14.6 Data Model

6.1.14.6.1 General

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

Table 6.1.14.6.1-1 specifies the data types defined for the AIMLES_SplitOpNodeRegistration API.

Table 6.1.14.6.1-1: AIMLES_SplitOpNodeRegistration API specific Data Types

Data type	Clause defined	Description	Applicability
SplitOpNodeReg	6.1.14.6.2.2	Represents the Split Operation Node Register information.	
SplitOpNodeRegPatch	6.1.14.6.2.3	Represents the Split Operation Node Register information to be modified	

Table 6.1.14.6.1-2 specifies data types re-used by the AIMLES_SplitOpNodeRegistration API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the AIMLES_SplitOpNodeRegistration API.

Table 6.1.14.6.1-2: AIMLES_SplitOpNodeRegistration API re-used Data Types

Data type	Reference	Comments	Applicability
ConnInfo	3GPP TS 29.548 [17]	Represents node information.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	

6.1.14.6.2 Structured data types

6.1.14.6.2.1 Introduction

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

6.1.14.6.2.2 Type: SplitOpNodeReg

Table 6.1.14.6.2.2-1: Definition of type SplitOpNodeReg

Attribute name	Data type	P	Cardinality	Description	Applicability
nodeInfo	ConnInfo	M	1	Contains the endpoint information of the requestor.	
sonRegCapability	SplitOpCapabilities	M	1	Identifies the split operation capabilities of the requestor.	
timeValidity	TimeWindow	O	0..1	Identifies the expiration time of the registration.	

6.1.14.6.2.3 Type: SplitOpNodeRegPatch

Table 6.1.14.6.2.3-1: Definition of type SplitOpNodeRegPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
sonRegCapability	SplitOpCapabilities	O	0..1	Identifies the split operation capabilities of the requestor.	
timeValidity	TimeWindow	O	0..1	Identifies the expiration time of the registration.	

6.1.14.6.2.4 Type: SplitOpCapabilities

Table 6.1.14.6.2.4-1: Definition of type SplitOpCapabilities

Attribute name	Data type	P	Cardinality	Description	Applicability
modelInfo	ModelInformation	M	1	Identifies the ML model capabilities for split operation.	
usageInfo	UsageInformation	O	0..1	Identifies the usage capabilities for split operation.	

6.1.14.6.2.5 Type: ModelInformation

Table 6.1.14.6.2.5-1: Definition of type ModelInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
modelId	string	M	1	Identifies the ML model identifier.	
modelName	string	O	0..1	Identifies the name of the ML model.	
modelVersion	string	M	1	Identifies the version of the ML model.	
supportedOperation	array(string)	M	1..N	Contains the list of supported split operations.	

6.1.14.6.2.6 Type: UsageInformation

Table 6.1.14.6.2.6-1: Definition of type UsageInformation

Attribute name	Data type	P	Cardinality	Description	Applicability
inputFreq	UInteger	O	0..1	Contains the input frequency in bytes per second at which data is being fed to the ML model.	
inputSize	UInteger	O	0..1	Contains the size in bytes of input data being fed to the ML model.	
outputFreq	UInteger	O	0..1	Contains the output frequency in bytes per second at which data is being fed to the ML model.	
outputSize	UInteger	O	0..1	Contains the size in bytes of output data from the ML model.	

6.1.14.6.3 Simple data types and enumerations

6.1.14.6.3.1 Introduction

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

6.1.14.6.3.2 Simple data types

The simple data types defined in table 6.1.14.6.3.2-1 shall be supported.

Table 6.1.14.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.1.14.6.3.3 Enumeration: SuppAimlRoleType

The enumeration SuppAimlRoleType represents information regarding the supported AIML role identity of the AIMLE Split Operation Node Register. It shall comply with the provisions defined in table 6.1.14.6.3.3-1.

Table 6.1.14.6.3.3-1: Enumeration SuppMITaskType

Enumeration value	Description	Applicability
FL_CLIENT	Identifies the supported AIML role of AIMLE Split Operation Node Register is used as FL client.	
FL_SERVER	Identifies the supported AIML role of AIMLE Split Operation Node Register is used as FL server.	

6.1.14.6.3.4 Enumeration: MLAppType

The enumeration MLAppType represents information regarding the supported ML application related to the capability of the AIMLE Split Operation Node Register. It shall comply with the provisions defined in table 6.1.14.6.3.4-1.

Table 6.1.14.6.3.4-1: Enumeration MLAppType

Enumeration value	Description	Applicability
REINFORCEMENT_LEARNING	Identifies the ML application of reinforcement learning type related to the capability of AIMLE Split Operation Node Register.	
SUPERVISED_LEARNING	Identifies the ML application of supervised learning type related to the capability of AIMLE Split Operation Node Register.	
TRANSFER_LEARNING	Identifies the ML application of transfer learning type related to the capability of AIMLE Split Operation Node Register.	

6.1.14.6.3.5 Enumeration: AvailabilityType

The enumeration AvailabilityType represents information regarding the availability of the AIMLE Split Operation Node Register. It shall comply with the provisions defined in table 6.1.14.6.3.5-1.

Table 6.1.14.6.3.5-1: Enumeration AvailabilityType

Enumeration value	Description	Applicability
AVAILABLE	Identifies the AIMLE Split Operation Node Register is available.	
NOT_AVAILABLE	Identifies the AIMLE Split Operation Node Register is not available.	

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

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

6.1.14.6.5 Binary data**6.1.14.6.5.1 Binary Data Types**

The binary data types defined for the AIMLES_SplitOpNodeRegistration API are listed in Table 6.1.14.6.5.1-1.

Table 6.1.14.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.14.7 Error Handling

6.1.14.7.1 General

For the AIMLES_SplitOpNodeRegistration API, HTTP error responses shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.14.7.2 Protocol Errors

No specific procedures for the AIMLES_SplitOpNodeRegistration API are specified.

6.1.14.7.3 Application Errors

The application errors defined for the AIMLES_SplitOpNodeRegistration API are listed in Table 6.1.14.7.3-1.

Table 6.1.14.7.3-1: Application errors

Application Error	HTTP status code	Description

6.1.14.8 Feature negotiation

The optional features in table 6.1.14.8-1 are defined for the AIMLES_SplitOpNodeRegistration API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.14.8-1: Supported Features

Feature number	Feature Name	Description

6.1.14.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_SplitOpNodeRegistration API.

6.1.15 AIMLES_MLModelUpdate API

6.1.15.1 Introduction

The AIMLES_MLModelUpdate service shall use the AIMLES_MLModelUpdate API.

The API URI of the AIMLES_MLModelUpdate API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "aimles-mlmupd".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.1.15.3 and 6.1.15.4.

NOTE: When 3GPP TS 29.122 [2] is referenced for the common protocol and interface aspects for API definition in the clauses under clause 6.1.15, the AIMLE Server takes the role of the SCEF and the service consumer takes the role of the SCS/AS.

6.1.15.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelUpdate API.

6.1.15.3 Resources

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

6.1.15.4 Custom Operations without associated resources

6.1.15.4.1 Overview

Table 6.1.15.4.1-1: Custom operations without associated resources

Custom Operation Name	Custom operation URI	Mapped HTTP method	Description
RequestMLMdlUpd	/request	POST	Enables a service consumer to request ML model update to the AIMLE Server.

6.1.15.4.2 Operation: RequestMLMdlUpd

6.1.15.4.2.1 Description

The custom operation enables a service consumer to request ML model update to the AIMLE Server.

6.1.15.4.2.2 Operation Definition

This operation shall support the request data structures and the response data structures and response codes specified in tables 6.1.15.4.2.2-1 and 6.1.15.4.2.2-2.

Table 6.1.15.4.2.2-1: Data structures supported by the POST Request Body on this custom operation

Data type	P	Cardinality	Description
MLMdlUpdateReq	M	1	Contains the parameters to request ML model update.

Table 6.1.15.4.2.2-2: Data structures supported by the POST Response Body on this custom operation

Data type	P	Cardinality	Response codes	Description
MLMdlUpdateRsp	M	1	200 OK	Successful case. The ML model update request is successfully received and processed.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI located in an alternative AIMLE Server. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.1.15.4.2.2-3: Headers supported by the 307 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

Table 6.1.15.4.2.2-4: Headers supported by the 308 Response Code on this custom operation

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative target URI located in an alternative AIMLE Server.

6.1.15.5 Notifications

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

6.1.15.6 Data Model

6.1.15.6.1 General

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

Table 6.1.15.6.1-1 specifies the data types defined for the AIMLES_MLModelUpdate API.

Table 6.1.15.6.1-1: AIMLES_MLModelUpdate API specific Data Types

Data type	Clause defined	Description	Applicability
MLMdlUpdateReq	6.1.15.6.2.2	Represents the ML model update request.	
MLMdlUpdateRsp	6.1.15.6.2.3	Represents the ML model update response.	

Table 6.1.15.6.1-2 specifies data types re-used by the AIMLES_MLModelUpdate API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the AIMLES_MLModelUpdate API.

Table 6.1.15.6.1-2: AIMLES_MLModelUpdate API re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.571 [11]	Represents data in bytes.	
EndPoint	3GPP TS 29.558 [15]	Represent an endpoint.	
MIMdlDegradedParam	6.1.9.6.3.6	Represents the parameters of the degraded ML model.	
MLModel	6.2.1.6.2.4	Represents a ML Model.	

6.1.15.6.2 Structured data types

6.1.15.6.2.1 Introduction

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

6.1.15.6.2.2 Type: MLMdlUpdateReq

Table 6.1.15.6.2.2-1: Definition of type MLMdlUpdateReq

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelId	string	M	1	Contains the identifier of ML model.	
performanceDegradationInfo	MIMdlDegradedParam	O	0..1	Identifies the detected performance degradation of ML model.	
mlModelRetrievalEndpoint	EndPoint	O	0..1	Represents the ML model endpoint where the ML model file can be retrieved.	

6.1.15.6.2.3 Type: MLMdlUpdateRsp

Table 6.1.15.6.2.3-1: Definition of type MLMdlUpdateRsp

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelInformation	MLModel	O	0..1	Contains the updated ML model information.	
mlModelRetrievalEndpoint	EndPoint	C	0..1	Represents the ML model endpoint where the ML model file can be retrieved. NOTE	
mlModel	Bytes	C	0..1	Contains the updated ML model. NOTE	
NOTE: At least one of these attributes shall be present.					

6.1.15.6.3 Simple data types and enumerations

6.1.15.6.3.1 Introduction

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

6.1.15.6.3.2 Simple data types

The simple data types defined in table 6.1.15.6.3.2-1 shall be supported.

Table 6.1.15.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
n/a			

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

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

6.1.15.6.5 Binary data

6.1.15.6.5.1 Binary Data Types

Table 6.1.15.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.1.15.7 Error Handling

6.1.15.7.1 General

For the AIMLES_MLModelUpdate API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.1.15.7.2 Protocol Errors

No specific protocol errors for the AIMLES_MLModelUpdate API are specified.

6.1.15.7.3 Application Errors

The application errors defined for the AIMLES_MLModelUpdate API are listed in Table 6.1.15.7.3-1.

Table 6.1.15.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.1.15.8 Feature negotiation

The optional features in table 6.1.15.8-1 are defined for the AIMLES_MLModelUpdate API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.1.15.8-1: Supported Features

Feature number	Feature Name	Description

6.1.15.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the AIMLES_MLModelUpdate API.

6.2 AIMLE Repository APIs

6.2.1 MLR_MLModelManagement API

6.2.1.1 Introduction

The MLR_MLModelManagement service shall use the MLR_MLModelManagement API.

The API URI of the MLR_MLModelManagement Service API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "mlr-mlmm".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.2.1.3 and clause 6.2.1.4.

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

6.2.1.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the MLR_MLModelManagement API.

6.2.1.3 Resources

6.2.1.3.1 Overview

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

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

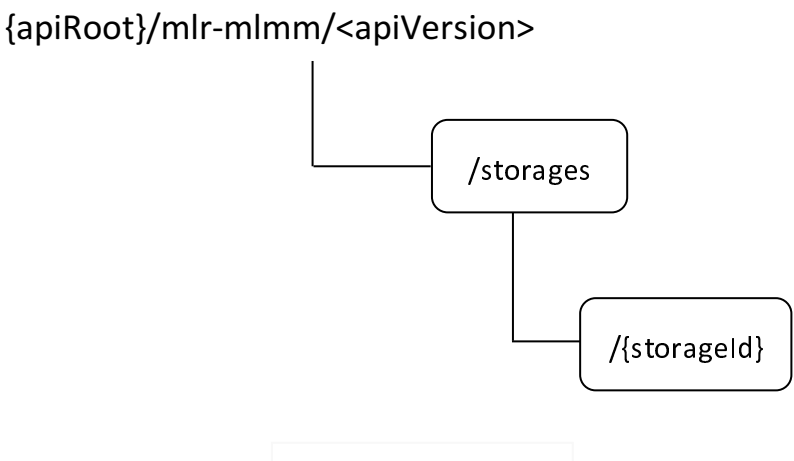


Figure 6.2.1.3.1-1: Resource URIs structure of the MLR_MLModelManagement API

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

Table 6.2.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
ML Models Storages	/storages	GET	Retrieve one or several existing ML Models Storage(s).
		POST	Request the creation of a ML Models Storage.
Individual ML Models Storage	/storages/{storageId}	GET	Retrieve an existing ML Models Storage.
		PUT	Request the update of an existing "Individual ML Models Storage" resource.
		PATCH	Request the modification of an existing "Individual ML Models Storage" resource.
		DELETE	Request the deletion of an existing "Individual ML Models Storage" resource.

6.2.1.3.2 Resource: ML Models Storages

6.2.1.3.2.1 Description

This resource represents the collection of ML Models Storage(s) managed by the AIMLE Repository.

6.2.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/mlr-mlmm/<apiVersion>/storages**

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

Table 6.2.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1.

6.2.1.3.2.3 Resource Standard Methods

6.2.1.3.2.3.1 GET

The HTTP GET method allows a service consumer to retrieve one or several existing "Individual ML Models Storage" resource(s) managed by the AIMLE Repository.

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

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

Name	Data type	P	Cardinality	Description	Applicability
storage-ids	array(string)	O	1..N	Contains the identifier(s) of the targeted ML Models Storage resource(s). (NOTE)	
profile-ids	array(string)	O	1..N	Contains the identifier(s) of the profile(s) of the targeted stored ML Model(s). (NOTE)	
supp-feats	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.2.1.8. This query parameter shall be present only when feature negotiation is required.	
NOTE: These query parameters are mutually exclusive and only one of them may be present.					

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

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

Data type	P	Cardinality	Description
n/a			

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

Data type	P	Cardinality	Response codes	Description
array(MLModelsStorage)	M	0..N	200 OK	Successful case. The requested "Individual ML Models Storage" resource(s) shall be returned. If there are no available "Individual ML Models Storage" resource(s) fulfilling the request, an empty array 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 AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.2.3.1-4: 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 AIMLE Repository.

Table 6.2.1.3.2.3.1-5: 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 AIMLE Repository.

6.2.1.3.2.3.2 POST

The HTTP POST method allows a service consumer to request the creation of a ML Models Storage at the AIMLE Repository.

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

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

Name	Data type	P	Cardinality	Description	Applicability
n/a					

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

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

Data type	P	Cardinality	Description
MLModelsStorage	M	1	Represents the parameters to request the creation of a ML Models Storage resource.

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

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

Table 6.2.1.3.2.3.2-4: Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/mlr-mlmm/<apiVersion>/storages/{storageId}

6.2.1.3.2.4 Resource Custom Operations

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

6.2.1.3.3 Resource: Individual ML Models Storage

6.2.1.3.3.1 Description

This resource represents an "Individual ML Models Storage" resource managed by the AIMLE Repository.

6.2.1.3.3.2 Resource Definition

Resource URI: {apiRoot}/mlr-mlmm/<apiVersion>/storages/{storageId}

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

Table 6.2.1.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.1.1.
storageId	string	Represents the identifier of the "Individual ML Models Storage" resource.

6.2.1.3.3.3 Resource Standard Methods

6.2.1.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing "Individual ML Models Storage" resource at the AIMLE Repository.

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

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

Name	Data type	P	Cardinality	Description	Applicability
n/a					

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

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

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MLModelsStorage	M	1	200 OK	Successful case. The requested "Individual ML Models Storage" 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 AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.1.3.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.2.1.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual ML Models Storage" resource at the AIMLE Repository.

This method shall support the URI query parameters specified in table 6.2.1.3.3.3.2-1.

Table 6.2.1.3.3.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.2-3.

Table 6.2.1.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
MLModelsStorage	M	1	Represents the updated representation of the "Individual ML Models Storage" resource.

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

Data type	P	Cardinality	Response codes	Description
MLModelsStorage	M	1	200 OK	Successful case. The "Individual ML Models Storage" 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 ML Models Storage" 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 AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.2-4: 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 AIMLE Repository.

Table 6.2.1.3.3.3.2-5: Headers supported by the 308 Response Code on this resource

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

6.2.1.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual ML Models Storage" resource at the AIMLE Repository.

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

Table 6.2.1.3.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.3-3.

Table 6.2.1.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
MLModelsStoragePatch	M	1	Represents the parameters to request the modification of the "Individual ML Models Storage" resource.

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

Data type	P	Cardinality	Response codes	Description
MLModelsStorage	M	1	200 OK	Successful case. The "Individual ML Models Storage" 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 ML Models Storage" 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 AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.1.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

6.2.1.3.3.3.4 DELETE

The HTTP DELETE method allows a service consumer to request the deletion of an existing "Individual ML Models Storage" resource at the AIMLE Repository.

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

Table 6.2.1.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.1.3.3.3.4-2 and the response data structures and response codes specified in table 6.2.1.3.3.3.4-3.

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

Data type	P	Cardinality	Description
n/a			

Table 6.2.1.3.3.3.4-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The "Individual ML Models Storage" 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 AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative AIMLE Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.1.3.3.3.4-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.1.3.3.3.4-5: Headers supported by the 308 Response Code on this resource

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

6.2.1.3.3.4 Resource Custom Operations

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

6.2.1.4 Custom Operations without associated resources

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

6.2.1.5 Notifications

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

6.2.1.6 Data Model

6.2.1.6.1 General

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

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

Table 6.2.1.6.1-1: MLR_MLModelManagement API specific Data Types

Data type	Clause defined	Description	Applicability
AccessReqs	6.2.1.6.3.6	Represents the ML Model access requirements.	
DataFreshness	6.2.1.6.3.7	Represents the data freshness level.	
MLModel	6.2.1.6.2.4	Represents a ML Model.	
MLModelAccessReqs	6.2.1.6.2.10	Represents ML Model access requirements.	
MLModelDomain	6.2.1.6.3.3	Represents the domain of the ML Model.	
MLModelPerf	6.2.1.6.2.8	Represents the performance information of the ML Model.	
MLModelPhase	6.2.1.6.3.4	Represents the ML Model phase.	
MLModelPhaseInfo	6.2.1.6.2.5	Represents the ML Model phase related information.	
MLModelProfile	6.2.1.6.2.3	Represents the ML Model Profile.	
MLModelsStorage	6.2.1.6.2.2	Represents a ML Models Storage.	
MLModelsStoragePatch	6.2.1.6.2.11	Represents the requested modifications to a ML Models Storage.	
MLModelStoreDiscReqs	6.2.1.6.2.6	Represents the ML Model storage and discovery requirements.	
MLModelTrainingInfo	6.2.1.6.2.9	Represents the ML Model training information.	
MLModelUsage	6.2.1.6.3.5	Represents the ML Model usage.	
MLModelUsageReqs	6.2.1.6.2.7	Represents the ML Model usage requirements.	

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

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

Data type	Reference	Comments	Applicability
AdaeAnalyticsId	3GPP TS 29.549 [10]	Represents the ADAE analytics identifier.	
DurationSec	3GPP TS 29.122 [2]	Represents a time duration in seconds.	
EndPoint	3GPP TS 29.558 [15]	Represent an endpoint.	
LocationArea5G	3GPP TS 29.122 [2]	Represents a location.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the list of supported feature(s) and used to negotiate the applicability of the optional features.	
Volume	3GPP TS 29.122 [2]	Represents a data volume.	

6.2.1.6.2 Structured data types

6.2.1.6.2.1 Introduction

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

6.2.1.6.2.2

Type: MLModelsStorage

Table 6.2.1.6.2.2-1: Definition of type MLModelsStorage

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModels	array(MLModel Profile)	C	1..N	Contains the profile(s) of the ML Model(s). (NOTE)	
mlModelsAddresses	array(EndPoint)	C	1..N	Contains the address(es) (e.g., URI(s)) via which the ML Model(s) shall be retrieved. This attribute may be present only in the initial request to store ML Model(s) for the first time, i.e., it shall be used only to retrieve the ML Model(s) related information and thus not be present in the "ML Models Storage" resource representation. (NOTE)	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features among the ones defined in clause 6.2.1.8. This attribute shall be present only when feature negotiation is required.	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.3

Type: MLModelProfile

Table 6.2.1.6.2.3-1: Definition of type MLModelProfile

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelProfileId	string	C	0..1	Contains the identifier of the ML Model profile. This value of this attribute is assigned by the AIMLE Repository and shall hence not be present in the initial request to store the ML Model for the first time.	
aimleSvcId	string	C	0..1	Contains the identifier of the service consumer that stored the ML Model. This attribute shall be added by the AIMLE Repository and shall hence not be present in the initial request to store the ML Model for the first time.	
aimleRepoId	string	C	0..1	Contains the identifier of the AIMLE Repository where the ML Model is stored. This attribute shall be added by the AIMLE Repository and shall hence not be present in the initial request to store the ML Model for the first time.	
mlModelInfo	MLModel	M	1	Contains the ML Model related information.	
mlModelUri	EndPoint	O	0..1	Contains the endpoint information via which the ML Model profile can be retrieved.	

