**3GPP TSG-SA4 Meeting #118-e *S4-220379***

**Online, 6th – 14th April 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **26.512** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | dCR on Adding Edge Support |
|  |  |
| ***Source to WG:*** | S4 |
| ***Source to TSG:*** | Qualcomm Incorporated |
|  |  |
| ***Work item code:*** | 5GMS\_EDGE\_3 |  | ***Date:*** | 31 March 2022 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | 17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | Support for edge resources provisioning and configuration is added. |
|  |  |
| ***Summary of change:*** | Extensions to the procedures in the M1 and M5 interface to add support for edge media processing. |
|  |  |
| ***Consequences if not approved:*** | No support for edge. |
|  |  |
| ***Clauses affected:*** | 2, 3.3, 4.2, 4.3.10, 4.7.2.1, 5.2, 6.4.3.8, 6.4.4.4, 7.10, 11.2.3, C.2, C.3.9, C.4.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st Change** |

# 2 References

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

…

[42] 3GPP TS 24.558: "Enabling Edge Applications; Protocol specification".

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

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| **2nd Change** |

## 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].

…

BMFF (ISO) Base Media File Format

ABR Adaptive Bit Rate

ACR Application Context Relocation

AF Application Function

…

DNS Domain Name Server

EAS Edge Application Server

ECGI E-UTRAN Cell Global Identifier

ECMA European Computer Manufacturers Association

…

EES Edge Enabler Server

5GMS EAS Edge-enabled 5GMS Application Server

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| **3rd Change** |

## 4.2 APIs relevant to Downlink Media Streaming

Table 4.2‑1 summarises the APIs used to provision and use the various downlink media streaming features specified in TS 26.501 [2].

Table 4.2‑1: Summary of APIs relevant to downlink media streaming features

|  |  |  |
| --- | --- | --- |
| 5GMSd feature | Abstract | Relevant APIs |
| Interface | API name | Clause |
| Content protocols discovery | Used by the 5GMSd Application Provider to interrogate which content ingest protocols are supported by 5GMSd AS(s). | M1d | Content Protocols Discovery API | 7.5 |
| Content hosting | Content is ingested, hosted and distributed by the 5GMSd AS according to a Content Hosting Configuration associated with a Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Server Certificates Provisioning API | 7.3 |
| Content Preparation Templates Provisioning API | 7.4 |
| Content Hosting Provisioning API | 7.6 |
| M2d | HTTP-pull based content ingest protocol | 8.2 |
| DASH-IF push based content ingest protocol | 8.3 |
| M4d | DASH [4] or 3GP [37] | 10 |
| M5d | Service Access Information API | 11.2 |
| Metrics reporting | The 5GMSd Client uploads metrics reports to the 5GMSd AF according to a provisioned Metrics Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Metrics Reporting Provisioning API | 7.8 |
| M5d | Service Access Information API | 11.2 |
| Metrics Reporting API | 11.4 |
| Consumption reporting | The 5GMSd Client provides feedback reports on currently consumed content according to a provisioned Consumption Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Consumption Reporting Provisioning API | 7.7 |
| M5d | Service Access Information API | 11.2 |
| Consumption Reporting API | 11.3 |
| Dynamic Policy invocation | The 5GMSd Client activates different traffic treatment policies selected from a set of Policy Templates configured in its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Policy Templates Provisioning API | 7.9 |
| M5d | Service Access Information API | 11.2 |
| Dynamic Policies API | 11.5 |
| Network Assistance | The 5GMSd Client requests bit rate recommendations and delivery boosts from the 5GMSd AF. | M5d | Service Access Information API | 11.2 |
| Network Assistance API | 11.6 |
| Edge content processing | Edge resources are provisioned for processing content in 5GMS downlink media streaming sessions. | M1d | Edge Resources Provisioning API | 7.10 |
| M5d | Service Access Information API | 11.2 |

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| **4th Change** |

### 4.3.10 Edge Resources Provisioning Procedures

#### 4.3.10.1 General

These procedures are used by the 5GMS Application Provider and the 5GMS AF at reference point M1d to provision edge resources for downlink streaming.