6.2.1.6.2.4

Type: MLModel

Table 6.2.1.6.2.4-1: Definition of type MLModel

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelId	string	M	1	Contains the identifier of the ML Model.	
adaeAnalyticsId	AdaeAnalyticsId	O	0..1	Contains the ADAE analytics ID with which the ML Model can be used.	
mlModelSize	Volume	O	0..1	Contains the size of the ML Model.	
mlModelSrcId	string	O	0..1	Contains the identifier of the source entity that stored the ML Model. This attribute shall be added by the AIMLE Repository and shall hence not be present in the initial request to store the ML Model for the first time.	
valServiceIds	array(string)	O	1..N	Contains the identifier(s) of the VAL service(s) for which the ML Model applies.	
domain	MLModelDomain	O	0..1	Contains the domain of the ML Model.	
customDomain	string	O	0..1	Contains the customized domain information of the ML Model. This attribute may be present only if the "domain" attribute is present and set to "CUSTOM".	
vendors	array(string)	C	1..N	Contains the vendor(s) that are allowed to use (and thus interoperable with) the ML Model. (NOTE)	
interopInfo	string	C	0..1	Contains the ML Model interoperability information. (NOTE)	
phaseInfo	MLModelPhaseInfo	C	0..1	Contains the ML Model interoperability information. (NOTE)	
storeDiscReqs	MLModelStoreDiscReqs	C	0..1	Contains the ML Model storage and discovery requirements. (NOTE)	
usageReqs	MLModelUsageReqs	O	0..1	Contains the ML Model usage requirements.	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.5

Type: MLModelPhaseInfo

Table 6.2.1.6.2.5-1: Definition of type MLModelPhaseInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
phase	MLModelPhase	M	1	Contains the ML Model phase.	
observedPerf	MLModelPerf	O	0..1	Contains the observed performance of the ML Model. This attribute may be present only if the "phase" attribute is set to "TRAINED" or "DEPLOYED".	
trainingInfo	MLModelTrainingInfo	O	0..1	Contains information on the data that has been used to train the ML Model. This attribute may be present only if the "phase" attribute is set to "TRAINED" or "DEPLOYED".	
contTrainInd	boolean	O	0..1	Indicates whether the ML Model can be trained continuously or not. - "true": Indicates that the ML Model can be trained continuously. - "false": Indicates that the ML Model cannot be trained continuously. - The default value is "false" when this attribute is omitted.	
contTrainParams	string	O	0..1	Contains the parameters required for continuous model training. This attribute may be present only if the "contTrainInd" attribute is present and set to "true".	

6.2.1.6.2.6

Type: MLModelStoreDiscReqs

Table 6.2.1.6.2.6-1: Definition of type MLModelStoreDiscReqs

Attribute name	Data type	P	Cardinality	Description	Applicability
duration	DurationSec	C	0..1	Contains the duration of the ML Model storage, i.e., the time duration after which the ML Model storage shall be deleted. (NOTE)	
accessReqs	MLModelAccessReqs	C	0..1	Contains the access requirements of the ML Model. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.7

Type: MLModelUsageReqs

Table 6.2.1.6.2.7-1: Definition of type MLModelUsageReqs

Attribute name	Data type	P	Cardinality	Description	Applicability
usages	array(MLModelUsage)	M	1..N	Contains the usage(s) of the ML Model.	

6.2.1.6.2.8

Type: MLModelPerf

Table 6.2.1.6.2.8-1: Definition of type MLModelPerf

Attribute name	Data type	P	Cardinality	Description	Applicability
resourceAddr	integer	C	0..1	Contains the accuracy level of the ML Model, expressed as a percentage. Minimum: 0, Maximum: 100. (NOTE)	
appSpecPerfData	string	C	0..1	Contains application-specific performance metrics of the ML Model. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.9

Type: MLModelTrainingInfo

Table 6.2.1.6.2.9-1: Definition of type MLModelTrainingInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
dataSources	string	C	0..1	Contains information on the data sources used to train the ML Model. (NOTE)	
dataVolume	Volume	C	0..1	Contains the data volume used to train the ML Model. (NOTE)	
freshness	DataFreshness	C	0..1	Contains the freshness level of the data used to train the ML Model. (NOTE)	
baseModelId	string	C	0..1	Contains the identifier of the base model. (NOTE)	
NOTE: At least one of these attributes shall be present.					

6.2.1.6.2.10

Type: MLModelAccessReqs

Table 6.2.1.6.2.10-1: Definition of type MLModelAccessReqs

Attribute name	Data type	P	Cardinality	Description	Applicability
accessReqs	array(AccessReqs)	M	1	Contains the ML Model access requirements.	
valServerIds	array(string)	O	1..N	Contains the identifier(s) of the VAL Server(s) that are allowed to access and use the ML Model. This attribute may be present only if the "accessReqs" attribute is set to "RESTRICTED". (NOTE)	
valClientIds	array(string)	O	1..N	Contains the identifier(s) of the VAL Client(s) that are allowed to access and use the ML Model. This attribute may be present only if the "accessReqs" attribute is set to "RESTRICTED". (NOTE)	
timePeriod	DurationSec	O	0..1	Contains the time period during which the ML Model can be accessed and used. This attribute may be present only if the "accessReqs" attribute is set to "RESTRICTED". (NOTE)	
location	LocationArea5G	O	0..1	Contains the location/area within which the ML Model can be accessed and used. This attribute may be present only if the "accessReqs" attribute is set to "RESTRICTED". (NOTE)	
NOTE: When the "accessReqs" attribute is set to "RESTRICTED", then at least one of these attributes shall be present.					

6.2.1.6.2.11

Type: MLModelsStoragePatch

Table 6.2.1.6.2.11-1: Definition of type MLModelsStoragePatch

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModels	array(MLModel Profile)	O	1..N	Contains the profile(s) of the ML Model(s).	
mlModelsAddresses	array(EndPoint)	O	1..N	Contains the address(es) (e.g., URI(s)) via which the ML Model(s) shall be retrieved.	

6.2.1.6.3 Simple data types and enumerations

6.2.1.6.3.1

Introduction

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

6.2.1.6.3.2 Simple data types

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

Table 6.2.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.1.6.3.3 Enumeration: MLModelDomain

The enumeration MLModelDomain represents the domain of the ML Model. It shall comply with the provisions defined in table 6.2.1.6.3.3-1.

Table 6.2.1.6.3.3-1: Enumeration MLModelDomain

Enumeration value	Description	Applicability
SPEECH_RECOGNITION	Indicates that the domain of the ML Model is speech recognition.	
IMAGE_RECOGNITION	Indicates that the domain of the ML Model is image recognition.	
IMAGE_PROCESSING	Indicates that the domain of the ML Model is image processing.	
LOCATION_PREDICTION	Indicates that the domain of the ML Model is location prediction.	
CUSTOM	Indicates that the domain of the ML Model is a custom domain.	

6.2.1.6.3.4 Enumeration: MLModelPhase

The enumeration MLModelPhase represents the ML Model phase. It shall comply with the provisions defined in table 6.2.1.6.3.4-1.

Table 6.2.1.6.3.4-1: Enumeration MLModelPhase

Enumeration value	Description	Applicability
NOT_TRAINED	Indicates that the ML Model phase is that ML Model is not trained.	
IN_TRAINING	Indicates that the ML Model phase is that the ML Model is in training.	
TRAINED	Indicates that the ML Model phase is that the ML Model is trained.	
IN_RETRAINING	Indicates that the ML Model phase is that the ML Model is in re-training.	
DEPLOYED	Indicates that the ML Model phase is that the ML Model is deployed.	

6.2.1.6.3.5 Enumeration: MLModelUsage

The enumeration MLModelUsage represents the ML Model usage. It shall comply with the provisions defined in table 6.2.1.6.3.5-1.

Table 6.2.1.6.3.5-1: Enumeration MLModelUsage

Enumeration value	Description	Applicability
TRAINING	Indicates that the ML Model usage is training.	
INFERENCE	Indicates that the ML Model usage is inference.	

6.2.1.6.3.6 Enumeration: AccessReqs

The enumeration AccessReqs represents the ML Model access requirements. It shall comply with the provisions defined in table 6.2.1.6.3.6-1.

Table 6.2.1.6.3.6-1: Enumeration AccessReqs

Enumeration value	Description	Applicability
PUBLICLY_AVAILABLE	Indicates that the ML Model is publicly available.	
RESTRICTED	Indicates that the ML Model is restricted.	
PRIVATE_USE_ONLY	Indicates that the ML Model is for private use only.	

6.2.1.6.3.7 Enumeration: DataFreshness

The enumeration DataFreshness represents the data freshness level. It shall comply with the provisions defined in table 6.2.1.6.3.7-1.

Table 6.2.1.6.3.7-1: Enumeration DataFreshness

Enumeration value	Description	Applicability
REAL_TIME	Indicates that the data freshness level is real-time.	
NEAR_REAL_TIME	Indicates that the data freshness level is near real-time.	
HOURLY	Indicates that the data freshness level is hourly.	
DAILY	Indicates that the data freshness level is daily.	
WEEKLY	Indicates that the data freshness level is weekly.	
MONTHLY	Indicates that the data freshness level is monthly.	

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

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

6.2.1.6.5 Binary data

6.2.1.6.5.1 Binary Data Types

Table 6.2.1.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.2.1.7 Error Handling

6.2.1.7.1 General

For the MLR_MLModelManagement API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.2.1.7.2 Protocol Errors

No specific protocol errors for the MLR_MLModelManagement API are specified.

6.2.1.7.3 Application Errors

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

Table 6.2.1.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.2.1.8 Feature negotiation

The optional features listed in table 6.2.1.8-1 are defined for the MLR_MLModelManagement API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.2.1.8-1: Supported Features

Feature number	Feature Name	Description

6.2.1.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the MLR_MLModelManagement API.

6.2.2 MLR_ModelInformationDiscovery API

6.2.2.1 Introduction

The MLR_ModelInformationDiscovery service shall use the MLR_ModelInformationDiscovery API.

The API URI of the MLR_ModelInformationDiscovery API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "mlr-mid".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clauses 6.2.2.3 and 6.2.2.4.

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

6.2.2.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the MLR_ModelInformationDiscovery API.

6.2.2.3 Resources

6.2.2.3.1 Overview

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

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

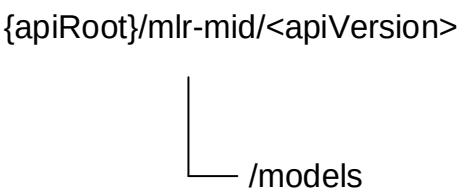


Figure 6.2.2.3.1-1: Resource URI structure of the MLR_ModelInformationDiscovery Service API

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

Table 6.2.2.3.1-1: Resources and methods overview

Resource purpose/name	Resource URI (relative path after API URI)	HTTP method or custom operation	Description (service operation)
ML Models	/models	GET	Discover the ML model information according to the filtering criteria.

6.2.2.3.2 Resource: ML Models

6.2.2.3.2.1 Description

The "ML Models" resource represents the ML Models.

6.2.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/mlr-mid/<apiVersion>/models**

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

Table 6.2.2.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.5 of 3GPP TS 29.549 [10].

6.2.2.3.2.3 Resource Standard Methods

6.2.2.3.2.3.1 GET

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

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

Name	Data type	P	Cardinality	Description
filt-criteria	MLModel	M	1	Represents the ML model filtering criteria.
supported-features	SupportedFeatures	C	0..1	Contains supported features information, used to negotiate the applicability of optional features. This query parameter shall be present only if feature negotiation needs to take place.

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

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

Data type	P	Cardinality	Description
n/a			

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

Data type	P	Cardinality	Response codes	Description
DiscoveryResp	M	1	200 OK	Successful case. The response body contains the result of the search over the list of stored ML Models.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative MLR. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative target URI of the resource located in an alternative MLR. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.2.3.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.2.3.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.2.2.3.2.4 Resource Custom Operations

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

6.2.2.4 Custom Operations without associated resources

There are no custom operations without associated resources in the present release of the document.

6.2.2.5 Notifications

There are no notifications in the present release of the document.

6.2.2.6 Data Model

6.2.2.6.1 General

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

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

Table 6.2.2.6.1-1: MLR_ModelInformationDiscovery API specific Data Types

Data type	Section defined	Description	Applicability
DiscoveryResp	6.2.2.6.2.2	Represents the ML model discovery response.	
MIModel	6.2.2.6.2.3	Represents the ML model.	

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

Table 6.2.2.6.1-2: MLR_ModelInformationDiscovery API Re-used Data Types

Data type	Reference	Comments	Applicability
Bytes	3GPP TS 29.571 [11]	Represents data in bytes.	
MLModel	Clause 6.2.1.6.2.4	Represents the ML model information.	
MLModelProfile	Clause 6.2.1.6.2.3	Represents the ML model profile.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	

6.2.2.6.2 Structured data types

6.2.2.6.2.1 Introduction

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

6.2.2.6.2.2 Type: DiscoveryResp

Table 6.2.2.6.2.2-1: Definition of type DiscoveryResp

Attribute name	Data type	P	Cardinality	Description	Applicability
profiles	array(MLModelProfile)	C	1..N	Contains the list of ML model profiles. (NOTE)	
mlModels	array(MIModel)	C	1..N	Contains the list of ML models. (NOTE)	
indicator	boolean	O	0..1	Represents the continuously training indicator. - "true": Indicates that the ML Model needs to be continuously trained. - "false": Indicates that the ML Model does not need to be continuously trained. - The default value is "false" when this attribute is omitted.	
NOTE: One of these attributes shall be provided.					

6.2.2.6.2.3 Type: MIModel

Table 6.2.2.6.2.3-1: Definition of type MIModel

Attribute name	Data type	P	Cardinality	Description	Applicability
mlModelId	string	M	1	Represents the ML model identifier.	
mlModel	Bytes	O	0..1	Represents the ML model.	

6.2.2.6.3 Simple data types and enumerations

6.2.2.6.3.1 Introduction

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

6.2.2.6.3.2 Simple data types

None.

6.2.2.6.3.3 Enumerations

There are no enumerations in this release of the specification.

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

There are no data types describing alternative data types and combinations of data types in this release of the specification.

6.2.2.6.5 Binary data

There are no binary data defined in this release of the specification.

6.2.2.7 Error Handling

6.2.2.7.1 General

For the MLR_ModelInformationDiscovery API, error handling shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.2.2.7.2 Protocol Errors

No specific procedures for the MLR_ModelInformationDiscovery API are specified.

6.2.2.7.3 Application Errors

The application errors defined for MLR_ModelInformationDiscovery API are listed in table 6.2.2.7.3-1.

Table 6.2.2.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.2.2.8 Feature Negotiation

The optional features in table 6.2.2.8-1 are defined for the MLR_ModelInformationDiscovery API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.2.2.8-1: Supported Features

Feature number	Feature Name	Description

6.2.2.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the MLR_ModelInformationDiscovery API.

6.2.3 MLR_FLEvents API

6.2.3.1 Introduction

The MLR_FLEvents Service shall use the MLR_FLEvents API.

The API URI of the MLR_FLEvents API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "mlr-file".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.2.3.3 and clause 6.2.3.4.

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

6.2.3.2 Usage of HTTP

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the MLR_FLEvents API.

6.2.3.3 Resources

6.2.3.3.1 Overview

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

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

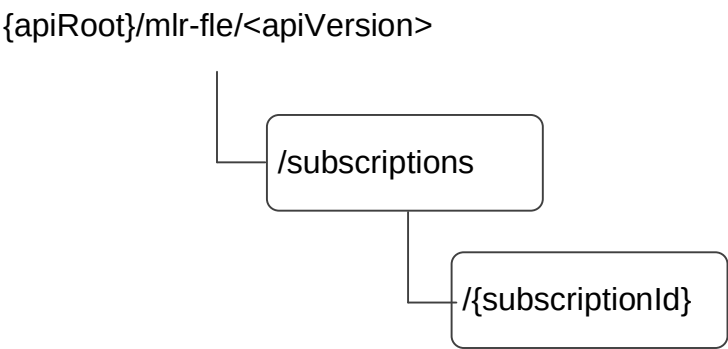


Figure 6.2.3.3.1-1: Resource URI structure of the MLR_FLEvents API

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

Table 6.2.3.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
MLR FL Events Subscriptions	/subscriptions	POST	Request the creation of an MLR FL Events Subscription resource.
Individual MLR FL Events Subscription	/subscriptions/{subscriptionId}	GET	Retrieve an existing "Individual MLR FL Events Subscription" resource.
		PUT	Request the update of an existing "Individual MLR FL Events Subscription" resource.
		PATCH	Request the modification of an existing "Individual MLR FL Events Subscription" resource.
		DELETE	Request the deletion of an existing "Individual MLR FL Events Subscription" resource.

6.2.3.3.2 Resource: MLR FL Events Subscriptions

6.2.3.3.2.1 Description

This resource represents the collection of MLR FL Events Subscriptions managed by the ML Repository.

6.2.3.3.2.2 Resource Definition

Resource URI: {apiRoot}/mlr-fl/<apiVersion>/subscriptions

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

Table 6.2.3.3.2.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.2.3.1.

6.2.3.3.2.3 Resource Standard Methods

6.2.3.3.2.3.1 POST

The HTTP POST method enables a AIMLE service consumer to request the creation of a new Individual MLR FL Events Subscription at the ML Repository.

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

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

Name	Data type	P	Cardinality	Description

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

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

Data type	P	Cardinality	Description
FIEvtsSub	M	1	Create a new Individual MLR FL Events Subscription resource.

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

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

Table 6.2.3.3.2.3.1-4: 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}/mlr-fl/<apiVersion>/subscriptions/{subscriptionId}

6.2.3.3.2.4 Resource Custom Operations

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

6.2.3.3.3 Resource: Individual MLR FL Events Subscription

6.2.3.3.3.1 Description

6.2.3.3.3.2 Resource Definition

Resource URI: {apiRoot}/mlr-fl/<apiVersion>/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.2.3.3.3.2-1.

Table 6.2.3.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 6.2.3.1
subscriptionId	string	Represents the identifier of an "Individual MLR FL Events Subscription" resource.

6.2.3.3.3.3 Resource Standard Methods

6.2.3.3.3.3.1 GET

The HTTP GET method allows a service consumer to retrieve an existing " Individual MLR FL Events Subscription" resource at the ML Repository.

This method shall support the URI query parameters specified in table 6.2.3.3.3.3.1-1.

Table 6.2.3.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.3.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.3.3.3.3.1-3.

Table 6.2.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

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

Data type	P	Cardinality	Response codes	Description
FlEvsSub	M	1	200 OK	Successful case. The requested "Individual MLR FL Events 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 ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.3.3.1-4: 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 ML Repository.

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 ML Repository.

6.2.3.3.3.2 PUT

The HTTP PUT method allows a service consumer to request the update of an existing "Individual MLR FL Events Subscription" resource at the ML Repository.

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 PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.3.3.3.2-2 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 PUT Request Body on this resource

Data type	P	Cardinality	Description
FIEvtsSub	M	1	Represents the updated representation of the "Individual MLR FL Events Subscription" resource.

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

Data type	P	Cardinality	Response codes	Description
FIEvtsSub	M	1	200 OK	Successful case. The "Individual MLR FL Events 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 MLR FL Events 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 ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.3.3.2-4: 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 ML Repository.

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 ML Repository.

6.2.3.3.3.3 PATCH

The HTTP PATCH method allows a service consumer to request the modification of an existing "Individual MLR FL Events Subscription" resource at the ML Repository.

This method shall support the URI query parameters specified in table 6.2.3.3.3.3-1.

Table 6.2.3.3.3.3-1: 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 6.2.3.3.3.3.3-2 and the response data structures and response codes specified in table 6.2.3.3.3.3.3-3.

Table 6.2.3.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
FIEvtsSubPatch	M	1	Represents the parameters to request the modification of the "Individual MLR FL Events Subscription" resource.

Table 6.2.3.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
FIEvtsSub	M	1	200 OK	Successful case. The "Individual MLR FL Events 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 MLR FL Events 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 ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.3.3.3-4: 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 ML Repository.

Table 6.2.3.3.3.3-5: 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 ML Repository.

6.2.3.3.3.4 DELETE

The HTTP DELETE method allows a AIMLE service consumer to request the deletion of an existing "Individual MLR FL Events Subscription" resource.

Table 6.2.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 6.2.3.3.3.4-2 and the response data structures and response codes specified in table 6.2.3.3.3.4-3.

Table 6.2.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.3.3.3.4-3: 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 MLR FL Events 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 ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML Repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.3.3.4-4: 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 ML Repository.

Table 6.2.3.3.3.4-5: 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 ML Repository.

6.2.3.3.3.4 Resource Custom Operations

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

6.2.3.4 Custom Operations without associated resources

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

6.2.3.5 Notifications

6.2.3.5.1 General

Notifications shall comply to clause 6.6 of 3GPP TS 29.549 [10].

Table 6.2.3.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
MLR FL Events Event Notification	{notifUri}	POST	This service operation enables an ML Repository to notify a previously subscribed AIMLE service consumer on MLR FL Events related event(s).

6.2.3.5.2 MLR FL Events Event Notification

6.2.3.5.2.1 Description

The MLR FL Events Event Notification is used by the ML Repository to notify a previously subscribed AIMLE service consumer on MLR FL Events related event(s).

6.2.3.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.2.3.5.2.2-1.

Table 6.2.3.5.2.2-1: Callback URI variables

Name	Definition
notifUri	The Notification URI is assigned within the Individual MLR FL Events Subscription and described within the FIEvtsSub type

6.2.3.5.2.3 Standard Methods

6.2.3.5.2.3.1 POST

This method shall support the request data structures specified in table 6.2.3.5.2.3.1-1 and the response data structures and response codes specified in table 6.2.3.5.2.3.1-2.

Table 6.2.3.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
FIEvtsNotif	M	1	Represents the AIMLE ML Model Performance Monitor Event Notification.

Table 6.2.3.5.2.3.1-2: 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 MLR FL Events Event 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 AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI representing the end point of an alternative AIMLE service consumer where the notification should be sent. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] shall also apply.				

Table 6.2.3.5.2.3.1-3: 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 AIMLE service consumer towards which the notification should be redirected.

Table 6.2.3.5.2.3.1-4: 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 AIMLE service consumer towards which the notification should be redirected.

6.2.3.6 Data Model

6.2.3.6.1 General

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

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

Table 6.2.3.6.1-1: MLR_FLEvents API specific Data Types

Data type	Section defined	Description	Applicability
EnterLeave	6.2.3.6.3.4	Represent if FL member is entering or leaving available list.	
EvtContent	6.2.3.6.2.9	Represents event content.	
EvtInfo	6.2.3.6.2.6	Represents the event information.	
EvtType	6.2.3.6.2.7	Represent the event type.	
FIEvtsNotif	6.2.3.6.2.4	Represents the MLR FL Events notification.	
FIEvtsSub	6.2.3.6.2.2	Represents the MLR FL Events subscription information.	
FIEvtsSubPatch	6.2.3.6.2.3	Represents the requested modifications to the MLR FL Events subscription information.	
FIMbrInfo	6.2.3.6.2.5	Represents the FL member information.	
FIMbrType	6.2.3.6.3.3	Represent FL member type.	
FIMdlInfo	6.2.3.6.2.8	Represents FL model information.	

Table 6.2.3.6.1-2 specifies data types re-used by the MLR_FLEvents API service.

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

Data type	Reference	Comments	Applicability
ClientCapability	3GPP TS 24.560 [12]	Contains the AIMLE client capability information (e.g. ML application type, allowed resource usage level).	
DateTime	3GPP TS 29.122 [2]	Used to represent the date and time.	
LocationArea	3GPP TS 29.122 [2]	Identifies the location area.	
MLModel	6.2.1.6.2.4	Represents a ML Model.	
ScheduledCommunicationTime	3GPP TS 29.122 [2]	Represents an offered scheduled communication time.	
SupportedFeatures	3GPP TS 29.571 [11]	Represents the supported features, used to negotiate the supported optional features of the API.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
UInteger	3GPP TS 29.571 [11]	Represents an unsigned Integer.	
Uri	3GPP TS 29.122 [2]	Used to indicate the notification URI.	

6.2.3.6.2 Structured data types

6.2.3.6.2.1 Introduction

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

6.2.3.6.2.2

Type: FIEvtsSub

Table 6.2.3.6.2.2-1: Definition of type FIEvtsSub

Attribute name	Data type	P	Cardinality	Description	Applicability
flMbrInfo	FIMbrInfo	M	1	Identifies the FL member information, for which the Individual FL Event is requested.	
notifUri	Uri	M	1	Identifies the URI, towards which the notification should be delivered.	
mlMdlInfo	MLModel	M	1	Identifies the ML model information, for which the Individual FL Event is requested.	
evtInfo	EvtInfo	M	1	Identifies the event information, for which the Individual FL Event is requested.	
timeValidity	TimeWindow	M	1	Identifies the time of interest, for which the Individual FL Events is requested.	
suppFeat	SupportedFeatures	C	0..1	Identifies the supported features. This attribute shall be provided when feature negotiation needs to take place.	

6.2.3.6.2.3

Type: FIEvtsSubPatch

Table 6.2.3.6.2.3-1: Definition of type FIEvtsSubPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
flMbrInfo	FIMbrInfo	O	0..1	Identifies the FL member information, for which the Individual FL Event is requested.	
notifUri	Uri	O	0..1	Identifies the URI, towards which the notification should be delivered.	
mlMdlInfo	MLModel	O	0..1	Identifies the ML model information, for which the Individual FL Event is requested.	
evtInfo	EvtInfo	O	0..1	Identifies the event information, for which the Individual FL Event is requested.	
timeValidity	TimeWindow	O	0..1	Identifies the time of interest, for which the Individual FL Events is requested.	

6.2.3.6.2.4

Type: FIEvtsNotif

Table 6.2.3.6.2.4-1: Definition of type FIEvtsNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
evtId	string	M	1	Identifies the identity of the event.	
evtTime	DateTime	M	1	Identifies the time of interest, for which the event applies.	
evtArea	LocationArea	O	0..1	Identifies the location of interest, for which the event applies.	
evtContentList	array(EvtContent)	M	1..N	Identifies the list of one or more Event Contents.	

6.2.3.6.2.5 Type: FIMbrInfo

Table 6.2.3.6.2.5-1: Definition of type FIMbrInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
fIMbrType	FIMbrType	C	0..1	Identifies the type of the FL member, for which the individual FL Event is requested. (NOTE)	
fIMbrId	string	C	0..1	Identifies the identity of the FL member, for which the individual FL Event is requested. (NOTE)	

NOTE: At least one of these shall be present.

6.2.3.6.2.6 Type: EvtInfo

Table 6.2.3.6.2.6-1: Definition of type EvtInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
evtId	string	O	0..1	Identifies the identity of the event, for which the individual FL Event is requested.	
evtType	EvtType	M	1	Identifies the type of the event, for which the individual FL Event is requested.	

6.2.3.6.2.7 Type: EvtType

Table 6.2.3.6.2.7-1: Definition of type EvtType

Attribute name	Data type	P	Cardinality	Description	Applicability
availFIMbr	AvailFIMbr	M	1	Identifies the availability of the FL member.	
fIMdlInfo	FIMdlInfo	M	1	Identifies the information of the FL model.	
fIMbrLdInfo	UInteger	M	1	Identifies the information of the FL member computational load.	

6.2.3.6.2.8 Type: FIMdlInfo

Table 6.2.3.6.2.8-1: Definition of type FIMdlInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
accuracy	UInteger	M	1	Identifies an unsigned integer between 0 and 100 representing the percentage of the accuracy of the FL model training.	
timeSchedule	array(ScheduledCommunicationTime)	M	1..N	Identifies the time schedule of the FL model training.	
latency	UInteger	M	1	Identifies an unsigned integer in time unit representing when the FL model training shall be completed.	

6.2.3.6.2.9 Type: EvtContent

Table 6.2.3.6.2.9-1: Definition of type EvtContent

Attribute name	Data type	P	Cardinality	Description	Applicability
fIMbrInfo	FIMbrInfo	M	1	Identifies the FL member information, for which the Individual FL Event is executed.	
fIMbrEnterLeave	EnterLeave	O	0..1	Indicates if FL member is entering or leaving the available list.	
fIMbrCapabilityUpdated	ClientCapability	O	0..1	Provides the updated capabilities of the FL member.	
fIMbrTimeAvail	TimeWindow	O	0..1	Identifies the time period the FL member is available.	
areaOfInterest	LocationArea	O	0..1	The are of interest, exact or predicted for which the event applies.	

6.2.3.6.3 Simple data types and enumerations

6.2.3.6.3.1 Introduction

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

6.2.3.6.3.2 Simple data types

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

Table 6.2.2.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.3.6.3.3 Enumeration: FIMbrType

Table 6.2.3.6.3.3-1: Enumeration FIMbrType

Enumeration value	Description	Applicability
FL_CLIENT	Identifies the FL Member Type is FL Client.	
FL_SERVER	Identifies the FL Member Type is FL Server.	

6.2.3.6.3.4 Enumeration: EnterLeave

Table 6.2.3.6.3.4-1: Enumeration EnterLeave

Enumeration value	Description	Applicability
ENTERING	Identifies the FL Member is entering the available list.	
LEAVING	Identifies the FL Member is leaving the available list.	

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

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

6.2.3.6.5 Binary data

6.2.3.6.5.1 Binary Data Types

Table 6.2.3.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.2.3.7 Error Handling

6.2.3.7.1 General

For the MLR_FLEvents API, HTTP error responses shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.2.3.7.2 Protocol Errors

No specific protocol errors for the MLR_FLEvents API are specified.

6.2.3.7.3 Application Errors

The application errors defined for MLR_FLEvents API are listed in table 6.2.3.7.3-1.

Table 6.2.3.7.3-1: Application errors

Application Error	HTTP status code	Description	Applicability

6.2.3.8 Feature negotiation

The optional features in table 6.2.3.8-1 are defined for the MLR_FLEvents API. They shall be negotiated using the extensibility mechanism defined clause 6.8 of 3GPP TS 29.549 [10].

Table 6.2.3.8-1: Supported Features

Feature number	Feature Name	Description

6.2.3.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the MLR_FLEvents API.

6.2.4 MLR_FLMember API

6.2.4.1 Introduction

The MLR_FLMember Service shall use the MLR_FLMember API.

The API URI of the MLR_FLMember API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests shall have the Resource URI structure defined in clause 6.5 of 3GPP TS 29.549 [10], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in clause 6.5 of 3GPP TS 29.549 [10].
- The <apiName> shall be "mlr-fl".
- The <apiVersion> shall be "v1".
- The <apiSpecificSuffixes> shall be set as described in clause 6.2.4.3 and clause 6.2.4.4.

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

6.2.4.2 Usage of HTTP and common API related aspects

The provisions of clause 6.3 of 3GPP TS 29.549 [10] shall apply for the MLR_FLMember API.

6.2.4.3 Resources

6.2.4.3.1 Overview

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

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

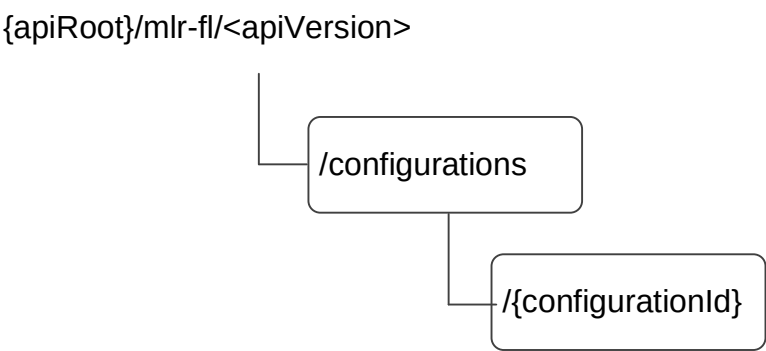


Figure 6.2.4.3.1-1: Resource URI structure of the MLR_FLMember API

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

Table 6.2.4.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description (service operation)
FL Member Configurations	/configurations	POST	Register a new Individual FL Member resource
Individual FL Member Configuration	/configurations/{configurationId}	GET	Query an Individual Registered FL Member resource.
		PUT	Update an Individual Registered FL Member resource.
		PATCH	Modify an Individual Registered FL Member resource.
		DELETE	Deregister an Individual Registered FL Member resource.

6.2.4.3.2 Resource: FL Member Configurations

6.2.4.3.2.1 Description

This resource represents the FL Member Configurations resource managed by the ML repository.

6.2.4.3.2.2 Resource Definition

Resource URI: **{apiRoot}/mlr-fl/<apiVersion>/configurations**

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

Table 6.2.4.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.4.1.

6.2.4.3.2.3 Resource Standard Methods

6.2.4.3.2.3.1 POST

The HTTP POST method enables the AIMLE service consumer to register an FL Member at the ML repository.

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

Table 6.2.4.3.2.3.1-1: URI query parameters supported by the 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 6.2.4.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.4.3.2.3.1-3.

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

Data type	P	Cardinality	Description
FIMbr	M	1	Register a new Individual FL member.

Table 6.2.4.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

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

Table 6.2.4.3.2.3.1-4: 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}/mlr-fl/<apiVersion>/configurations/{configurationId}

6.2.4.3.2.4 Resource Custom Operations

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

6.2.4.3.3 Resource: Individual FL Member Configuration

6.2.4.3.3.1 Description

This resource represents the individual FL Member Configuration resource managed by the ML repository.

6.2.4.3.3.2 Resource Definition

Resource URI: {apiRoot}/mlr-fl/<apiVersion>/configurations/{configurationId}

This resource shall support the resource URI variables defined in table 6.2.4.3.3.2-1.

Table 6.2.4.3.3.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	string	See clause 6.2.4.1.
configurationId	string	Represents the identifier of the Individual FL Member Configuration resource.

6.2.4.3.3.3 Resource Standard Methods

6.2.4.3.3.3.1 GET

The HTTP GET method enables the service consumer e.g., the AIMLE Server to query an Individual Registered FL Member at the ML repository.

This method shall support the URI query parameters specified in table 6.2.4.3.3.3.1-1.

Table 6.2.4.3.3.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.4.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.4.3.3.3.1-3.

Table 6.2.4.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.4.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
FIMbr	M	1	200 OK	Successful case. The requested information on the Individual Registered FL Member is confirmed and a representation of that resource is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP GET method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.2.4.3.3.3.1-4: 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 ML repository.

Table 6.2.4.3.3.3.1-5: 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 ML repository.

6.2.4.3.3.3.2 PUT

The HTTP PUT method enables the service consumer e.g., the AIMLE Server to update an Individual Registered FL Member at the ML repository.

This method shall support the URI query parameters specified in table 6.2.4.3.3.3.2-1.

Table 6.2.4.3.3.3.2-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.4.3.3.3.2-2 and the response data structures and response codes specified in table 6.2.4.3.3.3.2-3.

Table 6.2.4.3.3.2-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
FIMbr	M	1	Represents the updated representation of an Individual Registered FL Member.

Table 6.2.4.3.3.2-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
FIMbr	M	1	200 OK	Successful case. The requested update of the Individual Registered FL Member is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested update of the Individual Registered FL Member is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PUT method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.2.4.3.3.2-4: 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 ML repository.

Table 6.2.4.3.3.2-5: 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 ML repository.

6.2.4.3.3.3 PATCH

The HTTP PATCH method enables the service consumer e.g., the AIMLE Server to modify an Individual Registered FL Member at the ML repository.

This method shall support the URI query parameters specified in table 6.2.4.3.3.3-1.

Table 6.2.4.3.3.3-1: URI query parameters supported by the PATCH method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.4.3.3.3-2 and the response data structures and response codes specified in table 6.2.4.3.3.3-3.

Table 6.2.4.3.3.3-2: Data structures supported by the PATCH Request Body on this resource

Data type	P	Cardinality	Description
FIMbrPatch	M	1	Represents the parameters to modify of an Individual Registered FL Member.

Table 6.2.4.3.3.3-3: Data structures supported by the PATCH Response Body on this resource

Data type	P	Cardinality	Response codes	Description
FIMbr	M	1	200 OK	Successful case. The requested modification of the Individual FL Registered Member is confirmed and a representation of that resource is returned.
n/a			204 No Content	Successful case. The requested modification of the Individual Registered FL Member is confirmed and no content is returned.
n/a			307 Temporary Redirect	Temporary redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP PATCH method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.2.4.3.3.3-4: 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 ML repository.

Table 6.2.4.3.3.3-5: 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 ML repository.

6.2.4.3.3.4 DELETE

The HTTP DELETE method enables the service consumer e.g., AIMLE Server to deregister an Individual Registered FL Member at the ML repository.

This method shall support the URI query parameters specified in table 6.2.4.3.3.4-1.

Table 6.2.4.3.3.4-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.2.4.3.3.4-2 and the response data structures and response codes specified in table 6.2.4.3.3.4-3.

Table 6.2.4.3.3.4-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 6.2.4.3.3.4-3: 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. Deregistration of the Individual Registered FL Member is confirmed.
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 ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
n/a			308 Permanent Redirect	Permanent redirection. The response shall include a Location header field containing an alternative URI of the resource located in an alternative ML repository. Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [2].
NOTE: The mandatory HTTP error status code for the HTTP DELETE method listed in table 5.2.6-1 of 3GPP TS 29.122 [2] also apply.				

Table 6.2.4.3.3.4-4: 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 ML repository.

Table 6.2.4.3.3.4-5: 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 ML repository.

6.2.4.3.3.4 Resource Custom Operations

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

6.2.4.4 Custom Operations without associated resources

There is not any custom operation without associated resources defined for this API in this release of the specification.

6.2.4.5 Notifications

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

6.2.4.6 Data Model

6.2.4.6.1 General

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

Table 6.2.4.6.1-1 specifies the data types defined for the MLR_FLMember API.

Table 6.2.4.6.1-1: MLR_FLMember API specific Data Types

Data type	Clause defined	Description	Applicability
AvailabilityType	6.2.4.6.3.5	The availability of the FL member	
FLCapabilityType	6.2.4.6.2.4	The capability of the FL member	
FIMbr	6.2.4.6.2.2	Registration of a new individual FL Member and Individual Registered FL Member to be updated	
FIMbrAvailSchedule	6.2.4.6.2.5	The availability schedule of the FL member	
FIMbrPatch	6.2.4.6.2.3	Individual Registered FL Member to be modified	
SuppMITaskType	6.2.4.6.3.3	The supported AIML role identity of the FL member	

Table 6.2.4.6.1-2 specifies data types re-used by the MLR_FLMember API from other specifications, including a reference to their respective specifications, and when needed, a short description of their use within the MLR_FLMember API.

Table 6.2.4.6.1-2: MLR_FLMember API re-used Data Types

Data type	Reference	Comments	Applicability
ClientCapability	3GPP TS 24.560 [12]	Contains the AIMLE client capability information (e.g. ML application type, allowed resource usage level).	
FLGroupInfo	3GPP TS 24.560 [12]	Created Individual FL Member Support Group for the FL process.	
GeographicArea	3GPP TS 29.572 [14]	Identifies the geographical information of the FL member.	
LocationArea	3GPP TS 29.122 [2]	Identifies the location area of the FL member.	
ScheduledCommunicationTime	3GPP TS 29.122 [2]	Used to define the schedules for traffic pattern configurations.	
TimeWindow	3GPP TS 29.122 [2]	Identifies the start time and the end time for the validity time.	
VelocityEstimate	3GPP TS 29.572 [14]	Identifies the velocity information of the FL member.	

6.2.4.6.2 Structured data types

6.2.4.6.2.1 Introduction

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

6.2.4.6.2.2

Type: FIMbr

Table 6.2.4.6.2.2-1: Definition of type FIMbr

Attribute name	Data type	P	Cardinality	Description	Applicability
fIMbrId	string	M	1	Identifies the FL member, for which the request applies.	
fIMbrSuppGrp	FlGroupInfo	M	1	Identifies the FL Member Support Group for an FL process.	
suppAimlRole	SuppAimlRoleType	M	1	Identifies the supported AIML role, for which the request applies.	
fIMbrCapability	ClientCapability	O	0..1	Identifies the FL member capabilities, for which the request applies. (NOTE)	
fIMbrVelocity	VelocityEstimate	O	0..1	Identifies the FL member velocity, for which the request applies.	
fIMbrLocation	LocationArea	O	0..1	Identifies the FL member location, for which the request applies.	
fIMbrAvailSch	array(ScheduleCommunicationTime)	O	1..N	Identifies the FL member availability schedule, for which the request applies. (NOTE)	
supMIModelId	array(string)	O	1..N	Identifies the one or more supported ML models by the FL member, for which the request applies.	
areaValidity	GeographicArea	O	0..1	Identifies the coordinate of the area of interest, for which the request applies.	
timeValidity	TimeWindow	O	0..1	Identifies the time of interest, for which the request applies.	
NOTE: At least one of these attributes shall be included.					

6.2.4.6.2.3

Type: FIMbrPatch

Table 6.2.4.6.2.3-1: Definition of type FIMbrPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
fIMbrId	string	M	1	Identifies the FL member, for which the request applies.	
suppAimlRole	SuppAimlRoleType	O	0..1	Identifies the supported AIML role, for which the request applies. (NOTE)	
fIMbrAvailSch	array(ScheduleCommunicationTime)	O	1..N	Identifies the FL member availability schedule, for which the request applies. (NOTE)	
supMIModelId	array(string)	O	1..N	Identifies the one or more supported ML models by the FL member, for which the request applies. (NOTE)	
areaValidity	GeographicArea	O	0..1	Identifies the coordinate of the area of interest, for which the request applies. (NOTE)	
timeValidity	TimeWindow	O	0..1	Identifies the time of interest, for which the request applies. (NOTE)	
NOTE: At least one of these attributes shall be included.					

6.2.4.6.3

Simple data types and enumerations

6.2.4.6.3.1

Introduction

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

6.2.4.6.3.2 Simple data types

The simple data types defined in table 6.2.4.6.3.2-1 shall be supported.

Table 6.2.4.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability

6.2.4.6.3.3 Enumeration: SuppAimlRoleType

The enumeration SuppAimlRoleType represents information regarding the supported AIML role identity of the FL member. It shall comply with the provisions defined in table 6.2.4.6.3.3-1.

Table 6.2.4.6.3.3-1: Enumeration SuppAimlRoleType

Enumeration value	Description	Applicability
FL_CLIENT	Identifies the supported AIML role of FL member is used as FL client.	
FL_SERVER	Identifies the supported AIML role of FL member is used as FL server.	

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

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

6.2.4.6.5 Binary data

6.2.4.6.5.1 Binary Data Types

The binary data types defined for the MLR_FLMember API are listed in Table 6.2.4.6.5.1-1.

Table 6.2.4.6.5.1-1: Binary Data Types

Name	Clause defined	Content type

6.2.4.7 Error Handling

6.2.4.7.1 General

For the MLR_FLMember API, HTTP error responses shall be supported as specified in clause 6.7 of 3GPP TS 29.549 [10].

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

6.2.4.7.2 Protocol Errors

No specific procedures for the MLR_FLMember API are specified.

6.2.4.7.3 Application Errors

The application errors defined for the MLR_FLMember API are listed in Table 6.2.4.7.3-1.

Table 6.2.4.7.3-1: Application errors

Application Error	HTTP status code	Description

6.2.4.8 Feature negotiation

The optional features in table 6.2.4.8-1 are defined for the MLR_FLMember API. They shall be negotiated using the extensibility mechanism defined in clause 6.8 of 3GPP TS 29.549 [10].

Table 6.2.4.8-1: Supported Features

Feature number	Feature Name	Description

6.2.4.9 Security

The provisions of clause 9 of 3GPP TS 29.549 [10] shall apply for the MLR_FLMember API.

7 Using Common API Framework

The provisions of clause 8 of 3GPP TS 29.549 [10] shall apply for the AIMLE APIs defined in this specification.

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the APIs defined in the present specification. It consists of OpenAPI [18] specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the APIs.

NOTE: The semantics and procedures, as well as conditions, e.g., for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI [18] definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI [18] specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [3] and clause 5B of 3GPP TR 21.900 [4]).

A.2 AIMLES_ContextTransfer API

openapi: 3.0.0

info:

title: AIMLE Context Transfer Service
version: 1.0.0
description: |
AIMLES Context Transfer Information Service.
© 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-ct/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/transfer:
post:
summary: Request AIMLE context information transfer.
operationId: Transfer
tags:
- AIMLE Context Transfer Request
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/TransReq'
responses:
'204':
description: >
No Content. The AIMLE Context Transfer request is successfully received and
processed.
'307':
\$ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
\$ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
\$ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
\$ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
\$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
\$ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
\$ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
\$ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
\$ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

```
oAuth2ClientCredentials:
  type: oauth2
  flows:
    clientCredentials:
      tokenUrl: '{tokenUrl}'
      scopes: {}
```

```
schemas:
```

```
  TransReq:
    description: >
      Represents the AIMLE Context Transfer request.
    type: object
    properties:
      clientId:
        $ref: '#/components/schemas/AimleClientId'
      currServerId:
        type: string
      prevServerIds:
        type: array
        items:
          type: string
        minItems: 1
      servStatus:
        $ref: '#/components/schemas/AimleServStatus'
      servRes:
        type: string
      servApp:
        $ref: '#/components/schemas/AimleServApp'
      mlContextInfo:
        $ref: '#/components/schemas/MLContextInformation'
    required:
      - clientId
```

```
  AimleServStatus:
    description: >
      Represents the AIMLE service operations status related information.
    type: object
    properties:
      servOpStatus:
        $ref: '#/components/schemas/AimleServOpStatus'
      servOpCompPer:
        type: integer
        minimum: 0
        maximum: 100
    required:
      - servOpStatus
```

```
  AimleServApp:
    description: >
      Represents the AIMLE service applicability information.
    type: object
    properties:
      serviceArea:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
      operationPipeline:
        type: string
```

```
  MLContextInformation:
    description: >
      Represents the context information related to the ML operation.
    type: object
    properties:
      valServId:
        type: string
      mlModelInfo:
        $ref: 'TS29482_AIMLES_MLModelRetrieval.yaml#/components/schemas/MLModelDetail'
      mlTask:
        $ref: 'TS24560_Aimles_AIMLEClientRegistration.yaml#/components/schemas/AimlOperation'
      dataSetInfo:
        $ref: 'TS24560_Aimlec_MLModTngCapEva.yaml#/components/schemas/DataSetRequirements'
      trainOpStatus:
        $ref: '#/components/schemas/AimleServOpStatus'
      splitTaskInfo:
        $ref: 'TS29482_AIMLES_SplitOpEvent.yaml#/components/schemas/SplitOpProfile'
    required:
      - mlModelInfo
```

```
# SIMPLE DATA TYPES
```

#

AimleClientId:
description: Represents the unique identifier of a AIMLE Client.
type: string

#

ENUMERATIONS

#

AimleServOpStatus:
anyOf:
- type: string
enum:
- ACTIVE
- PAUSED
- COMPLETED
- 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 AIMLE service operations status.
Possible values are:
- ACTIVE: Indicates that the status of the AIML operations at the AIMLE Client is active.
- PAUSED: Indicates that the status of the AIML operations at the AIMLE Client is paused.
- COMPLETED: Indicates that the status of the AIML operations at the AIMLE Client is
completed.