The requirements on the 5GMS AF that is edge enabled as defined TS26.501 clause 4.5.2 shall apply.

#### 4.3.10.2 Create Edge Resources Provisioning Configuration

This procedure is used by the 5GMSd Application Provider to create a new Edge Resources Provisioning Configuration. The 5GMSd Application Provider shall use the HTTP POST method for this purpose and the request message body shall include an EdgeResourcesConfiguration resource, as specified in clause 7.10.3.1.

The edgeManagmentMode is set to EM\_AF\_DRIVEN for AF-driven edge resource management, in which case, the 5GMSd AF is responsible for requesting and managing the required edge resources and handling EAS relocation for the streaming session. If the edgeManagementMode is set to EM\_APP\_DRIVEN, the 5GMSd AF shall only request edge resources based on a request from the MSH.

If the procedure is successful, the 5GMSd AF shall generate a resource identifier representing the new Edge Resources Provisioning Configuration. In this case, the 5GMSd AF shall respond with a 201 (Created) HTTP response message and shall provide the URL to the newly created resource in the Location header field. The response message body may include an EdgeResourcesConfiguration resource (see clause 7.10.3.1) that represents the current state of the Edge Resources Provisioning Configuration, including any fields set by the 5GMSd AF.

If the procedure is not successful, the 5GMSd AF shall provide a response code as defined in clause 6.3.

#### 4.3.10.3 Read Edge Resources Provisioning Configuration

This procedure is used by the 5GMSd Application Provider to retrieve the current values of the properties of an existing Edge Resources Provisioning Configuration resource from the 5GMSd AF. The HTTP GET method shall be used for this purpose.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) response message that includes the EdgeResourcesConfiguration resource in the response message body.

If the procedure is not successful, the 5GMSd AF shall provide a response code as defined in clause 6.3.

#### 4.3.10.4 Update Edge Resources Provisioning Configuration

The update operation is invoked by the 5GMSd Application Provider to modify the properties of an existing EdgeResourcesConfiguration resource. All writeable properties except edgeManagementMode may be updated. The HTTP PATCH or HTTP PUT methods shall be used for the update operation.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) and provide the content of the resource in the response, confirming the successful update operation.

If the procedure is not successful, the 5GMSd AF shall provide a response code as defined in clause 6.3.

#### 4.3.10.5 Destroy Edge Resources Provisioning Configuration

This operation is used by the 5GMS Application Provider to destroy an Edge Resources Provisioning Configuration resource. The HTTP DELETE method shall be used for this purpose. This operation makes the configuration unsuable for future streaming sessions, but it does not affect any ongoing streaming sessions.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) response message.

If the procedure is not successful, the 5GMSd AF shall provide a response code as defined in clause 6.3.

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| **5th Change** |

#### 4.7.2.1 General

Service Access Information is the set of parameters and addresses needed by the 5GMSd Client to activate reception of a downlink media streaming session or by a 5GMSu Client to activate an uplink media streaming session for contribution. The data model of the ServiceAccessInformation resource acquired by the Media Session Handler of the 5GMS Client is shown in clause 11.2.3. Service Access Information additionally includes configuration information to allow the Media Session Handler to invoke procedures for dynamic policy (see clause 4.7.3), consumption reporting (clause 4.7.4), metrics reporting (clause 4.7.5) and network assistance (clause 4.7.6).

- For downlink media streaming, the Media Session Handler may obtain Service Access Information from either the 5GMSd-Aware Application (via M6d) or the 5GMSd AF (via M5d). In the former case, the Service Access Information is initially acquired by the 5GMSd-Aware Application from the 5GMSd Application Provider via M8d. In the latter case, the Service Access Information is derived by the 5GMSd AF from the Provisioning Session established via M1d.

Typically, the Service Access Information for downlink media streaming includes a media entry point (e.g. a URL to a DASH MPD or a URL to a progressive download file) that can be consumed by the Media Player and is handed to the Media Player through M7d.

If edge resources configuration is provisioned, the MSH shall aquire the Service Access Information from the 5GMSd AF (via M5d). The requirements on the MSH that is edge enabled as defined TS26.501 clause 4.5.2 shall apply.