A.3 AIMLES_DataManagement API

openapi: 3.0.0

info:

```
title: AIMLES Data Management Service
version: 1.0.0
description: |
  AIMLES Data Management Service.
  © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
  Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/
```

servers:

```
- url: '{apiRoot}/aimles-dm/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- oAuth2ClientCredentials: []
```

paths:

```
/subscriptions:
  post:
    summary: Request the creation of an AIMLE Data Management Assistance Subscription.
    operationId: CreateAimleDmAssistSubsc
    tags:
      - AIMLE Data Management Assistance Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/DataMgmtAssistSubsc'
    responses:
      '201':
        description: >
          The requested Individual AIMLE Data Management Assistance Subscription is successfully
          created and a representation of the created resource is returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DataMgmtAssistSubsc'
        headers:
          Location:
            description: Contains the URI of the newly created resource.
            required: true
            schema:
              type: string
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
```

```

    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    AIMLEDataMngtAssistNotif:
      '{$request.body#/notifUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/DataMgmtAssistNotif'
          responses:
            '204':
              description: >
                No Content. The AIMLE Data Management Assistance Notification is successfully
                received and acknowledged.
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Represents the identifier of the Individual AIMLE Data Management Assistance Subscription
        resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual AIMLE Data Management Assistance Subscription
resource.
    operationId: GetIndAimleDmAssistSubsc
    tags:
      - Individual AIMLE Data Management Assistance Subscription (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual AIMLE Data Management Assistance Subscription resource
          shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DataMgmtAssistSubsc'
      '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 AIMLE Data Management Assistance
Subscription resource.
operationId: UpdateIndAimleDmAssistSubsc
tags:
  - Individual AIMLE Data Management Assistance Subscription (Document)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/DataMgmtAssistSubsc'
responses:
  '200':
    description: >
      OK. The Individual AIMLE Data Management Assistance 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/DataMgmtAssistSubsc'
  '204':
    description: >
      No Content. The Individual AIMLE Data Management Assistance 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 AIMLE Data Management Assistance
Subscription resource.
operationId: ModifyIndAimleDmAssistSubsc
tags:
  - Individual AIMLE Data Management Assistance Subscription (Document)
requestBody:
  required: true
  content:
    application/json:

```

```

    schema:
      $ref: '#/components/schemas/DataMgmtAssistSubscPatch'
  responses:
    '200':
      description: >
        OK. The Individual AIMLE Data Management Assistance 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/DataMgmtAssistSubsc'
    '204':
      description: >
        No Content. The Individual AIMLE Data Management Assistance 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 AIMLE Data Management Assistance
Subscription.
    operationId: DeleteIndAimleDmAssistSubsc
    tags:
      - Individual AIMLE Data Management Assistance Subscription (Document).
    responses:
      '204':
        description: >
          No Content. The individual AIMLE Data Management Assistance 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:
  DataMgmtAssistSubsc:
    description: Represents the AIMLE Data Management Assistance Subscription.
    type: object
    properties:
      clientList:
        type: array
        items:
          $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
        minItems: 1
      selCriteria:
        $ref: 'TS29482_AIMLES_AIMLEClientDiscovery.yaml#/components/schemas/ClientDiscCriteria'
      dataMgmtOp:
        $ref: '#/components/schemas/DataMgmtOp'
      dataPrepReqs:
        $ref: '#/components/schemas/DataProcessReqs'
      dataAnalysisReqs:
        $ref: '#/components/schemas/DataProcessReqs'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      expTime:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - dataMgmtOp
      - notifUri
    anyOf:
      - required: [clientList]
      - required: [selCriteria]

  DataMgmtAssistNotif:
    description: Represents the AIMLE Data Management Assistance Notification.
    type: object
    properties:
      aggrDataPrepOut:
        $ref: '#/components/schemas/AggregatedDataPrepOutputs'
      aggrDataAnaOut:
        $ref: '#/components/schemas/AggregatedDataAnaOutputs'
      timeStamp:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

  DataProcessReqs:
    description: Represents the data preparation or analysis requirements.
    type: object
    properties:
      dataSetId:
        type: string
      dataOperReqs:
        type: array
        items:
          $ref: '#/components/schemas/DataOperReqs'
        minItems: 1
    required:
      - dataSetId
      - dataOperReqs

  DataOperReqs:
    description: Represents the data operation requirements.
    type: object
    properties:
      dataId:
        type: string
      dataSetFeatId:
        type: string
      dataOperFuncId:
        type: string
      dataOperFunction:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    required:
```

```
- dataId
- dataSetFeatId
anyOf:
- required: [dataOperFuncId]
- required: [dataOperFunction]

DataMgmtAssistSubscPatch:
description: >
  Represents the requested modifications to an AIMLE Data Management Assistance Subscription.
type: object
properties:
  dataPrepReqs:
    $ref: '#/components/schemas/DataProcessReqs'
  dataAnalysisReqs:
    $ref: '#/components/schemas/DataProcessReqs'
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

AggregatedDataPrepOutputs:
description: >
  Represents the outputs for data preparation.
type: object
properties:
  dataSetId:
    type: string
  preparedDataOutputs:
    type: array
    items:
      $ref: '#/components/schemas/PreparedDataOutput'
    minItems: 1
required:
- dataSetId
- preparedDataOutputs

PreparedDataOutput:
description: >
  Represents the prepared data output.
type: object
properties:
  featureId:
    type: string
  format:
    $ref: '#/components/schemas/DataFormat'
  categoryType:
    $ref: '#/components/schemas/CategoryType'
  numericValues:
    type: array
    items:
      type: integer
    minItems: 1
  categoricValues:
    type: array
    items:
      type: string
    minItems: 1
required:
- featureId
- format

AggregatedDataAnaOutputs:
description: >
  Represents the analysis data output.
type: object
properties:
  dataSetId:
    type: string
  statisticaOutputs:
    type: array
    items:
      $ref: '#/components/schemas/StatisticalOutput'
    minItems: 1
required:
- dataSetId
- statisticaOutputs

StatisticalOutput:
description: >
  Represents the statistical output.
```

```

type: object
properties:
  featureId:
    type: string
  mean:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  std:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  min:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  max:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  outlierValues:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    minItems: 1
  anomalies:
    type: array
    items:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    minItems: 1
  featureCorrelatedInfo:
    type: string
required:
  - featureId
anyOf:
  - required: [mean]
  - required: [std]
  - required: [min]
  - required: [max]
  - required: [outlierValues]
  - required: [anomalies]
  - required: [featureCorrelatedInfo]

```

```

#
# SIMPLE DATA TYPES
#

```

```

#
# ENUMERATIONS
DataMgmtOp:
  anyOf:
    - type: string
      enum:
        - DATA_PREPARATION
        - DATA_ANALYSIS
    - 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 data management operation type.
        Possible values are:
        - DATA_PREPARATION: Indicates that the data management operation type is data preparation.
        - DATA_ANALYSIS: Indicates that the data management operation type is data analysis.

```

```

DataFormat:
  anyOf:
    - type: string
      enum:
        - NUMERICAL
        - CATEGORICAL
    - 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 data management operation type.
        Possible values are:
        - NUMERICAL: Indicates that the data format type is numerical.
        - CATEGORICAL: Indicates that the data format type is categorical.

```

```

CategoryType:
  anyOf:
    - type: string
      enum:
        - NOMINAL

```

- ORDINAL
- 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 data management operation type.
 - Possible values are:
 - NOMINAL: Indicates that the categorical output type is nominal.
 - ORDINAL: Indicates that the categorical output type is ordinal.

#

A.4 MLR_MLModelManagement API

openapi: 3.0.0

info:

title: AIMLE Server ML Model Management
version: 1.0.0
description: |
AIMLE Server ML Model Management Service.
© 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 V19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/mlr-mlmm/v1'
variables:
apiRoot:
default: https://example.com
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549.

security:

- {}
- oAuth2ClientCredentials: []

paths:

/storages:

get:

summary: Retrieve one or several existing Individual ML Models Storage resource(s).
operationId: GetMLModelsStorages
tags:
- ML Models Storages (Collection)
parameters:
- name: storage-ids
in: query
description: Contains the identifier(s) of the targeted ML Models Storage resource(s).
required: false
schema:
type: array
items:
type: string
minItems: 1
- name: profile-ids
in: query
description: Contains identifier(s) of the profile(s) of the targeted stored ML Model(s).
required: false
style: form
explode: false
schema:
type: array
items:
type: string
minItems: 1
- name: supp-feats
in: query
description: >
Contains the list of supported features among the ones defined in clause 6.2.1.8.
This query parameter shall be present only when feature negotiation is required.
required: false
schema:
\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

responses:

'200':

description: >
OK. The requested Individual ML Models Storage resource(s) shall be returned.
If there are no available Individual ML Models Storage resource(s) fulfilling the
request, an empty array shall be returned.

content:

application/json:

schema:
type: array
items:
\$ref: '#/components/schemas/MLModelsStorage'

```

        minItems: 0
    '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

post:

```

summary: Request the creation of a ML Models Storage.
operationId: CreateMLModelsStorage
tags:
  - ML Models Storages (Collection)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/MLModelsStorage'
responses:
  '201':
    description: >
      Created. The ML Models Storage is successfully created and a representation of the
      created Individual ML Models Storage resource shall be returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MLModelsStorage'
    headers:
      Location:
        description: >
          Contains the URI of the created Individual ML Models Storage 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'

```

```

/storages/{storageId}:
  parameters:
    - name: storageId

```



```
in: path
description: >
  Represents the identifier of the Individual ML Models Storage resource.
required: true
schema:
  type: string

get:
summary: Retrieve an existing Individual ML Models Storage resource.
operationId: GetIndMLModelsStorage
tags:
  - Individual ML Models Storage (Document)
responses:
  '200':
    description: >
      OK. The requested Individual ML Models Storage resource shall be returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MLModelsStorage'
  '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 ML Models Storage resource.
operationId: UpdateIndMLModelsStorage
tags:
  - Individual ML Models Storage (Document)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/MLModelsStorage'
responses:
  '200':
    description: >
      OK. The Individual ML Models Storage 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/MLModelsStorage'
  '204':
    description: >
      No Content. The Individual ML Models Storage 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 ML Models Storage resource.
operationId: ModifyIndMLModelsStorage

tags:

- Individual ML Models Storage (Document)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/MLModelsStoragePatch'

responses:

'200':

description: >

OK. The Individual ML Models Storage 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/MLModelsStorage'

'204':

description: >

No Content. The Individual ML Models Storage 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 ML Models Storage resource.
operationId: DeleteIndMLModelsStorage

tags:

- Individual ML Models Storage (Document)

responses:

'204':

description: >

No Content. The Individual ML Models Storage resource is successfully deleted.

'307':

\$ref: 'TS29122_CommonData.yaml#/components/responses/307'

```

'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

```

```

schemas:

```

```

#
# STRUCTURED DATA TYPES
#

```

```

MLModelsStorage:
  description: >
    Represents a ML Models Storage.
  type: object
  properties:
    mlModels:
      type: array
      items:
        $ref: '#/components/schemas/MLModelProfile'
      minItems: 1
    mlModelsAddresses:
      type: array
      items:
        $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
      minItems: 1
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  anyOf:
    - required: [mlModels]
    - required: [mlModelsAddresses]

```

```

MLModelProfile:
  description: >
    Represents the ML Model Profile.
  type: object
  properties:
    mlModelProfId:
      type: string
    aimleServId:
      type: string
    aimleRepId:
      type: string
    mlModelInfo:
      $ref: '#/components/schemas/MLModel'
    mlModelUri:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
  required:
    - mlModelInfo

```

```

MLModel:
  description: >
    Represents a ML Model.
  type: object

```

```
properties:
  mlModelId:
    type: string
  adaeAnalyticsId:
    $ref: 'TS29549_SS_AADRF_DataManagement.yaml#/components/schemas/AdaeAnalyticsId'
  mlModelSize:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Volume'
  mlModelSrcId:
    type: string
  valServiceIds:
    type: array
    items:
      type: string
    minItems: 1
  domain:
    $ref: '#/components/schemas/MLModelDomain'
  customDomain:
    type: string
  vendors:
    type: array
    items:
      type: string
    minItems: 1
  interopInfo:
    type: string
  phaseInfo:
    $ref: '#/components/schemas/MLModelPhaseInfo'
  storeDiscReqs:
    $ref: '#/components/schemas/MLModelStoreDiscReqs'
  usageReqs:
    $ref: '#/components/schemas/MLModelUsageReqs'
required:
  - mlModelId
anyOf:
  - required: [vendors]
  - required: [interopInfo]
  - required: [phaseInfo]
  - required: [storeDiscReqs]

MLModelPhaseInfo:
  description: >
    Represents the ML Model phase related information.
  type: object
  properties:
    phase:
      $ref: '#/components/schemas/MLModelPhase'
    observedPerf:
      $ref: '#/components/schemas/MLModelPerf'
    trainingInfo:
      $ref: '#/components/schemas/MLModelTrainingInfo'
    contTrainInd:
      type: boolean
      default: false
      description: >
        Indicates whether the ML Model can be trained continuously or not.
        true indicates that the ML Model can be trained continuously.
        false indicates that the ML Model cannot be trained continuously.
        The default value is false when this attribute is omitted.
    contTrainParams:
      type: string
  required:
    - phase

MLModelStoreDiscReqs:
  description: >
    Represents the ML Model storage and discovery requirements.
  type: object
  properties:
    duration:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    accessReqs:
      $ref: '#/components/schemas/MLModelAccessReqs'
  anyOf:
    - required: [duration]
    - required: [accessReqs]

MLModelUsageReqs:
  description: >
```

```
    Represents the ML Model usage requirements.
  type: object
  properties:
    usages:
      type: array
      items:
        $ref: '#/components/schemas/MLModelUsage'
      minItems: 1
    required:
      - usages

MLModelPerf:
  description: >
    Represents the performance information of the ML Model.
  type: object
  properties:
    resourceAddr:
      type: integer
      minimum: 0
      maximum: 100
    appSpecPerfData:
      type: string
  anyOf:
    - required: [resourceAddr]
    - required: [appSpecPerfData]

MLModelTrainingInfo:
  description: >
    Represents the ML Model training information.
  type: object
  properties:
    dataSources:
      type: string
    dataVolume:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Volume'
    freshness:
      $ref: '#/components/schemas/DataFreshness'
    baseModelId:
      type: string
  anyOf:
    - required: [dataSources]
    - required: [dataVolume]
    - required: [freshness]
    - required: [baseModelId]

MLModelAccessReqs:
  description: >
    Represents ML Model access requirements.
  type: object
  properties:
    accessReqs:
      type: array
      items:
        $ref: '#/components/schemas/AccessReqs'
      minItems: 1
    valServerIds:
      type: array
      items:
        type: string
      minItems: 1
    valClientIds:
      type: array
      items:
        type: string
      minItems: 1
    timePeriod:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    location:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
  required:
    - accessReqs

MLModelsStoragePatch:
  description: >
    Represents the requested modifications to a ML Models Storage.
  type: object
  properties:
    mlModels:
```

```
    type: array
    items:
      $ref: '#/components/schemas/MLModelProfile'
    minItems: 1
  mlModelsAddresses:
    type: array
    items:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    minItems: 1

#
# Simple data types
#

#
# ENUMERATIONS
#

MLModelDomain:
  anyOf:
    - type: string
      enum:
        - SPEECH_RECOGNITION
        - IMAGE_RECOGNITION
        - IMAGE_PROCESSING
        - LOCATION_PREDICTION
        - CUSTOM
    - 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 domain of the ML Model.
    Possible values are:
    - SPEECH_RECOGNITION: Indicates that the domain of the ML Model is speech recognition.
    - IMAGE_RECOGNITION: Indicates that the domain of the ML Model is image recognition.
    - IMAGE_PROCESSING: Indicates that the domain of the ML Model is image processing.
    - LOCATION_PREDICTION: Indicates that the domain of the ML Model is location prediction.
    - CUSTOM: Indicates that the domain of the ML Model is a custom domain.

MLModelPhase:
  anyOf:
    - type: string
      enum:
        - NOT_TRAINED
        - IN_TRAINING
        - TRAINED
        - IN_RETRAINING
        - DEPLOYED
    - 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 ML Model phase.
    Possible values are:
    - NOT_TRAINED: Indicates that the ML Model phase is that ML Model is not trained.
    - IN_TRAINING: Indicates that the ML Model phase is that the ML Model is in training.
    - TRAINED: Indicates that the ML Model phase is that the ML Model is trained.
    - IN_RETRAINING: Indicates that the ML Model phase is that the ML Model is in re-training.
    - DEPLOYED: Indicates that the ML Model phase is that the ML Model is deployed.

MLModelUsage:
  anyOf:
    - type: string
      enum:
        - TRAINING
        - INFERENCE
    - 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 ML Model usage.
    Possible values are:
    - TRAINING: Indicates that the ML Model usage is training.
    - INFERENCE: Indicates that the ML Model usage is inference.
```

AccessReqs:**anyOf:**

- type: string
- enum:
 - PUBLICLY_AVAILABLE
 - RESTRICTED
 - PRIVATE_USE_ONLY
- 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 ML Model access requirements.

Possible values are:

- PUBLICLY_AVAILABLE: Indicates that the ML Model is publicly available.
- RESTRICTED: Indicates that the ML Model is restricted.
- PRIVATE_USE_ONLY: Indicates that the ML Model is for private use only.

DataFreshness:**anyOf:**

- type: string
- enum:
 - REAL_TIME
 - NEAR_REAL_TIME
 - HOURLY
 - DAILY
 - WEEKLY
 - MONTHLY
- 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 data freshness level.

Possible values are:

- REAL_TIME: Indicates that the data freshness level is real-time.
- NEAR_REAL_TIME: Indicates that the data freshness level is near real-time.
- HOURLY: Indicates that the data freshness level is hourly.
- DAILY: Indicates that the data freshness level is daily.
- WEEKLY: Indicates that the data freshness level is weekly.
- MONTHLY: Indicates that the data freshness level is monthly.

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

#

A.5 AIMLES_AIMLEClientDiscovery API

openapi: 3.0.0

info:

title: AIMLES_AIMLEClientDiscovery
version: 1.0.0
description: |
API for AIMLES Client Discovery Service.
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externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-disc/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/clients:

get:

summary: Retrieve an existing the Individual AIMLE Data Management Assistance Subscription resource.

operationId: GetAimleClients

tags:

- AIMLE Clients (Collection)

parameters:

- name: filt-criteria

in: query

description: >

Represents the AIMLE Client(s) filtering criteria.

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/ClientDiscCriteria'

- name: cl-number

in: query

description: >

Represents the required number of the discovered AIMLE Clients.

schema:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'

- name: supported-features

in: query

description: >

Contains supported features information, used to negotiate the applicability of optional features.

schema:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

responses:

'200':

description: >

OK. The response body contains the result of the search over the list of AIMLE Clients.

content:

application/json:

schema:

\$ref: '#/components/schemas/ClientDiscResp'

'307':

\$ref: 'TS29122_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29122_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':


```

    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

```

securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

```

schemas:

```

ClientDiscCriteria:
  description: Represents the AIMLE Client discovery criteria.
  type: object
  properties:
    serviceReq:
      $ref: '#/components/schemas/ServiceRequirement'
    mlModelTypes:
      type: array
      items:
        $ref: '#/components/schemas/MLModelType'
      minItems: 1
    aimlOps:
      type: array
      items:
        $ref: '#/components/schemas/AimlOperationRole'
      minItems: 1
    clientAppCap:
      $ref: '#/components/schemas/ClientAppCapability'
    datasetReq:
      $ref: '#/components/schemas/DatasetRequirement'
    clientTaskCap:
      $ref: '#/components/schemas/ClientTaskCapability'
    clientVel:
      $ref: '#/components/schemas/ClientVelocity'
    location:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    clientQosReqs:
      type: array
      items:
        $ref:
'TS29548_SDD_TransmissionQualityMeasurement.yaml#/components/schemas/TransQualMeasCriteriaSet'
      minItems: 1
    required:
      - serviceReq
      - aimlOps
      - clientAppCap

ServiceRequirement:
  description: Represents the AIMLE service requirements.
  type: object
  properties:
    valServId:
      type: string
    permLevel:
      $ref: '#/components/schemas/ServicePermLevel'
  required:
    - valServId

ClientAppCapability:
  description: Represents the AIMLE Client compute capability type.
  type: object
  properties:
    appType:
      $ref: '#/components/schemas/MLAppType'

```

```
    avail:
      type: array
      items:
        $ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
      minItems: 1
    dropOfRate:
      type: integer
      minimum: 0
      maximum: 100
    required:
      - appType

DatasetRequirement:
  description: Represents the dataset requirements.
  type: object
  properties:
    avail:
      $ref: '#/components/schemas/DatasetAvailability'
    cap:
      $ref: '#/components/schemas/DatasetCapability'

DatasetAvailability:
  description: Represents the dataset availability information.
  type: object
  properties:
    ids:
      type: array
      items:
        type: string
      minItems: 1
    age:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    size:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    features:
      type: array
      items:
        type: string
      minItems: 1

DatasetCapability:
  description: Represents the dataset capability information.
  type: object
  properties:
    dataType:
      $ref: '#/components/schemas/DataType'
    functions:
      type: array
      items:
        type: string
      minItems: 1

ClientTaskCapability:
  description: Represents the performance capabilities.
  type: object
  properties:
    compCap:
      $ref: '#/components/schemas/ComputeCapability'
    perfCap:
      $ref: '#/components/schemas/PerformanceCapability'

ClientDiscResp:
  description: Represents the AIMLE Client discovery response.
  type: object
  properties:
    clients:
      type: array
      items:
        $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
    suppTasks:
      type: array
      items:
        $ref: '#/components/schemas/ClientTaskCapability'
      minItems: 1
    suppFeats:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
```

```
# SIMPLE DATA TYPES
```

```
#
```

```
# ENUMERATIONS
```

```
ServicePermLevel:
```

```
anyOf:
```

```
- type: string
```

```
enum:
```

- PREMIUM
- STANDARD
- LIMITED

```
- 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 service permission level.

Possible values are:

- PREMIUM: Indicates that the service permission level is premium.
- STANDARD: Indicates that the service permission level is standard.
- LIMITED: Indicates that the service permission level is limited.

```
MLModelType:
```

```
anyOf:
```

```
- type: string
```

```
enum:
```

- DECISION_TREES
- LINEAR_REGRESSION
- NEURAL_NETWORKS

```
- 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 ML model type.

Possible values are:

- DECISION_TREES: Indicates that the ML model type is decision trees.
- LINEAR_REGRESSION: Indicates that the ML model type is linear regression.
- NEURAL_NETWORKS: Indicates that the ML model type is neural networks.

```
AIMLOperationRole:
```

```
anyOf:
```

```
- type: string
```

```
enum:
```

- MODEL_TRAINING
- MODEL_TRANSFER
- MODEL_INFERENCE
- MODEL_OFFLOAD
- MODEL_SPLIT

```
- 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 AIMLE operation role.

Possible values are:

- MODEL_TRAINING: Indicates that the supported AIML operation role is model training.
- MODEL_TRANSFER: Indicates that the supported AIML operation role is model transfer.
- MODEL_INFERENCE: Indicates that the supported AIML operation role is model inference.
- MODEL_OFFLOAD: Indicates that the supported AIML operation role is model offload.
- MODEL_SPLIT: Indicates that the supported AIML operation role is model split.

```
MLAppType:
```

```
anyOf:
```

```
- type: string
```

```
enum:
```

- FL
- TL
- SL

```
- 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 ML model type.

Possible values are:

- FL: Indicates that the supported ML application type is Federated Learning.

- TL: Indicates that the supported ML application type is Transfer Learning.
- SL: Indicates that the supported ML application type is Split Learning.

DataType:

anyOf:

- type: string

enum:

- RAW
- PROCESSED

- 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 the collected data.

Possible values are:

- RAW: Indicates that the type of the collected data is raw.
- PROCESSED: Indicates that the type of the collected data is processed.

PerformanceCapability:

anyOf:

- type: string

enum:

- GREEN_TASK
- ENERGY_EFFICIENT
- LOW_COSTS

- 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 performance capabilities.

Possible values are:

- GREEN_TASK: Indicates that the performance capability is green task.
- ENERGY_EFFICIENT: Indicates that the performance capability is energy-efficient.
- LOW_COSTS: Indicates that the performance capability is low costs.

ComputeCapability:

anyOf:

- type: string

enum:

- LOW
- HIGH

- 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 AIMLE Client compute capability type.

Possible values are:

- LOW: Indicates that the compute capability is low.
- HIGH: Indicates that the compute capability is high.

ClientVelocity:

anyOf:

- type: string

enum:

- MOBILE_LOW
- MOBILE_HIGH
- STATIC

- 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 AIMLE Client velocity level.

Possible values are:

- MOBILE_LOW: Indicates that the AIMLE Client is mobile with low velocity.
- MOBILE_HIGH: Indicates that the AIMLE Client is mobile with high velocity.
- STATIC: Indicates that the AIMLE Client is static.

A.6 MLR_ModelInformationDiscovery API

openapi: 3.0.0

info:

```
title: MLR_ModelInformationDiscovery
version: 1.0.0
description: |
  API for MLR Model Information Discovery Service.
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  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
  (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/
```

servers:

```
- url: '{apiRoot}/mlr-mid/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- OAuth2ClientCredentials: []
```

paths:

```
/models:
  get:
    summary: Discover the ML model information according to the filtering criteria.
    operationId: GetMLModelInfo
    tags:
      - ML Models (Collection)
    parameters:
      - name: filt-criteria
        in: query
        description: >
          Represents the ML model filtering criteria.
        required: true
        content:
          application/json:
            schema:
              $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
      - name: supported-features
        in: query
        description: >
          Contains supported features information, used to negotiate the applicability
          of optional features.
        schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    responses:
      '200':
        description: >
          OK. The response body contains the result of the search over the list
          of stored ML Models.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/DiscoveryResp'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
```

```
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

components:

```
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}
```

schemas:

```
  DiscoveryResp:
    description: Represents the ML model discovery response.
    type: object
    properties:
      profiles:
        type: array
        items:
          $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModelProfile'
        minItems: 1
      mlModels:
        type: array
        items:
          $ref: '#/components/schemas/MLModel'
        minItems: 1
      indicator:
        type: boolean
    oneOf:
      - required: [profiles]
      - required: [mlModels]
```

```
  MLModel:
    description: Represents the ML model.
    type: object
    properties:
      mlModelId:
        type: string
      mlModel:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    required:
      - mlModelId
```

SIMPLE DATA TYPES

#

ENUMERATIONS

A.7 AIMLES_AIMLEClientSelection API

openapi: 3.0.0

info:

title: AIMLES_AIMLEClientSelection
version: 1.0.0
description: |
API for AIMLES Client Selection Service.
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externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-sel/v1'
variables:
apiRoot:
default: https://example.com
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- OAuth2ClientCredentials: []

paths:

/subscriptions:
post:
summary: Request the creation of a Individual AIMLE Client Selection Subscription.
operationId: CreateAimleClSelSubscription
tags:
- AIMLE Client Selection Subscriptions (Collection)
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/ClientSelSub'
responses:
'201':
description: >
The requested Individual AIMLE Client Selection Subscription is successfully
created and a representation of the created resource is returned in the response body.
content:
application/json:
schema:
\$ref: '#/components/schemas/ClientSelSub'
headers:
Location:
description: Contains the URI of the newly created resource.
required: true
schema:
type: string
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
\$ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
\$ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
\$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
\$ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
\$ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
\$ref: 'TS29122_CommonData.yaml#/components/responses/503'

```

    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    myNotification:
      '{$request.body#/notifUri}':
        post:
          summary: Notify on the requested data.
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/ClientSelNotif'
          responses:
            '204':
              description: The notification is successfully received.
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Represents the Individual AIMLE Client Selection Subscription resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing the Individual AIMLE Client Selection Subscription resource.
    operationId: GetIndAimleClSelSubscription
    tags:
      - Individual AIMLE Client Selection Subscription (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual AIMLE Client Selection Subscription resource
          shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ClientSelSub'
      '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 AIMLE Client Selection Subscription
  resource.
  operationId: UpdateIndAimleClSelSubscription
  tags:
    - Individual AIMLE Client Selection Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ClientSelSub'
  responses:
    '200':
      description: >
        OK. The Individual AIMLE Client Selection 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/ClientSelSub'
    '204':
      description: >
        No Content. The Individual AIMLE Client Selection 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 AIMLE Client Selection
  Subscription resource.
  operationId: ModifyIndAimleClSelSubscription
  tags:
    - Individual AIMLE Client Selection Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ClientSelSubPatch'
  responses:

```

```

'200':
  description: >
    OK. The Individual AIMLE Client Selection 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/ClientSelSub'
'204':
  description: >
    No Content. The Individual AIMLE Client Selection 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: Remove the Individual AIMLE Client Selection Subscription.
 operationId: UnsubscribeAimleClSelSubscription

tags:

- Individual AIMLE Client Selection Subscription (Document).

responses:

```

'204':
  description: >
    The individual AIMLE Client Selection Subscription resource matching the
    subscriptionId is deleted.
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

/select:

post:

summary: Request to select AIMLE Clients.
 operationId: Select

tags:

- AIMLE Client Selection Request

requestBody:

```

    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/ClientSelReq'
  responses:
    '200':
      description: >
        The requested Individual AIMLE Client Selection Subscription is successfully
        created and a representation of the created resource is returned in the response body.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/ClientSelResp'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    ClientSelSub:
      description: Represents the AIMLE Client selection subscription information.
      type: object
      properties:
        selCriteria:
          $ref: 'TS29482_AIMLES_AIMLEClientDiscovery.yaml#/components/schemas/ClientDiscCriteria'
        reqNum:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        expTime:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
      required:
        - selCriteria
        - notifUri

    ClientSelNotif:
      description: Represents the AIMLE Client selection notification.
      type: object
      properties:
        reports:
          type: array
          items:
            $ref: '#/components/schemas/SelUpdate'
        minItems: 1

```

```
    timeStamp:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
    required:
      - reports

ClientSelSubPatch:
  description: >
    Represents the requested modifications to a AIMLE Client
    selection subscription information.
  type: object
  properties:
    selCriteria:
      $ref: 'TS29482_AIMLES_AIMLEClientDiscovery.yaml#/components/schemas/ClientDiscCriteria'
    reqNum:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

ClientSelReq:
  description: Represents the AIMLE Client selection request.
  type: object
  properties:
    valSvcId:
      type: string
    clients:
      type: array
      items:
        $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
    selCriteria:
      $ref: 'TS29482_AIMLES_AIMLEClientDiscovery.yaml#/components/schemas/ClientDiscCriteria'
    reqNum:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    minNum:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  oneOf:
    - required: [clients]
    - required: [selCriteria]

ClientSelResp:
  description: Represents the AIMLE Client selection response.
  type: object
  properties:
    clients:
      type: array
      items:
        $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
    clientSet:
      type: string
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

SelUpdate:
  description: Represents the update of the selected client.
  type: object
  properties:
    replaced:
      type: string
    selected:
      type: string
  required:
    - replaced
    - selected
```

SIMPLE DATA TYPES

#

A.8 AIMLES_AIMLEServiceOperationsManagement API

openapi: 3.0.0

info:

title: AIMLE Service Operations Control and Management Service
version: 1.0.0
description: |
AIMLES Service Operations Management Service.
© 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-opm/v1'
variables:
apiRoot:
default: https://example.com
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/request:

post:

summary: Request AIMLE service operations control and management.
operationId: Request

tags:

- AIMLE Service Operation Request

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/AimlServOperReq'

responses:

'200':

description: >

The AIMLE service operations control and management request is successfully
received and processed.

content:

application/json:

schema:

\$ref: '#/components/schemas/AimlServOperResp'

'307':

\$ref: 'TS29122_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29122_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29122_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29122_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29122_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29122_CommonData.yaml#/components/responses/415'

'429':

\$ref: 'TS29122_CommonData.yaml#/components/responses/429'

'500':

\$ref: 'TS29122_CommonData.yaml#/components/responses/500'

'503':

\$ref: 'TS29122_CommonData.yaml#/components/responses/503'

default:

\$ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:

```
securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

schemas:
  AimplServOperReq:
    description: >
      Represents the AIMLE service operations control and management request.
    type: object
    properties:
      valSvcId:
        type: string
      clients:
        type: array
        items:
          $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
        minItems: 1
      setId:
        type: string
      operId:
        $ref: '#/components/schemas/AimleOperId'
      operInfo:
        $ref: '#/components/schemas/AimleOperInfo'
      operMode:
        $ref: '#/components/schemas/AimleOperMode'
      confModes:
        type: array
        items:
          $ref: '#/components/schemas/AimleConfigMode'
        minItems: 1
      operModeStatReport:
        $ref: '#/components/schemas/StatReport'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - operMode
    oneOf:
      - required: [clients]
      - required: [setId]

  AimplServOperResp:
    description: >
      Represents the AIMLE service operations control and management response.
    type: object
    properties:
      valSvcId:
        type: string
      operId:
        $ref: '#/components/schemas/AimleOperId'
      operMode:
        $ref: '#/components/schemas/AimleOperMode'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - operId
      - operMode

  AimleOperId:
    description: >
      Represents the AIMLE service operation identifier.
    type: object
    properties:
      trainingId:
        type: string
      taskId:
        type: string
    oneOf:
      - required: [trainingId]
      - required: [taskId]

  AimleOperInfo:
```

```
description: >
  Represents the AIMLE service operation information.
type: object
properties:
  container:
    type: string
  fetchUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  agrUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  assitInfo:
    $ref: '#/components/schemas/AimleOperAssist'
required:
  - container
  - fetchUri
  - agrUri
  - assitInfo
```

```
AimleOperAssist:
description: >
  Represent the AIMLE service operation assistance information.
type: object
properties:
  maxConvTime:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
required:
  - maxConvTime
```

```
AimleConfigMode:
description: >
  Represent the AIMLE service operation configuration mode information.
type: object
properties:
  mode:
    $ref: '#/components/schemas/AimleOperMode'
  measThrValues:
    $ref: '#/components/schemas/MeasurementData'
  thrDirection:
    $ref: 'TS29520_Nnwdaf_EventsSubscription.yaml#/components/schemas/MatchingDirection'
required:
  - mode
  - measThrValues
  - thrDirection
```

```
MeasurementData:
description: Represent the measurement data for the AIMLE service operation.
type: object
properties:
  latency:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  time:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  accuracy:
    type: integer
    minimum: 0
    maximum: 100
```

```
StatReport:
description: Contains AIML operation status reporting modes.
type: object
properties:
  period:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
  servOperEvent:
    $ref: '#/components/schemas/ServiceOperEvent'
anyOf:
  - required: [period]
  - required: [servOperEvent]
```

```
# SIMPLE DATA TYPES
#
```

```
#
# ENUMERATIONS
#
```

```
AimleOperMode:
  anyOf:
```

- type: string
- enum:
 - START
 - STOP
- 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 AIMLE service operation mode.
 - Possible values are:
 - START: Indicates the AIMLE service operation mode is start.
 - STOP: Indicates the AIMLE service operation mode is stop.

ServiceOperEvent:

- anyOf:
 - type: string
 - enum:
 - OPERATION_TRANSITION
 - 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 AIMLE event types.
 - Possible values are:
 - OPERATION_TRANSITION: Indicates the event is an AIMLE service operation transition.

A.9 AIMLES_HierarchicalComputingAssist API

openapi: 3.0.0

info:

title: AIMLES_HierarchicalComputingAssist Service
version: 1.0.0
description: |
AIMLES Hierarchical Computing Assist Service.
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All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-hca/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/request:
post:
summary: Request AIMLE hierarchical computing assist.
operationId: Request
tags:
- AIMLE Hierarchical Computing Assist Request
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/AimlHierAssitReq'
responses:
'200':
description: >
The AIMLE hierarchical computing assist request is successfully
received and processed.
content:
application/json:
schema:
\$ref: '#/components/schemas/AimlHierAssitResp'
'307':
\$ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
\$ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
\$ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
\$ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
\$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
\$ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
\$ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
\$ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:

```
$ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

AimlHierAssitReq:

description: >

Represents the AIMLE hierarchical computing assist request.

type: object

properties:

origReqId:

\$ref: '#/components/schemas/RequestorId'

role:

\$ref: '#/components/schemas/Role'

task:

\$ref: '#/components/schemas/TaskType'

assistTypes:

type: array

items:

\$ref: '#/components/schemas/AssistInfoType'

minItems: 1

exeNodes:

type: array

items:

\$ref: '#/components/schemas/ExecutionNode'

minItems: 1

suppFeat:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

required:

- role
- task
- assistTypes

AimlHierAssitResp:

description: >

Represents the AIMLE hierarchical computing assist response.

type: object

properties:

assistSets:

type: array

items:

\$ref: '#/components/schemas/AssistInfo'

minItems: 1

suppFeat:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

required:

- assistSets

RequestorId:

description: >

Represents the requestor identifier.

type: object

properties:

valServId:

type: string

easId:

type: string

casId:

type: string

oneOf:

- required: [valServId]
- required: [easId]
- required: [casId]

AssistInfo:

description: >

Represents the assistance information.

type: object

properties:

easId:

```
    type: string
    status:
      $ref: 'TS29549_SS_ADAE_EdgeLoadAnalytics.yaml#/components/schemas/EasAnalytics'
    required:
      - easId
      - status

ExecutionNode:
  description: >
    Represent the execution node information.
  type: object
  properties:
    easId:
      type: string

# SIMPLE DATA TYPES
#

#
# ENUMERATIONS
#

Role:
  anyOf:
    - type: string
      enum:
        - ROOT_NODE
        - SUB_ROOT_NODE
        - LEAF_NODE
    - 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 role of the node.
    Possible values are:
    - ROOT_NODE: Indicates the role is root node.
    - SUB_ROOT_NODE: Indicates the role is sub root node.
    - LEAF_NODE: Indicates the role is leaf node.

TaskType:
  anyOf:
    - type: string
      enum:
        - VFL
        - HFL
    - 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 task.
    Possible values are:
    - VFL: Indicates the task is VFL.
    - HFL: Indicates the task is HFL.

AssistInfoType:
  anyOf:
    - type: string
      enum:
        - EXECUTION_NODE_LIST
        - COMPUTING_PREPARATION_STATUS
    - 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 assistance information type.
    Possible values are:
    - EXECUTION_NODE_LIST: Indicates the execution node list is required.
    - COMPUTING_PREPARATION_STATUS: Indicates the computing preparation status is required.
```

A.10 AIMLES_AssistedMLModelSelection API

openapi: 3.0.0

info:

```
title: AIMLES_AssistedMLModelSelection
version: 1.0.0
description: |
  API for AIMLES Assisted ML Model Selection Service.
  © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
  (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/
```

servers:

```
- url: '{apiRoot}/aimles-amlmsel/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- OAuth2ClientCredentials: []
```

paths:

/subscriptions:

post:

```
summary: Request the creation of a AIMLE Assisted ML Model Selection Subscription resource.
operationId: CreateAimleAssistMLMdlSelSubscription
```

tags:

```
- AIMLE Assisted ML Model Selection Subscriptions (Collection)
```

requestBody:

```
required: true
content:
  application/json:
    schema:
      $ref: '#/components/schemas/AssistMLMdlSelSubsc'
```

responses:

'201':

description: >

Successful case. The creation of an Individual AIMLE Assisted ML Model Selection Subscription resource is confirmed and a representation of that resource is returned in the response body.

content:

```
application/json:
  schema:
    $ref: '#/components/schemas/AssistMLMdlSelSubsc'
```

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29122_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29122_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29122_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29122_CommonData.yaml#/components/responses/415'

'429':

\$ref: 'TS29122_CommonData.yaml#/components/responses/429'

'500':

\$ref: 'TS29122_CommonData.yaml#/components/responses/500'

'503':

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    myNotification:
      '{$request.body#/notifUri}':
        post:
          summary: notify a previously subscribed service consumer on AIML Assisted ML Model
Selection related event(s).
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/AssistMLMdlSelNotif'
          responses:
            '204':
              description: The notification is successfully received.
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Represents the identifier of an Individual AIMLE Assisted ML Model Selection Subscription
        resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual AIMLE Assisted ML Model Selection Subscription
resource.
    operationId: GetAimleAssistMLMdlSelSubscription
    tags:
      - Individual AIMLE Assisted ML Model Selection Subscription (Document)
    responses:
      '200':
        description: >
          Successful case. The requested Individual AIMLE Assisted ML Model Selection
          Subscription resource shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/AssistMLMdlSelSubsc'
      '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 AIMLE Assisted ML Model Selection Subscription resource.

operationId: UpdateAimleAssistMLMdlSelSubscription

tags:

- Individual AIMLE Assisted ML Model Selection Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/AssistMLMdlSelSubsc'

responses:

'200':

description: >

Successful case. The Individual AIMLE Assisted ML Model Selection 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/AssistMLMdlSelSubsc'

'204':

description: >

No Content. The Individual AIMLE Assisted ML Model Selection 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 AIMLE Assisted ML Model Selection Subscription resource.

operationId: ModifyAimleAssistMLMdlSelSubscription

tags:

- Individual AIMLE Assisted ML Model Selection Subscription (Document)

requestBody:

required: true

content:

```

    application/json:
      schema:
        $ref: '#/components/schemas/AssistMLMdlSelSubscPatch'
  responses:
    '200':
      description: >
        Successful case. The Individual AIMLE Assisted ML Model Selection 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/AssistMLMdlSelSubsc'
    '204':
      description: >
        No Content. The Individual AIMLE Assisted ML Model Selection 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 AIMLE Assisted ML Model Selection
    Subscription resource.
    operationId: UnsubscribeAimleAssistMLMdlSelSubscription
    tags:
      - Individual AIMLE Assisted ML Model Selection Subscription (Document).
    responses:
      '204':
        description: >
          No Content. The Individual AIMLE Assisted ML Model Selection 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:

```
AssistMLMdlSelSubsc:
  description: Represents the AIMLE Assisted ML Model Selection subscription information.
  type: object
  properties:
    aimlProfile:
      $ref: '#/components/schemas/AimlProfile'
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    repInfo:
      $ref: '#/components/schemas/ReportingInformation'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - aimlProfile
```

```
AssistMLMdlSelNotif:
  description: Represents the AIMLE Assisted ML Selection notification.
  type: object
  properties:
    opStatus:
      $ref: 'TS29482_AIMLES_DataManagement.yaml#/components/schemas/DataMgmtOp'
    trainMLModel:
      $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModelTrainingInfo'
    elapseTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DurationSec'
    timeStamp:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
  required:
    - opStatus
    - trainMLModel
```

```
AimlProfile:
  description: Represents the ML model selection operation.
  type: object
  properties:
    candMLMdl:
      type: array
      items:
        $ref: '#/components/schemas/CandMLMdl'
      minItems: 1
    mlMdlReq:
      $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
    dataSetIds:
      type: array
      items:
        type: string
      minItems: 1
    trainReq:
      type: array
      items:
        $ref: '#/components/schemas/TrainingRequirement'
      minItems: 1
    clientList:
      type: array
      items:
        $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
    clientSelCriteria:
      $ref: 'TS29482_AIMLES_AIMLEClientDiscovery.yaml#/components/schemas/ClientDiscCriteria'
    clNumber:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  required:
    - candMLMdl
    - dataSetIds
    - trainReq
  anyOf:
    - required: [clientList]
    - required: [clientSelCriteria]
```

TrainingRequirement:


```
description: Represents the training requirements for ML model selection.
type: object
properties:
  perfReq:
    type: array
    items:
      $ref: '#/components/schemas/PerformanceRequirement'
    minItems: 1
  trainCount:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  sampleCount:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
required:
  - perfReq
  - trainCount
  - sampleCount
```

```
PerformanceRequirement:
description: Represents the performance requirements for ML model selection.
type: object
properties:
  perfMetric:
    $ref: '#/components/schemas/PerformanceMetric'
  perfTarget:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
required:
  - perfMetric
```

```
AssistMLMdlSelSubscPatch:
description: >
  Represents the requested modifications to a AIMLE Assisted ML Selection subscription
  information.
type: object
properties:
  mlMdlReq:
    $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
  trainReq:
    type: array
    items:
      $ref: '#/components/schemas/TrainingRequirement'
    minItems: 1
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
```

```
ReportingInformation:
description: Represents the reporting requirements for ML model selection.
type: object
properties:
  notifMethod:
    $ref: '#/components/schemas/NotificationMethod'
  jobPercentage:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  timewindow:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
```

```
CandMLMdl:
description: Contains the candidate ML model selection information.
type: object
properties:
  mlMdlId:
    type: string
  mlMdlParam:
    type: string
required:
  - mlMdlId
  - mlMdlParam
```

```
# SIMPLE DATA TYPES
#
```

```
# ENUMERATIONS
PerformanceMetric:
  anyOf:
    - type: string
    enum:
      - ACCURACY
      - PRECISION
      - RECALL
```

- MEAN_SQUARED_ERROR
- MEAN_ABSOLUTE_ERROR

- 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 performance metric for training the ML model.

Possible values are:

- ACCURACY: Indicates the performance metric is accuracy.
- PRECISION: Indicates the performance metric is precision.
- RECALL: Indicates the performance metric is recall.
- MEAN_SQUARED_ERROR: Indicates the performance metric is mean squared error.
- MEAN_ABSOLUTE_ERROR: Indicates the performance metric is mean absolute error.

NotificationMethod:

anyOf:

- type: string

enum:

- PERIODIC
- ON_JOB_COMPLETION
- ON_PCT_COMPLETION
- ON_EVENT_DETECTION

- 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 notification methods that can be subscribed.

Possible values are:

- PERIODIC: The notification of the ML model status is periodically sent.
- ON_JOB_COMPLETION: The notification is sent only after the entire ML model selection job is completed.
- ON_PCT_COMPLETION: The notification is sent after the certain job percentage completion.
- ON_EVENT_DETECTION: The notification is sent each time the event is detected.

A.11 AIMLES_MLModelRetrieval API

openapi: 3.0.0

info:

```
title: AIMLES_MLModelRetrieval
version: 1.0.0
description: |
  API for AIMLES ML Model Retrieval Service.
  © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
  All rights reserved.
```

externalDocs:

```
description: >
  3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
  (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/
```

servers:

```
- url: '{apiRoot}/aimles-mlmr/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549
```

security:

```
- {}
- OAuth2ClientCredentials: []
```

paths:

/retrieve:

post:

summary: Enables a service consumer to send AIMLE ML Model retrieval request to the AIMLE

server.

operationId: RetrieveMLModel

tags:

```
- Retrieve ML Model
```

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/MLMdlRetReq'

responses:

'200':

description: OK (The requested location information)

content:

application/json:

schema:

\$ref: '#/components/schemas/MLMdlRetRsp'

'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:
  post:
    summary: Request the creation of a Individual AIMLE ML Model Retrieval Subscription.
    operationId: CreateAimleMLModelRetrievalSubscription
    tags:
      - AIMLE ML Model Retrieval Subscriptions (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MLMdlRetSub'
    responses:
      '201':
        description: >
          The requested Individual AIMLE ML Model Retrieval Subscription is successfully
          created and a representation of the created resource is returned in the response body.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MLMdlRetSub'
        headers:
          Location:
            description: Contains the URI of the newly created resource.
            required: true
            schema:
              type: string
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    myNotification:
      '{$request.body#/notifUri}':
        post:
          summary: Notify on the requested data.
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/MLMdlRetNotif'
          responses:
            '204':
              description: The notification is successfully received.
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
```

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

/subscriptions/{subscriptionId}:

```

parameters:
  - name: subscriptionId
    in: path
    description: >
      Represents the Individual AIMLE ML Model Retrieval Subscription resource.
    required: true
    schema:
      type: string

```

get:

summary: Retrieve an existing the Individual AIMLE ML Model Retrieval Subscription resource.
 operationId: GetIndAimleMLModelRetrievalSubscription

tags:

- Individual AIMLE ML Model Retrieval Subscription (Document)

responses:

```

  '200':
    description: >
      OK. The requested Individual AIMLE ML Model Retrieval Subscription resource
      shall be returned.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MLMdlRetSub'
  '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 AIMLE ML Model Retrieval Subscription resource.

operationId: UpdateIndAimleMLModelRetrievalSubscription

tags:

- Individual AIMLE ML Model Retrieval Subscription (Document)

requestBody:

required: true

content:

```

  application/json:
    schema:
      $ref: '#/components/schemas/MLMdlRetSub'

```

responses:

```

  '200':
    description: >
      OK. The Individual AIMLE ML Model Retrieval 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/MLMdlRetSub'
  '204':
    description: >
      No Content. The Individual AIMLE ML Model Retrieval 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 AIMLE ML Model Retrieval
Subscription resource.
  operationId: ModifyIndAimleMLModelRetrievalSubscription
  tags:
    - Individual AIMLE ML Model Retrieval Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MLMdlRetSubPatch'
  responses:
    '200':
      description: >
        OK. The Individual AIMLE ML Model Retrieval 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/MLMdlRetSub'
    '204':
      description: >
        No Content. The Individual AIMLE ML Model Retrieval 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: Remove the Individual AIMLE ML Model Retrieval Subscription.
  operationId: UnsubscribeAimleMLModelRetrievalSubscription
  tags:
    - Individual AIMLE ML Model Retrieval Subscription (Document).
  responses:
    '204':
      description: >
        The individual AIMLE ML Model Retrieval Subscription resource matching the
        subscriptionId is deleted.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{tokenUrl}'
          scopes: {}

  schemas:
    MLmdlRetSub:
      description: Represents the AIMLE ML Model Retrieval subscription information.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        modelSelCrit:
          $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
        expTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        suppFeat:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      required:
        - notifUri

    MLmdlRetSubPatch:
      description: Represents the requested modifications to the AIMLE ML Model Retrieval
      subscription information.
      type: object
      properties:
        notifUri:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
        modelSelCrit:
          $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
        expTime:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'

    MLmdlRetNotif:

```

```
description: Represents the AIMLE ML Model Retrieval notification.
type: object
properties:
  subId:
    type: string
  mlModels:
    type: array
    items:
      $ref: '#/components/schemas/MLModelDetail'
    minItems: 1
required:
  - subId
```

```
MLMdlRetReq:
description: Represents the AIMLE ML Model Retrieval request information.
type: object
properties:
  modelSelCrit:
    $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
```

```
MLMdlRetRsp:
description: Represents the AIMLE ML Model Retrieval response information.
type: object
properties:
  mlModels:
    type: array
    items:
      $ref: '#/components/schemas/MLModelDetail'
    minItems: 1
  suppFeat:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
required:
  - mlModels
```

```
MLModelDetail:
description: Represents the ML Model information.
type: object
properties:
  mlModelId:
    type: string
  mlMdlEndpoint:
    $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
  mlModel:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Bytes'
required:
  - mlModelId
anyOf:
  - required: [mlMdlEndpoint]
  - required: [mlModel]
```

```
# SIMPLE DATA TYPES
```

```
#
```

```
#
```

```
# ENUMERATIONS
```

```
#
```


A.12 AIMLES_SplitOpNodeRegistration API

openapi: 3.0.0

info:

title: AIMLES_SplitOpNodeRegistration

version: 1.0.0

description: |

API for AIMLES Split Operation Node Register Configurations.

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externalDocs:

description: >

3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.

url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-sonreg/v1'

variables:

apiRoot:

default: <https://example.com>

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

security:

- {}

- OAuth2ClientCredentials: []

paths:

/configurations:

post:

summary: Request the creation of a Individual AIMLE Split Operation Node Register.
operationId: CreateAimleSplitOpNodeRegSubscription

tags:

- AIMLE Split Operation Node Register Configurations (Collection)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/SplitOpNodeReg'

responses:

'201':

description: >

The registration of the new Individual AIMLE AIMLE Split Operation Node Register is

confirmed

and a representation of that resource is returned.

content:

application/json:

schema:

\$ref: '#/components/schemas/SplitOpNodeReg'

headers:

Location:

description: Contains the URI of the newly created resource.

required: true

schema:

type: string

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29122_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29122_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29122_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29122_CommonData.yaml#/components/responses/415'

'429':

\$ref: 'TS29122_CommonData.yaml#/components/responses/429'

'500':

\$ref: 'TS29122_CommonData.yaml#/components/responses/500'

'503':

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/configurations/{configurationId}:
  get:
    summary: Retrieve an existing Individual AIMLE Split Operation Node Register resource.
    operationId: GetIndAimleSplitOpNodeRegSubscription
    tags:
      - Individual AIMLE Split Operation Node Register Configuration (Document)
    parameters:
      - name: configurationId
        in: path
        description: Identifier of the configuration resource
        required: true
        schema:
          type: string
    responses:
      '200':
        description: >
          OK. The requested information on the Individual Resgietered AIMLE Split
          Operation Node Register is confirmed and a representation of that resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SplitOpNodeReg'
      '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 AIMLE Split Operation Node Register
    resource.
    operationId: UpdateIndAimleSplitOpNodeRegSubscription
    tags:
      - Individual AIMLE Split Operation Node Register Configuration (Document)
    parameters:
      - name: configurationId
        in: path
        description: Identifier of the configuration resource
        required: true
        schema:
          type: string
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/SplitOpNodeReg'
    responses:
      '200':
        description: >
          OK. The requested update of the Individual Registered AIMLE Split Operation
          Node Register is confirmed and a representation of that resource is returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SplitOpNodeReg'
      '204':

```

```

description: >
  No Content. The Individual AIMLE Split Operation Node Register 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 AIMLE Split Operation Node Register resource.

operationId: ModifyIndAimleSplitOpNodeRegSubscription

tags:

- Individual AIMLE Split Operation Node Register Configuration (Document)

parameters:

- name: configurationId
 - in: path
 - description: Identifier of the configuration resource
 - required: true
 - schema:
 - type: string

requestBody:

- required: true
- content:
 - application/json:
 - schema:
 - \$ref: '#/components/schemas/SplitOpNodeRegPatch'

responses:

```

'200':
  description: >
    OK. The requested modification of the Individual Registered AIMLE Split Operation Node
    Register is confirmed and a representation of that resource is returned.
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/SplitOpNodeReg'
'204':
  description: >
    No Content. The requested modification of the Individual Registered AIMLE Split
    Operation Node Register is confirmed and no content is returned.
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'

```

```
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

delete:

```
summary: Remove the Individual AIMLE Split Operation Node Register.
operationId: UnsubscribeAimleSplitOpNodeRegSubscription
tags:
  - Individual AIMLE Split Operation Node Register Configuration (Document).
parameters:
  - name: configurationId
    in: path
    description: Identifier of the configuration resource
    required: true
    schema:
      type: string
responses:
  '204':
    description: >
      Deregistration of the Individual Registered AIMLE Split Operation Node Register is
      confirmed.
  '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:

```
SplitOpNodeReg:
  description: Represents the Split Operation Node Register information.
  type: object
  properties:
    nodeInfo:
      $ref: 'TS29548_SDD_Transmission.yaml#/components/schemas/ConnInfo'
    sonRegCapability:
      $ref: '#/components/schemas/SplitOpCapabilities'
    timeValidity:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
  required:
    - nodeInfo
    - sonRegCapability
```

SplitOpNodeRegPatch:

```
description: Represents the split operation node register information to be modified.
type: object
properties:
  sonRegCapability:
```

```
    $ref: '#/components/schemas/SplitOpCapabilities'
  timeValidity:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
```

```
SplitOpCapabilities:
  description: Represents the split operation capabilities.
  type: object
  properties:
    modelInfo:
      $ref: '#/components/schemas/ModelInformation'
    usageInfo:
      $ref: '#/components/schemas/UsageInformation'
  required:
    - modelInfo
```

```
ModelInformation:
  description: Represents the ML model information.
  type: object
  properties:
    modelId:
      type: string
    modelName:
      type: string
    modelVersion:
      type: string
    suppOperation:
      type: array
      items:
        type: string
      minItems: 1
  required:
    - modelId
    - modelVersion
    - suppOperation
```

```
UsageInformation:
  description: Represents the data analysis requirement.
  type: object
  properties:
    inputFreq:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    inputSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    outputFreq:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    outputSize:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
```

```
# SIMPLE DATA TYPES
```

```
#
```

```
#
```

```
# ENUMERATIONS
```

```
#
```

```
SuppMLTaskType:
  anyOf:
    - type: string
    enum:
      - FL_CLIENT
      - FL_SERVER
    - 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 information regarding the supported AIML role identity of the AIMLE Split
    Operation Node Register.
    Possible values are:
    - FL_CLIENT: Identifies the supported AIML role of AIMLE Split Operation Node Register is
      used as FL client.
    - FL_SERVER: Identifies the supported AIML role of AIMLE Split Operation Node Register is
      used as FL server.
```

```
MLAppType:
  anyOf:
    - type: string
    enum:
      - REINFORCEMENT_LEARNING
```

```
- SUPERVISED_LEARNING
- TRANSFER_LEARNING
- 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 information regarding the supported ML application related to the capability of
  the AIMLE Split Operation Node Register.
  Possible values are:
  - REINFORCEMENT_LEARNING: Identifies the ML application of reinforcement learning type
    related to the capability of AIMLE Split Operation Node Register.
  - SUPERVISED_LEARNING: Identifies the ML application of supervised learning type related to
    the capability of AIMLE Split Operation Node Register.
  - TRANSFER_LEARNING: Identifies the ML application of transfer learning type related to the
    capability of AIMLE Split Operation Node Register.

AvailabilityType:
anyOf:
- type: string
  enum:
    - AVAILABLE
    - NOT_AVAILABLE
- 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 represents information regarding the availability of the AIMLE Split Operation
  Node Register.
  Possible values are:
  - AVAILABLE: Identifies the AIMLE Split Operation Node Register is available.
  - NOT_AVAILABLE: Identifies the AIMLE Split Operation Node Register is not available.
```

A.13 AIMLES_MLModelUpdate API

openapi: 3.0.0

info:

title: AIMLES_ML Model Update Request Service
version: 1.0.0
description: |
AIMLES ML Model Update Request Service.
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externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-mlmupd/v1'
variables:
apiRoot:
default: https://example.com
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/request:
post:
summary: Enables a service consumer to request ML model update to the AIMLE Server.
operationId: RequestMLModelUpdate
tags:
- ML Model Update Request
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/MLMdlUpdateReq'
responses:
'200':
description: >
Successful case. The ML model update request is successfully received and processed.
content:
application/json:
schema:
\$ref: '#/components/schemas/MLMdlUpdateRsp'
'307':
\$ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
\$ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
\$ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
\$ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
\$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
\$ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
\$ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
\$ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
\$ref: 'TS29122_CommonData.yaml#/components/responses/default'

components:

```
securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

schemas:
  MLMdlUpdateReq:
    description: >
      Represents the ML model update request.
    type: object
    properties:
      mlModelId:
        type: string
      performanceDegradationInfo:
        $ref: 'TS29482_AIMLES_MLModelPerfMonitor.yaml#/components/schemas/MLMdlDegradedParam'
      mlModelRetrievalEndpoint:
        $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    required:
      - mlModelId

  MLMdlUpdateRsp:
    description: >
      Represents the ML model update response.
    type: object
    properties:
      mlModelInformation:
        $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'
      mlModelRetrievalEndpoint:
        $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
      mlModel:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Bytes'
    anyOf:
      - required: [mlModelInformation]
      - required: [mlModelRetrievalEndpoint]
```

SIMPLE DATA TYPES

#

#

ENUMERATIONS

#

A.14 AIMLES_FLMemberGroupSupport API

openapi: 3.0.0

info:

title: AIMLES Federated Learning Member Group Support Service
version: 1.0.0
description: |
AIMLE Server provides a service consumer to create, update, and delete an FL Member Support Group for an FL process.
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externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-fl/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/configurations:
post:
summary: Create a new Individual FL Member Support Group resource.
operationId: CreateFLMemberGroupSupport
tags:
- FL Member Group Support (Collection)
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/FLMbrSuppGrp'
responses:
'201':
description: >
New Individual FL Member Support Group for the FL process is Created.
content:
application/json:
schema:
\$ref: '#/components/schemas/FLMbrSuppGrp'
'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}:

parameters:
- name: configurationId

```
in: path
description: String identifying an individual FL member support group resource.
required: true
schema:
  type: string

get:
summary: Retrieve an existing Individual FL Member Support Group resource.
operationId: RetrieveFLMemberSupportGroup
tags:
  - Individual FL Member Support Group (Document)
parameters:
  - name: fl-member-id
    in: query
    description: ID of the FL member to be queried.
    required: false
    schema:
      type: string
responses:
  '200':
    description: The requested "Individual FL member support group" is retrieved.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/FLMbrSuppGrp'
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29122_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
summary: Update completely an existing Individual FL Member Support Group resource.
operationId: UpdateFLMemberSupportGroup
tags:
  - Individual FL Member Support Group (Document)
requestBody:
  description: Configuration information to be completely updated.
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/FLMbrSuppGrp'
responses:
  '200':
    description: OK. The configuration is updated successfully.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/FLMbrSuppGrp'
  '204':
    description: No Content. Successful case but without any Content
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
```

```
$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

patch:

```
summary: Modify partially an existing Individual FL Member Support Group resource.
operationId: ModifyPartiallyFLMemberSupportGroup
tags:
  - Individual FL Member Support Group (Document)
requestBody:
  required: true
  content:
    application/json:
      schema:
        $ref: '#/components/schemas/FlMbrSuppGrpPatch'
responses:
  '200':
    description: >
      OK. The individual FL member support group is partially modified successfully.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/FlMbrSuppGrp'
  '204':
    description: successful case but without any Content
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29122_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29122_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29122_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29122_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29122_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29122_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

delete:

```
summary: Deletes an individual FL member support group.
operationId: DeleteFLMemberSupportGroup
tags:
  - Individual FL Member Support Group (Document)
responses:
  '204':
    description: The individual configuration matching configuration Id is deleted.
  '307':
    $ref: 'TS29122_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29122_CommonData.yaml#/components/responses/308'
```

```

'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

FLMbrSuppGrp:

description: Represents a new Individual FL Member Support Group for an FL process.

type: object

properties:

valServId:

description: Identity of the VAL Service

type: string

mlModelId:

description: Identity of the ML Model

type: string

adaeAnalyticsId:

\$ref: 'TS29549_SS_AADRF_DataManagement.yaml#/components/schemas/AdaeAnalyticsId'

mlTask:

\$ref: '#/components/schemas/MLTaskInfo'

mlModelProfile:

\$ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModelProfile'

flMembers:

type: array

items:

\$ref: '#/components/schemas/FLMember'

minItems: 1

flMbrSuppGrp:

type: array

items:

\$ref: 'TS24560_Aimlec_FLGroupIndication.yaml#/components/schemas/FLGroupInfo'

minItems: 1

suppFeat:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

anyOf:

- required: [valServId]
- required: [mlModelId]
- required: [adaeAnalyticsId]

FLMbrSuppGrpPatch:

description: Represents individual FL Member Support Group to be partially modified.

type: object

properties:

valServId:

description: Identity of the VAL Service

type: string

mlModelId:

description: Identity of the ML Model

type: string

adaeAnalyticsId:

\$ref: 'TS29549_SS_AADRF_DataManagement.yaml#/components/schemas/AdaeAnalyticsId'

mlTask:

\$ref: '#/components/schemas/MLTaskInfo'

mlModelProfile:

\$ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModelProfile'

flMembers:

type: array

```
    items:
      $ref: '#/components/schemas/FLMember'
    minItems: 1
```

```
MLTaskInfo:
  description: Represents information on the identity and type of the ML task.
  type: object
  properties:
    mlTaskId:
      description: Identity of the ML task
      type: string
    mlTaskType:
      $ref: '#/components/schemas/MLTaskType'
  required:
    - mlTaskId
    - mlTaskType
```

```
FLMember:
  description: Represents information on candidate or selected FL member.
  type: object
  properties:
    flMbrId:
      description: Identity of the FL member
      type: string
    flMbrType:
      $ref: '#/components/schemas/FLMbrType'
    flMbrStatus:
      $ref: '#/components/schemas/FLMbrStatus'
    availability:
      description: Contains availability of FL member.
      type: string
    constraints:
      description: contains constraints of FL member.
      type: array
      items:
        type: string
      minItems: 1
  required:
    - flMbrId
```

```
# Simple data types
#
```

```
# Enumerations
#
```

```
MLTaskType:
  anyOf:
    - type: string
      enum:
        - FL_TRAINING
        - FL_INFERENCE
    - 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 different types of the ML task.
    Possible values are:
    - FL_TRAINING: Identifies an ML model training.
    - FL_INFERENCE: Identifies an ML model inference.
```

```
FLMbrType:
  anyOf:
    - type: string
      enum:
        - FL_SERVER
        - FL_CLIENT
    - 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 different types of the ML member.
    Possible values are:
    - FL_SERVER: Identifies an FL server.
```

- FL_CLIENT: Identifies an FL client.

FLMbrStatus:

anyOf:

- type: string

enum:

- FL_CANDIDATE
- FL_SELECTED

- 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 information on the status of the ML member.

Possible values are:

- FL_CANDIDATE: Identifies an FL member being a candidate.
- FL_SELECTED: Identifies an FL member being selected.

A.15 AIMLES_MLModelPerfMonitor API

openapi: 3.0.0

info:

title: AIMLE Machine Learning Model Performance Monitor Service

version: 1.0.0

description: |

AIMLE Server provides a service consumer to create/update/delete an AIMLES ML Model Performance Monitor Subscription and receive AIMLES ML Model Performance Monitor Notifications.
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All rights reserved.

externalDocs:

description: >

3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.

url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-mlmpm/v1'

variables:

apiRoot:

default: <https://example.com>

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

security:

- {}

- oAuth2ClientCredentials: []

paths:

/subscriptions:

post:

summary: Request the creation of an AIMLE ML Model Performance Monitor Subscription resource.

operationId: SubMLModelPerformanceMonitor

tags:

- ML Model Performance Monitor (Collection)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/MlMdlPerfMonitSub'

responses:

'201':

description: >

ML Model Performance Monitor Subscription is Created.

content:

application/json:

schema:

\$ref: '#/components/schemas/MlMdlPerfMonitSub'

'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:

MlMdlPerfMonitNotif:

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

post:

```

    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MLMdlPerfMonitNotif'
    responses:
      '204':
        description: >
          The AIMLE ML Model Performance Monitor Event Notification is
          successfully received and acknowledged.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: String identifying an individual ML Model Performance Monitor resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual AIMLE ML Model Performance Monitor Subscription
    resource.
    operationId: RetrieveMLModelPerformanceMonitor
    tags:
      - Individual ML Model Performance Monitor (Document)
    responses:
      '200':
        description: The requested "Individual ML Model Performance Monitor" is retrieved.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MLMdlPerfMonitSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'

```



```

'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Update completely an existing Individual ML Model Performance Monitor resource.
  operationId: UpdateMLModelPerformanceMonitor
  tags:
    - Individual ML Model Performance Monitor (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MlMdlPerfMonitSub'
  responses:
    '200':
      description: OK. The configuration is updated successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MlMdlPerfMonitSub'
    '204':
      description: successful case but without any Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Modify partially an existing Individual ML Model Performance Monitor resource.
  operationId: ModifyPartiallyMLModelPerformanceMonitor
  tags:
    - Individual ML Model Performance Monitor (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/MlMdlPerfMonitSubPatch'
  responses:
    '200':
      description: OK. The individual ML Model Performance Monitor is partially modified.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MlMdlPerfMonitSub'
    '204':
      description: Successful case but without any content.
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'

```

```

'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

description: Deletes an individual ML Model Performance Monitor.
 operationId: DeleteMLModelPerformanceMonitor

tags:

- Individual ML Model Performance Monitor (Document)

responses:

```

'204':
  description: The individual subscription matching subscription Id is deleted.
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oAuth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

MLMdlPerfMonitSub:

description: Represents the AIMLE ML Model Performance Monitor subscription information.

type: object

properties:

mlMdlId:

description: Identifies the ML model, for which the request applies.

type: string

notifUri:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

montReportConfig:

\$ref: '#/components/schemas/MontReportConfig'

aimlOperInfo:

\$ref: '#/components/schemas/AimlOperInfo'

trigActReq:

type: array

items:

\$ref: '#/components/schemas/TrigActReqType'

minItems: 1

```
    areaValidity:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
    timeValidity:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - mlMdlId
    - notifUri
    - montReportConfig

MlMdlPerfMonitSubPatch:
  description: Represents the AIMLE ML Model Performance Monitor subscription information.
  type: object
  properties:
    notifUri:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
    montReportConfig:
      $ref: '"/components/schemas/MontReportConfig'
    aimlOperInfo:
      $ref: '"/components/schemas/AimlOperInfo'
    trigActReq:
      type: array
      items:
        $ref: '"/components/schemas/TrigActReqType'
      minItems: 1
    areaValidity:
      $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
    timeValidity:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'

MlMdlPerfMonitNotif:
  description: Represents the metrics of the degraded ML model.
  type: object
  properties:
    mlMdlDegraded:
      $ref: '"/components/schemas/MlMdlDegraded'
    trigActReq:
      $ref: '"/components/schemas/TrigActReqType'
  required:
    - mlMdlDegraded

MontReportConfig:
  description: Represents the configuration of the monitoring report.
  type: object
  properties:
    reportType:
      $ref: '"/components/schemas/ReportType'
    delay:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    minAccuracy:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    period:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - reportType

AimlOperInfo:
  description: Represents the information on the AIML operation.
  type: object
  properties:
    aimlOper:
      $ref: '"/components/schemas/AimlOperType'
    servId:
      description: Identifies the AIMLE service using the ML model.
      type: string
    clientList:
      type: array
      items:
        $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
    servPerfKpi:
      $ref: '"/components/schemas/ServPerfKpi'
  required:
    - aimlOper
    - servId
    - servPerfKpi
    - clientList
```

```

MLMdlDegraded:
  description: Represents the metrics of the degraded ML model.
  type: object
  properties:
    mlMdlDegradeInd:
      description: Identifies whether the ML model has degraded (TRUE) or not (FALSE).
      type: boolean
    mlMdlDegradedParam:
      type: array
      items:
        $ref: '#/components/schemas/MLMdlDegradedParam'
      minItems: 1
    mlMdlDegradedCause:
      description: Identifies the cause for the ML model degradation.
      type: string
  required:
    - mlMdlDegradeInd

ServPerfKpi:
  description: Represents the key performance indicators for the AIMLE service performance.
  type: object
  properties:
    latency:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    accuracy:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    qos:
      $ref: 'TS29122_AsSessionWithQoS.yaml#/components/schemas/QosMonitoringInformation'
  required:
    - latency
    - accuracy
    - qos

MLMdlDegradedParam:
  description: Represents the parameters of the degraded ML model.
  type: object
  properties:
    recall:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    precision:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    accuracy:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - recall
    - precision
    - accuracy

# Simple data types
#

# Enumerations
#

AimlOperType:
  anyOf:
    - type: string
    enum:
      - ML_MODEL
      - HFL
      - VFL
      - TL
    - 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 AIML operation type.
    Possible values are:
    - ML_MODEL: Identifies that AIML operation is ML model training.
    - HFL: Identifies that AIML operation is Horizontal Federated Learning (HFL) training.
    - VFL: Identifies that AIML operation is Vertical Federated Learning (VFL) training.
    - TL: Identifies that AIML operation is Transfer Learning (TL) training.

ReportType:
  anyOf:

```

```
- type: string
enum:
  - ONE_TIME
  - PERIODIC
  - EVENT_TRIGGERED
- type: string
  description: >
    This string provides forward-compatibility with future
    extensions to the enumeration and is not used to encode
    content defined in the present version of this API.
description: |
  Represents the type of the monitoring report.
  Possible values are:
  - ONE_TIME: Identifies the report is of one time type.
  - PERIODIC: Identifies the report is of periodic type.
  - EVENT_TRIGGERED: Identifies the report is of event triggered type.

TrigActReqType:
anyOf:
- type: string
  enum:
    - ADAPTATION
    - RETRAINING
    - TERMINATION
- 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 types of the trigger action requirements on the monitoring event.
  Possible values are:
  - ADAPTATION: Identifies the trigger action requirement is training of a new ML model for
    the AIMLE service by the same or a new AIMLE client.
  - RETRAINING: Identifies the trigger action requirement is retraining of the existing ML
    model for the AIMLE service by the same or a new AIMLE client.
  - TERMINATION: Identifies the trigger action requirement is terminating of the existing ML
    model for AIMLE service and initiating to train a new ML model by the same or a new AIMLE
    client.
```

A.16 AIMLES_TLModelSelectionAssistance API

openapi: 3.0.0

info:

title: AIMLE Transfer Learning Model Selection Assistance Service
version: 1.0.0
description: |
API for AIMLES Transfer Learning Model Selection Assistance Service.
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All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-tlmsa/v1'
variables:
apiRoot:
default: https://example.com
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/pre-trained-models:

get:

summary: Obtain AIMLE TL Model Selection Assistance.
operationId: GetTlModelSelectionAssistance
tags:
- AIMLE TL Model Selection Assistance (Collection)
parameters:
- name: filt-criteria
in: query
description: >
Represents the AIMLE Model Selection Assistance filtering criteria.
required: true
content:
application/json:
schema:
\$ref:

'TS24560_Aimles_UeTLModelSelectionAssistance.yaml#/components/schemas/TlModelSelectAssistReq'

- name: supported-features
in: query
description: >
Contains supported features information, used to negotiate the applicability
of optional features.
schema:
\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

responses:

'200':
description: >
The response body contains the selected pre-trained ML models for TL enablement service.
content:
application/json:
schema:
\$ref:

'TS24560_Aimles_UeTLModelSelectionAssistance.yaml#/components/schemas/TlModelSelectAssistResp'

'307':
\$ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
\$ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'406':
\$ref: 'TS29122_CommonData.yaml#/components/responses/406'

```
'429':  
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'  
'500':  
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'  
'503':  
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'  
default:  
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

```
components:  
  securitySchemes:  
    oAuth2ClientCredentials:  
      type: oauth2  
      flows:  
        clientCredentials:  
          tokenUrl: '{tokenUrl}'  
          scopes: {}
```

A.17 MLR_FLEvents API

openapi: 3.0.0

info:

title: Machine Learning Federated Learning Events Service
 version: 1.0.0
 description: |
 ML Repository provides a service consumer to create/update/delete an MLR FL Events
 Subscription and receive MLR FL Events Notifications.
 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
 All rights reserved.

externalDocs:

description: >
 3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
 Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
 url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/mlr-fle/v1'
 variables:
 apiRoot:
 default: https://example.com
 description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
 - oAuth2ClientCredentials: []

paths:

/subscriptions:
 post:
 summary: Request the creation of an MLR FL Events Subscription resource.
 operationId: SubFLEvents
 tags:
 - FL Events (Collection)
 requestBody:
 required: true
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/FlEvtsSub'
 responses:
 '201':
 description: >
 FL Events Subscription is Created.
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/FlEvtsSub'
 '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:
 FlEvtsNotif:
 '{\$request.body#/notifUri}':
 post:


```

    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/FlEvtsNotif'
    responses:
      '204':
        description: >
          The MLR FL Events Event Notification is successfully received and acknowledged.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29122_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29122_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29122_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: String identifying an individual FL Events resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing "Individual MLR FL Events Event Subscription" resource.
    operationId: RetrieveFLEvents
    tags:
      - Individual FL Events (Document)
    responses:
      '200':
        description: The requested "Individual FL Events" is retrieved.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/FlEvtsSub'
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '406':
        $ref: 'TS29122_CommonData.yaml#/components/responses/406'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'

```

```
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Update completely an existing Individual FL Events resource.
  operationId: UpdateFLEvents
  tags:
    - Individual FL Events (Document)
  requestBody:
    description: Subscription information to be completely updated.
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/FlEvtsSub'
  responses:
    '200':
      description: OK. The configuration is updated successfully.
      content:
        application/json:
          schema:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/FlEvtsSub'
    '204':
      description: successful case but without any Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29122_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29122_CommonData.yaml#/components/responses/default'

patch:
  summary: Modify partially an existing Individual FL Events resource.
  operationId: ModifyPartiallyFLEvents
  tags:
    - Individual FL Events (Document)
  requestBody:
    description: Subscription information to be partially modified.
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS29122_CommonData.yaml#/components/schemas/FlEvtsSubPatch'
  responses:
    '200':
      description: OK. The individual FL Events is partially modified.
      content:
        application/json:
          schema:
            $ref: 'TS29122_CommonData.yaml#/components/schemas/FlEvtsSub'
    '204':
      description: successful case but without any Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
```

```

'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
  $ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
  $ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
  $ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

delete:

description: Deletes an individual FL Events.

operationId: DeleteFLEvents

tags:

- Individual FL Events (Document)

responses:

```

'204':
  description: The individual subscription matching subscription Id is deleted.
'307':
  $ref: 'TS29122_CommonData.yaml#/components/responses/307'
'308':
  $ref: 'TS29122_CommonData.yaml#/components/responses/308'
'400':
  $ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
  $ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
  $ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
  $ref: 'TS29122_CommonData.yaml#/components/responses/404'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oAuth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

FLEvtsSub:

description: Represents the FL Events subscription information.

type: object

properties:

fLMbrInfo:

\$ref: '#/components/schemas/fLMbrInfo'

notifUri:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

mLMdlInfo:

\$ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'

evtInfo:

\$ref: '#/components/schemas/EvtInfo'

timeValidity:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'

supFeat:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'

required:

- fLMbrInfo

- notifUri
- mlMdlInfo
- evtInfo
- timeValidity

FlEvsSubPatch:

description: Represents requested partial update to the FL Events subscription information.

type: object

properties:

flMbrInfo:

\$ref: '#/components/schemas/FlMbrInfo'

notifUri:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

mlMdlInfo:

\$ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MLModel'

evtInfo:

\$ref: '#/components/schemas/EvtInfo'

timeValidity:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'

FlEvsNotif:

description: Represents the FL Events notification information.

type: object

properties:

evtId:

description: Identity of the event

type: string

evtTime:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'

evtArea:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea'

evtContentList:

type: array

items:

\$ref: '#/components/schemas/EvtContent'

minItems: 1

required:

- evtId
- evtTime
- evtContentList

FlMbrInfo:

description: Represents the FL member information.

type: object

properties:

flMbrId:

description: Identity of the FL member

type: string

flMbrType:

\$ref: '#/components/schemas/FlMbrType'

anyOf:

- required: [flMbrType]
- required: [flMbrId]

EvtInfo:

description: Represents the event information.

type: object

properties:

evtId:

description: Identity of the event

type: string

evtType:

\$ref: '#/components/schemas/EvtType'

required:

- evtType

EvtType:

description: Represents the event type information.

type: object

properties:

availFlMbr:

\$ref: '#/components/schemas/AvailFlMbr'

flMdlInfo:

\$ref: '#/components/schemas/FlMdlInfo'

flMbrLdInfo:

\$ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'

required:

- availFlMbr

- flMdlInfo
- flMbrLdInfo

FlMdlInfo:
 description: Represents the FL model information.
 type: object
 properties:
 accuracy:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
 timeSchedule:
 type: array
 items:
 \$ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'
 minItems: 1
 latency:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
 required:
 - accuracy
 - timeSchedule
 - latency

EvtContent:
 description: Represents the event content information.
 type: object
 properties:
 flMbrInfo:
 \$ref: '#/components/schemas/FlMbrInfo'
 flMbrEnterLeave:
 \$ref: '#/components/schemas/EnterLeave'
 flMbrCapabilityUpdated:
 \$ref: 'TS24560_Aimles_AIMLEClientRegistration.yaml#/components/schemas/ClientCapability'
 flMbrTimeAvail:
 \$ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
 areaOfInterest:
 \$ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea'
 required:
 - flMbrInfo

Simple data types
 #

Enumerations
 #

FlMbrType:
 anyOf:
 - type: string
 enum:
 - FL_CLIENT
 - FL_SERVER
 - 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 supported type of the FL member.
 Possible values are:
 - FL_CLIENT: Identifies the supported FL member type is FL client.
 - FL_SERVER: Identifies the supported FL member type is FL server.

EnterLeave:
 anyOf:
 - type: string
 enum:
 - ENTERING
 - LEAVING
 - 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 if the supported FL member is entering or leaving the available list.
 Possible values are:
 - ENTERING: Identifies the FL member is entering the available list.
 - LEAVING: Identifies the FL member is leaving the available list.

AvailFLMbr:
anyOf:
- type: string
 enum:
 - AVAILABLE
 - UNAVAILABLE
- 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 supported FL member availability
 Possible values are:
 - AVAILABLE: Identifies the FL member is available.
 - UNAVAILABLE: Identifies the FL member is not available.

A.18 MLR_FLMember API

openapi: 3.0.0

info:

title: AIMLE Repository Federated Member Service
 version: 1.0.0
 description: |
 AIMLE Repository provides a service consumer to register/update/deregister/retrieve FL members.
 © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
 All rights reserved.

externalDocs:

description: >
 3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
 Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
 url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/mlr-fl/v1'
 variables:
 apiRoot:
 default: <https://example.com>
 description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
 - OAuth2ClientCredentials: []

paths:

/configurations:
 post:
 summary: Register a new Individual FL Member resource.
 operationId: RegisterFLMember
 tags:
 - FL Member(Collection)
 requestBody:
 required: true
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/FLMbr'
 responses:
 '201':
 description: >
 The registration of the new Individual FL Member is confirmed.
 content:
 application/json:
 schema:
 \$ref: '#/components/schemas/FLMbr'
 '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}:

parameters:
 - name: configurationId
 in: path

```
description: String identifying an individual FL member resource.
required: true
schema:
  type: string

get:
  summary: Query an Individual Registered FL Member resource.
  operationId: QueryFLMember
  tags:
    - Individual FL Member(Document)
  responses:
    '200':
      description: The requested "Individual FL member" is retrieved.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/FLMbr'
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29122_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29122_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29122_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

put:
  summary: Update completely an Individual Registered FL Member resource.
  operationId: UpdateFLMember
  tags:
    - Individual FL Member(Document)
  requestBody:
    description: Configuration information to be completely updated.
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/FLMbr'
  responses:
    '200':
      description: OK. The configuration is updated successfully.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/FLMbr'
    '204':
      description: No Content. Successful case but without any Content
    '307':
      $ref: 'TS29122_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29122_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29122_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29122_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29122_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29122_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29122_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29122_CommonData.yaml#/components/responses/413'
    '415':
```



```
$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
  $ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
  $ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':
  $ref: 'TS29122_CommonData.yaml#/components/responses/503'
default:
  $ref: 'TS29122_CommonData.yaml#/components/responses/default'
```

patch:

summary: Modify partially an Individual Registered FL Member resource.

operationId: ModifyPartiallyFLMember

tags:

- Individual FL Member (Document)

requestBody:

description: Configuration information to be partially modified.

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/FlMbrPatch'

responses:

'200':

description: >

OK. The individual FL member is partially modified successfully.

content:

application/json:

schema:

\$ref: '#/components/schemas/FlMbr'

'204':

description: successful case but without any Content

'307':

\$ref: 'TS29122_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29122_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29122_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29122_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29122_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29122_CommonData.yaml#/components/responses/415'

'429':

\$ref: 'TS29122_CommonData.yaml#/components/responses/429'

'500':

\$ref: 'TS29122_CommonData.yaml#/components/responses/500'

'503':

\$ref: 'TS29122_CommonData.yaml#/components/responses/503'

default:

\$ref: 'TS29122_CommonData.yaml#/components/responses/default'

delete:

summary: Deletes an individual registered FL member.

operationId: DeleteFLMember

tags:

- Individual FL Member (Document)

responses:

'204':

description: The individual configuration matching configuration Id is deleted.

'307':

\$ref: 'TS29122_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29122_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29122_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29122_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29122_CommonData.yaml#/components/responses/403'

'404':

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29122_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29122_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{tokenUrl}'

scopes: {}

schemas:

FLMbr:

description: >

Registration of a new individual FL Member and update of an Individual Registered FL Member.

type: object

properties:

flMbrId:

description: Identity of the FL member

type: string

flMbrSuppGrp:

\$ref: 'TS24560_Aimlec_FLGroupIndication.yaml#/components/schemas/FLGroupInfo'

suppAimlRole:

\$ref: '#/components/schemas/SuppAimlRoleType'

flMbrCapability:

\$ref: 'TS24560_Aimles_AIMLEClientRegistration.yaml#/components/schemas/ClientCapability'

flMbrVelocity:

\$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/VelocityEstimate'

flMbrLocation:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea'

flMbrAvailSch:

type: array

items:

\$ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'

minItems: 1

supMlModelId:

description: Identifies the one or more supported ML models by the FL member.

type: array

items:

type: string

minItems: 1

areaValidity:

\$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'

timeValidity:

\$ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'

anyOf:

- required: [flMbrCapability]

- required: [flMbrAvailSch]

required:

- flMbrId

- flMbrSuppGrp

- suppAimlRole

FLMbrPatch:

description: >

Partial update of an Individual Registered FL Member.

type: object

properties:

flMbrId:

description: Identity of the FL member

type: string

suppAimlRole:

\$ref: '#/components/schemas/SuppAimlRoleType'

flMbrAvailSch:

type: array

items:

\$ref: 'TS29122_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'

minItems: 1

supMlModelId:

description: Identifies the one or more supported ML models by the FL member.

```
    type: array
    items:
      type: string
    minItems: 1
  areaValidity:
    $ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'
  timeValidity:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
  anyOf:
    - required: [suppAimlRole]
    - required: [flMbrAvailSch]
    - required: [supMlModelId]
    - required: [areaValidity]
    - required: [timeValidity]
  required:
    - flMbrId
```

Simple data types

#

Enumerations

#

```
SuppAimlRoleType:
  anyOf:
    - type: string
    enum:
      - FL_CLIENT
      - FL_SERVER
    - 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 supported AIML role identity of the FL member.
    Possible values are:
    - FL_CLIENT: Identifies the supported AIML role of FL member is used as FL client.
    - FL_SERVER: Identifies the supported AIML role of FL member is used as FL server.
```

A.19 AIMLES_MLModelTraining API

openapi: 3.0.0

info:

title: AIMLE ML Model Training API
version: 1.0.0
description: |
API for AIMLES ML Model Training Service.
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All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Service Enabler Architecture Layer for Verticals (SEAL); Artificial
Intelligence Machine Learning Enablement (AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-trn/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/request-train:
post:
summary: Request the AIMLE server for AIMLE ML Model Training.
operationId: RequestTrain
tags:
- AIMLE ML Model Training service (Collection)
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/TrainRequest'
responses:
'200':
description: >
OK. The requested ML model training response containing ML model ID and ML model
training ID shall be returned.
content:
application/json:
schema:
\$ref: '#/components/schemas/MlModelTrainResp'
'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'

```

callbacks:
  myNotification:
    '{$request.body#/notifUri}':
      post:
        summary: Notify on the requested data.
        requestBody:
          required: true
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/MlModelTrainNotif'
        responses:
          '204':
            description: The notification is successfully received.
          '307':
            $ref: 'TS29122_CommonData.yaml#/components/responses/307'
          '308':
            $ref: 'TS29122_CommonData.yaml#/components/responses/308'
          '400':
            $ref: 'TS29122_CommonData.yaml#/components/responses/400'
          '401':
            $ref: 'TS29122_CommonData.yaml#/components/responses/401'
          '403':
            $ref: 'TS29122_CommonData.yaml#/components/responses/403'
          '404':
            $ref: 'TS29122_CommonData.yaml#/components/responses/404'
          '411':
            $ref: 'TS29122_CommonData.yaml#/components/responses/411'
          '413':
            $ref: 'TS29122_CommonData.yaml#/components/responses/413'
          '415':
            $ref: 'TS29122_CommonData.yaml#/components/responses/415'
          '429':
            $ref: 'TS29122_CommonData.yaml#/components/responses/429'
          '500':
            $ref: 'TS29122_CommonData.yaml#/components/responses/500'
          '503':
            $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29122_CommonData.yaml#/components/responses/default'

```

components:

```

securitySchemes:
  oAuth2ClientCredentials:
    type: oauth2
    flows:
      clientCredentials:
        tokenUrl: '{tokenUrl}'
        scopes: {}

```

```

schemas:
  TrainRequest:
    description: >
      Represents the AIMLE ML Model Training service.
    type: object
    properties:
      trnType:
        $ref: '#/components/schemas/TrainingType'
      members:
        type: array
        items:
          $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
      minItems: 1
      clientSetId:
        type: string
      memSelCrit:
        $ref: '#/components/schemas/MemberSelCriteria'
      numReqClients:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
      modelInf:
        $ref: '#/components/schemas/MlModelInfo'
      modelReq:
        $ref: 'TS29482_MLR_MLModelManagement.yaml#/components/schemas/MlModel'
      trainObj:
        $ref: '#/components/schemas/TrainingObj'
      datasetId:
        type: array

```

```
    items:
      type: string
    minItems: 1
  dataSamples:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uinteger'
  opSchedule:
    type: string
  vflParam:
    $ref: '#/components/schemas/VFLParam'
  memUpdNotif:
    type: boolean
  notifUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
  required:
    - trnType
    - datasetId

MLModelTrainNotif:
  description: >
    Represents the AIMLE ML Model Training Notification.
  type: object
  properties:
    trainingID:
      type: string
    members:
      type: array
      items:
        $ref: '#/components/schemas/MemberInfo'
      minItems: 1
    trainOut:
      $ref: '#/components/schemas/PerfParams'
    percentageComp:
      type: integer
      minimum: 0
      maximum: 100
    trainErr:
      $ref: '#/components/schemas/TrainingErr'

MLModelTrainResp:
  description: >
    Represents the AIMLE service status information.
  type: object
  properties:
    trainingId:
      type: string
    modelId:
      type: string
  required:
    - trainingId

MemberSelCriteria:
  description: >
    Represents the criteria that needs to be continuously monitored for selecting
    the member clients.
  type: object
  properties:
    clientLoc:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/LocationArea5G'
    clientAvailability:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    clientCapability:
      $ref: 'TS24560_Aimles_AIMLEClientRegistration.yaml#/components/schemas/ClientCapability'

MLModelInfo:
  description: >
    Represents the ML model that has to be distributed to the selected member clients
    for training.
  type: object
  properties:
    mlModelId:
      type: string
    mlModelLoc:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'

MemberInfo:
  description: >
    Represents the list of AIMLE clients selected/de-selected for ML model training.
  type: object
```

```
properties:
  clientSel:
    type: boolean
  clientUri:
    $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

PerfParams:
  description: >
    Represents the output of training, e.g., ML model parameters for the training.
  type: object
  properties:
    modelAccuracy:
      type: integer
      minimum: 0
      maximum: 100
    modelPrecision:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    modelRecall:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    modelF1score:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    errorMeanSquare:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    errorMeanAbs:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'

TrainingObj:
  description: >
    Represents the termination condition for the ML model training.
  type: object
  properties:
    objType:
      $ref: 'TS29482_AIMLES_AssistedMLModelSelection.yaml#/components/schemas/PerformanceMetric'
    targetValue:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    earlyStopCri:
      $ref: '#/components/schemas/EarlyStopCri'
    maxEpochs:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
    accTrainingErr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    inferenceLatency:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
  required:
    - objType

EarlyStopCri:
  description: >
    Represents the AIMLE service status information.
  type: object
  properties:
    minDelta:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Float'
    patience:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'

VFLParam:
  description: >
    Represents the parameters specific to VFL training.
  type: object
  properties:
    datasetComm:
      type: array
      items:
        $ref: '#/components/schemas/CommonId'
      minItems: 1
    featureList:
      type: array
      items:
        $ref: '#/components/schemas/FeatureList'
      minItems: 1
    featureAlign:
      type: array
      items:
        $ref: '#/components/schemas/FeatureList'
      minItems: 1
    dataLabels:
      type: array
```

```

    items:
      type: string
    minItems: 1

CommonId:
  description: >
    Represents the list of one or more common features required for VFL training.
  type: object
  properties:
    featureType:
      type: string
    featureId:
      type: string

FeatureList:
  description: >
    Represents the list of features for each data domain of the dataset at the
    client.
  type: object
  properties:
    clientId:
      $ref: 'TS29482_AIMLES_ContextTransfer.yaml#/components/schemas/AimleClientId'
    list:
      type: array
      items:
        type: string
      minItems: 1

# SIMPLE DATA TYPES
#

# ENUMERATIONS
#

TrainingType:
  anyOf:
    - type: string
      enum:
        - TRAIN_VFL
        - TRAIN_HFL
    - 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 AIMLE service operation status.
    Possible values are:
    - TRAIN_VFL: Indicates that the training type is horizontal federated learning
    - TRAIN_HFL: Indicates that the training type is vertical federated learning

TrainingErr:
  anyOf:
    - type: string
      enum:
        - UNDERFITTING
        - OVERFITTING
        - PERFORMANCE_ERRORS
        - DATA_LEAKAGE
    - 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 training error encountered during ML model training.
    Possible values are:
    - UNDERFITTING: Indicates that the trained model is underfitting the
      training data.
    - OVERFITTING: Indicates that the trained mode is overfitting the training
      data.
    - PERFORMANCE_ERRORS: Indicates that the trained model is unable to meet the
      desired performance.
    - DATA_LEAKAGE: Indicates that there is data leakage from evaluation data set
      to the training data.

```


A.20 AIMLES_SplitOpEvent API

openapi: 3.0.0

info:

title: AIMLES_SplitOpEvent
version: 1.0.0
description: |
API for AIMLES Split Operation Event Service.
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All rights reserved.

externalDocs:

description: >
3GPP TS 29.482 v19.0.0; Artificial Intelligence Machine Learning Enablement
(AIMLE) Services; Stage 3.
url: https://www.3gpp.org/ftp/Specs/archive/29_series/29.482/

servers:

- url: '{apiRoot}/aimles-splitopevent/v1'
variables:
apiRoot:
default: <https://example.com>
description: apiRoot as defined in clause 6.5 of 3GPP TS 29.549

security:

- {}
- oAuth2ClientCredentials: []

paths:

/subscriptions:
post:
summary: Request the creation of an Individual AIMLE Split Operation Event Subscription.
operationId: CreateAimleSplitOpEventSubscription
tags:
- AIMLE Split Operation Event Subscription (Collection)
requestBody:
required: true
content:
application/json:
schema:
\$ref: '#/components/schemas/SplitOpEventSub'
responses:
'201':
description: >
The requested Individual AIMLE Split Operation Event Subscription is
successfully created and a representation of the created resource is
returned in the response body.
content:
application/json:
schema:
\$ref: '#/components/schemas/SplitOpEventSub'
headers:
Location:
description: Contains the URI of the newly created resource.
required: true
schema:
type: string
'400':
\$ref: 'TS29122_CommonData.yaml#/components/responses/400'
'401':
\$ref: 'TS29122_CommonData.yaml#/components/responses/401'
'403':
\$ref: 'TS29122_CommonData.yaml#/components/responses/403'
'404':
\$ref: 'TS29122_CommonData.yaml#/components/responses/404'
'411':
\$ref: 'TS29122_CommonData.yaml#/components/responses/411'
'413':
\$ref: 'TS29122_CommonData.yaml#/components/responses/413'
'415':
\$ref: 'TS29122_CommonData.yaml#/components/responses/415'
'429':
\$ref: 'TS29122_CommonData.yaml#/components/responses/429'
'500':
\$ref: 'TS29122_CommonData.yaml#/components/responses/500'
'503':

```

    $ref: 'TS29122_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29122_CommonData.yaml#/components/responses/default'
  callbacks:
    myNotification:
      '{$request.body#/notifUri}':
        post:
          summary: Notify on the requested data.
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/SplitOpEventNotif'
          responses:
            '204':
              description: The notification is successfully received.
            '307':
              $ref: 'TS29122_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29122_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29122_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29122_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29122_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29122_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29122_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29122_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29122_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29122_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29122_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29122_CommonData.yaml#/components/responses/503'
          default:
            $ref: 'TS29122_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  parameters:
    - name: subscriptionId
      in: path
      description: >
        Represents the Individual AIMLE Split Operation Event Subscription resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing the Individual AIMLE Split Operation Event Subscription
      resource.
    operationId: GetIndAimleSplitOpEventSub
    tags:
      - Individual AIMLE Split Operation Event Subscription (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual AIMLE Split Operation Event Subscription
          resource shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/SplitOpEventSub'
      '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 AIMLE Split Operation Event
    Subscription resource.
  operationId: UpdateIndAimleSplitOpEventSub
  tags:
    - Individual AIMLE Split Operation Event Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/SplitOpEventSub'
  responses:
    '200':
      description: >
        OK. The Individual AIMLE Split Operation Event 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/SplitOpEventSub'
    '204':
      description: >
        No Content. The Individual AIMLE Split Operation Event 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 AIMLE Split Operation Event Subscription
    resource.
  operationId: ModifyIndAimleSplitOpEventSub
  tags:
    - Individual AIMLE Split Operation Event Subscription (Document)
  requestBody:
    required: true
    content:
      application/json:

```

```
    schema:
      $ref: '#/components/schemas/SplitOpEventSubPatch'
  responses:
    '200':
      description: >
        OK. The Individual AIMLE Split Operation Event 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/SplitOpEventSub'
    '204':
      description: >
        No Content. The Individual AIMLE Split Operation Event 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: Remove the Individual AIMLE Split Operation Event Subscription.
    operationId: UnsubscribeAimleSplitOpEventSub
    tags:
      - Individual AIMLE Split Operation Event Subscription (Document)
    responses:
      '204':
        description: >
          The individual AIMLE Split Operation Event Subscription resource
          matching the subscriptionId is deleted.
      '307':
        $ref: 'TS29122_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29122_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29122_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29122_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29122_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29122_CommonData.yaml#/components/responses/404'
      '429':
        $ref: 'TS29122_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29122_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29122_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29122_CommonData.yaml#/components/responses/default'

  components:
    securitySchemes:
      oAuth2ClientCredentials:
```

```
type: oauth2
flows:
  clientCredentials:
    tokenUrl: '{tokenUrl}'
    scopes: {}

schemas:
  SplitOpEventSub:
    description: Represents the AIMLE Split Operation Event Subscription information.
    type: object
    properties:
      splitOpPipelineId:
        type: string
      reportReq:
        $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
      splitOpEventId:
        $ref: '#/components/schemas/SplitOpEventId'
      discFilters:
        $ref: '#/components/schemas/DiscFilters'
      assistInfo:
        $ref: '#/components/schemas/AssistanceInfo'
      expTime:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'
      suppFeat:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    required:
      - splitOpPipelineId
      - notifUri
      - splitOpEventId

  SplitOpEventSubPatch:
    description: >
      Represents the requested modifications to the AIMLE Split Operation Event subscription.
      information.
    type: object
    properties:
      reportReq:
        $ref: 'TS29523_Npcf_EventExposure.yaml#/components/schemas/ReportingInformation'
      splitOpEventId:
        $ref: '#/components/schemas/SplitOpEventId'
      discFilters:
        $ref: '#/components/schemas/DiscFilters'
      expTime:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/DateTime'
      notifUri:
        $ref: 'TS29122_CommonData.yaml#/components/schemas/Uri'

  SplitOpEventNotif:
    description: >
      Represents the AIMLE Split Operation Event notification.
    type: object
    properties:
      splitOpEventId:
        $ref: '#/components/schemas/SplitOpEventId'
      availabilityInfo:
        $ref: '#/components/schemas/AvailabilityInfo'
      splitOpPipelineInfo:
        $ref: '#/components/schemas/SplitOpPipelineInfo'
      assistanceInfo:
        $ref: '#/components/schemas/AssistanceInfo'
    required:
      - splitOpEventId

  DiscFilters:
    description: >
      Represents the set of characteristics to determine matching split operation profiles
      or nodes.
    type: object
    properties:
      stageInfo:
        type: array
        items:
          $ref: '#/components/schemas/StageInfo'
      usageInfo:
        $ref: 'TS29482_AIMLES_SplitOpNodeRegistration.yaml#/components/schemas/UsageInformation'
      minNodes:
```

```
    type: string
  required:
    - stageInfo

AssistanceInfo:
  description: Represents the assistance information for subscription.
  type: object
  properties:
    deliveryTime:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    achievableQoS:
      type: string
    qosSuggestion:
      type: string

SplitOpPipelineInfo:
  description: Represents split operation pipeline information.
  type: object
  properties:
    splitOpProfile:
      $ref: '"/components/schemas/SplitOpProfile'
    subEventId:
      $ref: '"/components/schemas/SubEventId'

AvailabilityInfo:
  description: >
    Represents the availability information of split operation pipeline.
  type: object
  properties:
    splitOpProfile:
      type: array
      items:
        $ref: '"/components/schemas/SplitOpProfile'
    availableNodes:
      type: string

SplitOpProfile:
  description: >
    Represents the split operation profile that service consumer participates to.
  type: object
  properties:
    splitOpPipelineId:
      type: string
    stageInfo:
      type: array
      items:
        $ref: '"/components/schemas/StageInfo'
    usageInfo:
      $ref: 'TS29482_AIMLES_SplitOpNodeRegistration.yaml#/components/schemas/UsageInformation'
    headEp:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    tailEp:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
  required:
    - splitOpPipelineId
    - headEp
    - tailEp
    - stageInfo

StageInfo:
  description: Represents the information about split operation stages.
  type: object
  properties:
    stageId:
      type: string
    numNodes:
      type: string
    headEp:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    tailEp:
      $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    nodeOrder:
      type: array
      items:
        $ref: 'TS29558_Eees_EASRegistration.yaml#/components/schemas/EndPoint'
    mlModelId:
      type: string
  required:
```

- stageId
- headEp
- tailEp
- nodeOrder
- mlModelId

#

SIMPLE DATA TYPES

#

#

ENUMERATIONS

SplitOpEventId:

anyOf:

- type: string

enum:

- SPLIT_OP_AVAILABILITY
- SPLIT_OP_PIPELINE_INFO
- SPLIT_OP_ASSISTANCE_INFO

- 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 split operation events.

Possible values are:

- SPLIT_OP_AVAILABILITY: Indicates split operation availability event.
- SPLIT_OP_PIPELINE_INFO: Indicates split operation pipeline information event.
- SPLIT_OP_ASSISTANCE_INFO: Indicates split operation assistance information event.

SubEventId:

anyOf:

- type: string

enum:

- CREATED
- UPDATED
- DELETED

- 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 sub event of split operation pipeline.

Possible values are:

- CREATED: Indicates that a new split operation profile is created.
- UPDATED: Indicates that an existing split operation profile is updated.
- DELETED: Indicates that an existing split operation profile is deleted.

#

Annex B (informative): Withdrawn API versions

B.1 General

This Annex lists withdrawn API versions of the APIs defined in the present specification. 3GPP TS 29.501 [3] clause 4.3.1.6 describes the withdrawal of API versions.

B.2 AIMLES_ContextTransfer API

The API versions listed in table B.2-1 are withdrawn for the AIMLES_ContextTransfer API.

Table B.2-1: Withdrawn API versions of the AIMLES_ContextTransfer service

API version number	Remarks

B.3 AIMLES_DataManagement API

The API versions listed in table B.3-1 are withdrawn for the AIMLES_DataManagement API.

Table B.3-1: Withdrawn API versions of the AIMLES_DataManagement service

API version number	Remarks

B.4 MLR_MLModelManagement API

The API versions listed in table B.4-1 are withdrawn for the MLR_MLModelManagement API.

Table B.4-1: Withdrawn API versions of the MLR_MLModelManagement service

API version number	Remarks

B.5 AIMLES_AIMLEClientDiscovery API

The API versions listed in table B.5-1 are withdrawn for the AIMLES_AIMLEClientDiscovery API.

Table B.5-1: Withdrawn API versions of the AIMLES_AIMLEClientDiscovery service

API version number	Remarks

B.6 MLR_ModelInformationDiscovery API

The API versions listed in table B.6-1 are withdrawn for the MLR_ModelInformationDiscovery API.

Table B.6-1: Withdrawn API versions of the MLR_ModelInformationDiscovery service

API version number	Remarks

B.7 AIMLES_AIMLEClientSelection API

The API versions listed in table B.7-1 are withdrawn for the AIMLES_AIMLEClientSelection API.

Table B.7-1: Withdrawn API versions of the AIMLES_AIMLEClientSelection service

API version number	Remarks

B.8 AIMLES_AIMLEServiceOperationsManagement API

The API versions listed in table B.8-1 are withdrawn for the AIMLES_AIMLEServiceOperationsManagement API.

Table B.8-1: Withdrawn API versions of the AIMLES_AIMLEServiceOperationsManagement service

API version number	Remarks

B.9 AIMLES_HierarchicalComputingAssist API

The API versions listed in table B.9-1 are withdrawn for the AIMLES_HierarchicalComputingAssist API.

Table B.9-1: Withdrawn API versions of the AIMLES_HierarchicalComputingAssist service

API version number	Remarks

B.10 AIMLES_AssistedMLModelSelection API

The API versions listed in table B.10-1 are withdrawn for the AIMLES_AssistedMLModelSelection API.

Table B.10-1: Withdrawn API versions of the AIMLES_AssistedMLModelSelection service

API version number	Remarks

B.11 AIMLES_MLModelRetrieval API

The API versions listed in table B.11-1 are withdrawn for the AIMLES_MLModelRetrieval API.

Table B.11-1: Withdrawn API versions of the AIMLES_MLModelRetrieval service

API version number	Remarks

B.12 AIMLES_SplitOpNodeRegistration API

The API versions listed in table B.12-1 are withdrawn for the AIMLES_AssistedMLModelSelection API.

Table B.12-1: Withdrawn API versions of the AIMLES_SplitOpNodeRegistration service

API version number	Remarks

B.13 AIMLES_MLModelUpdate API

The API versions listed in table B.13-1 are withdrawn for the AIMLES_MLModelUpdate API.

Table B.13-1: Withdrawn API versions of the AIMLES_MLModelUpdate service

API version number	Remarks

B.14 AIMLES_FLMemberGroupSupport API

The API versions listed in table B.14-1 are withdrawn for the AIMLES_FLMemberGroupSupport API.

Table B.14-1: Withdrawn API versions of the AIMLES_FLMemberGroupSupport service

API version number	Remarks

B.15 AIMLES_MLModelPerfMonitor API

The API versions listed in table B.15-1 are withdrawn for the AIMLES_MLModelPerfMonitor API.

Table B.15-1: Withdrawn API versions of the AIMLES_MLModelPerfMonitor service

API version number	Remarks

B.16 AIMLES_TLModelSelectionAssistance API

The API versions listed in table B.16-1 are withdrawn for the AIMLES_TLModelSelectionAssistance API.

Table B.16-1: Withdrawn API versions of the AIMLES_TLModelSelectionAssistance service

API version number	Remarks

B.17 MLR_FLEvents API

The API versions listed in table B.17-1 are withdrawn for the MLR_FLEvents API.

Table B.17-1: Withdrawn API versions of the MLR_FLEvents service

API version number	Remarks

B.18 MLR_FLMember API

The API versions listed in table B.18-1 are withdrawn for the MLR_FLMember API.

Table B.18-1: Withdrawn API versions of the MLR_FLMember service

API version number	Remarks

B.19 AIMLES_MLModelTraining API

The API versions listed in table B.19-1 are withdrawn for the AIMLES_MLModelTraining API.

Table B.19-1: Withdrawn API versions of the AIMLES_MLModelTraining service

API version number	Remarks

B.20 AIMLES_SplitOpEvent API

The API versions listed in table B.20-1 are withdrawn for the AIMLES_SplitOpEvent API.

Table B.20-1: Withdrawn API versions of the AIMLES_SplitOpEvent service

API version number	Remarks

Annex C (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2025-02	CT3#139					Based on skeleton C3-250618 Incorporates agreed pCRs C3-250513, C3-250514, C3-250517, C3-250519, C3-250520, C3-250521, C3-250522, C3-250523, C3-250524	0.1.0
2025-04	CT3#140					Incorporates agreed pCRs C3-251150, C3-251152, C3-251153, C3-251154, C3-251317, C3-251318, C3-251321, C3-251521, C3-251523, C3-251524, C3-251525, C3-251533, C3-251534, C3-251535, C3-251610, C3-251611, C3-251612, C3-251613	0.2.0
2025-05s	CT3#141					Incorporates agreed pCRs C3-252088, C3-252089, C3-252090, C3-252172, C3-252173, C3-252174, C3-252175, C3-252452, C3-252453, C3-252454, C3-252455, C3-252456, C3-252457, C3-252459, C3-252460, C3-252461, C3-252462, C3-252463, C3-252464, C3-252465, C3-252466, C3-252467, C3-252468	0.3.0
2025-06	CT#108	CP-251137				Presentation to TSG CT for information.	1.0.0
2025-08	CT3#142	C3-253651				Incorporates agreed pCRs C3-253049, C3-253193, C3-253199, C3-253217, C3-253218, C3-253219, C3-253220, C3-253221, C3-253222, C3-253223, C3-253224, C3-253332, C3-253332, C3-253333, C3-253334, C3-253335, C3-253336, C3-253337, C3-253429, C3-253430, C3-253431, C3-253432, C3-253559, C3-253561, C3-253562, C3-253563, C3-253564, C3-253565, C3-253566, C3-253567, C3-253568, C3-253673, C3-253674, C3-253675	1.1.0
2025-10	CT3#143	C3-254473				Incorporates agreed pCRs C3-254237, C3-254238, C3-254560, C3-254561, C3-254562, C3-254243, C3-254406, C3-254407, C3-254408, C3-254409, C3-254434, C3-254435, C3-254436, C3-254437, C3-254438, C3-254439, C3-254441, C3-254443, C3-254444, C3-254447, C3-254448, C3-254449, C3-254450, C3-254451, C3-254452, C3-254453, C3-254454, C3-254458, C3-254459, C3-254460, C3-254466, C3-254467, C3-254239, C3-254237, C3-254238, C3-254239, C3-254243, C3-254560, C3-254561, C3-254562	1.2.0
2025-11	CT3#144	C3-255658				Incorporates agreed pCRs C3-255104, C3-255109, C3-255110, C3-255266, C3-255268, C3-255376, C3-255378, C3-255379, C3-255380, C3-255381, C3-255383, C3-255384, C3-255387, C3-255388, C3-255389, C3-255392, C3-255394, C3-255395, C3-255396, C3-255422, C3-255423, C3-255442, C3-255530, C3-255531, C3-255532, C3-255545, C3-255546, C3-255547, C3-255548	1.3.0
2025-12	CT#110	CP-253019				Presentation to TSG CT for approval.	2.0.0
2025-12	CT#110	CP-253019				Approved by TSG CT.	19.0.0

History

Version	Date	Status
V19.0.0	February 2026	Publication