- For uplink media streaming, the 5GMSu Client may obtain Service Access Information from either the 5GMSu-Aware Application (via M6u/M7u) or the 5GMSu AF (via M5u). In the former case, the Service Access Information is initially acquired by the 5GMSu-Aware Application from the 5GMSu Application Provider via M8u. In the latter case, the Service Access Information is derived by the 5GMSu AF from the Provisioning Session established via M1u.

This clause specifies the procedures whereby the 5GMS Client fetches Service Access Information from the 5GMS AF.

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| **6th Change** |

## 5.2 APIs relevant to Uplink Media Streaming

Table 5.2‑1 summarises the APIs used to provision and use the various uplink media streaming features specified in TS 26.501 [2].

Table 5.2‑1: Summary of APIs relevant to uplink media streaming features

|  |  |  |
| --- | --- | --- |
| 5GMSu feature | Abstract | Relevant APIs |
| Interface | API name | Clause |
| Content protocols discovery | Used by the 5GMSu Application Provider to query which content egest protocols are supported by 5GMSu AS(s). | M1u | Content Protocols Discovery API | 7.5 |
| Content preparation | Supports manipulation by the 5GMSu AS of streaming media content uploaded by 5GMSu Client over M4u, prior to egest of the manipulated content over M2u. | M1u | Content Preparation Templates Provisioning API | 7.4 |
| Metrics reporting | The 5GMSu Client uploads metrics reports to the 5GMSu AF according to a provisioned Metrics Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1u | Provisioning Sessions API | 7.2 |
| Metrics Reporting Provisioning API | 7.8 |
| M5u | Service Access Information API | 11.2 |
| Metrics Reporting API | 11.4 |
| Dynamic Policy invocation | The 5GMSu Client activates different traffic treatment policies selected from a set of Policy Templates configured in its Provisioning Session. | M1u | Provisioning Sessions API | 7.2 |
| Policy Templates Provisioning API | 7.9 |
| M5u | Service Access Information API | 11.2 |
| Dynamic Policies API | 11.5 |
| Network Assistance | The 5GMSu Client requests bit rate recommendations and delivery boosts from the 5GMSu AF. | M5u | Service Access Information API | 11.2 |
| Network Assistance API | 11.6 |
| Edge content processing | Edge resources are provisioned for processing content in 5GMS uplink media streaming sessions. | M1u | Edge Resources Provisioning API | 7.10 |
| M5u | Service Access Information API | 11.2 |

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| **7th Change** |

#### 6.4.3.8 EdgeProcessingEligibilityCriteria type

The EdgeProcessingEligibilityCriteria type is specified in table 6.4.3.8-1 below:

Table 6.4.3.8-1: Definition of EdgeProcessingEligibilityCriteria type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| service‌DataFlow‌Descriptions | array(Service‌DataFlow‌Description) | 1..1 | A set of service data flow descriptions that are to be used as triggers for invoking edge media processing (see NOTE 1).If the set is empty, edge media processing may be invoked for an otherwise eligible media stream on any service data flow.Valid ServiceDataFlowDescription elements:- domainName- flowDescription.dstIp and flowDescription.dstPort- flowDescription.toSTc- flowDescription.flowLabelOther ServiceDataFlowDescription settings shall be rejected by the 5GMS AF. |
| ueLocations | array(Location‌Area5G) | 1..1 | A set of geographical areas in which edge media processing is to be triggered when a UE is present.If the set is empty, edge media processing may be invoked for an otherwise eligible media stream in any location. |
| timeWindows | array(TimeWindow) | 1..1 | Edge media processing is triggered when the session is taking place during one of the indicated time windows.If the set is empty, edge media processing may be invoked for an otherwise eligible media stream at any time. |
| appRequest | boolean | 1..1 | When set TRUE, edge media processing is to be triggered based on application request only. |
| NOTE 1: The usage of these fields to influence route selection and EAS re-selection are for future study.NOTE 2: Data types LocationArea5G and TimeWindow are defined in TS 24.558 [42]. |

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| **8th Change** |

#### 6.4.4.4 EASRelocationTolerance enumeration

The EASERelocationTolerance enumeration is specified in table 6.4.4.4-1 below:

Table 6.4.4.4‑1: Definition of EASRelocationTolerance enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| RELOCATION\_UNAWARE | The application is not aware of any EAS relocation that may happen. Relocation procedures may be executed without any restrictions. |
| RELOCATION\_TOLERANT | The application may tolerate EAS relocation, but requirements for the relocation procedure must be met. An application context may need to be transferred. |
| RELOCATION\_INTOLERANT | The application does not tolerate relocation. |

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| **9th Change** |

## 7.10 Edge Resources Provisioning API

### 7.10.1 General

The Edge Resources Provisioning API is used by the 5GMS Application Provider to provision edge resource usage for media streaming sessions associated with the parent Provisioning Session. The information serves as a template to select or instantiate the appropriate 5GMS AS EAS instance that will serve the media session to the UE.

### 7.10.2 Resource structure

The Edge Resources API is accessible through the following URL base path:

{apiRoot}/3gpp-m1/{apiVersion}/provisioning-sessions/{provisioningSessionId}/

Table 7.10.2-1 specifies the operations and the corresponding HTTP methods that are supported by the Edge Resources API. In each case, the Provisioning Session identifier shall be substituted into {provisioningSessionId} in the above URL template and the sub-resource path indicated by the second column of the table shall be appended to the resulting URL base path.

Table 7.10.2-1: Operations supported by the Edge Resources API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Configure Edge Resources | edge-resources-configurations | POST | Invoked on the Edge Resources Configurations collection to create a new Edge Resources Configuration.If the operation succeeds, the URL of the newly created Edge Resources Configuration resource shall be returned in the Location header of the response. |
| Retrieve Edge Resources Configuration | edge-resources-configurations/‌{edgeResourcesConfigurationId} | GET | Used to retrieve a specific Edge Resources Configuration resource. |
| Modify Edge Resources Configuration | PUT,PATCH | Used to modify or replace an existing Edge Resources Configuration resource. |
| Destroy Edge Resources Configuration | DELETE | Used to destroy an existing Edge Resources Configuration resource. |

### 7.10.3 Data model

#### 7.10.3.1 EdgeResourcesConfiguration resource type

The data model for the Edge Resources Configuration resource is specified in table 7.10.3.1-1:

Table 7.10.3.1-1: Definition of EdgeResourcesConfiguration resource type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| edgeResourcesConfigurationId | ResourceId | 1..1 | An identifier for this Edge Resources Configuration that is unique within the scope of the enclosing Provisioning Session. |
| edgeManagementMode | Edge‌Management‌Mode | 1..1 | Indicates whether the management of edge resources is client-driven or AF-driven. (See clause 7.10.3.2.) |
| eligibilityCriteria | Edge‌Processing‌Eligibility‌Criteria‌ | 0..1 | Condition to activate edge resources for this Provisioning Session. If the activationTrigger element is not provided, it shall be assumed that all media sessions related to the parent Provisioning Session will use edge resources. (See clause 6.4.3.8.) |
| easRequirements | EASRequirements | 1..1 | Requirements on the EAS Profile used by the 5GMS AF or by the EEC to discover and select one or more 5GMS EAS instances to serve media streaming sessions. (See clause 7.10.3.3.) |
| eas‌Relocation‌Requirements | M1EAS‌Relocation‌Requirements | 0..1 | EAS relocation tolerance and requirements.If not present, the 5GMS AF shall assume that the application is unaware of context transfer and that transfers to a target 5GMS EAS are allowed. (See clause 7.10.3.4.) |

#### 7.10.3.2 EdgeManagementMode enumeration

The EdgeManagementMode enumeration is specified in table 7.10.3.2-1 below:

Table 7.10.3.2‑1: Definition of EdgeManagementMode enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| EM\_AF\_DRIVEN | The 5GMS AF, in coordination with the Media Session Handler, assigns edge resources and directs application traffic to the 5GMS EAS instance transparently to the application running on the UE. |
| EM\_CLIENT\_DRIVEN | An Application Client running on the UE explicitly manages edge resources via the EES at reference point EDGE‑1. |

#### 7.10.3.3 EASRequirements type

The EASRequirements type is specified in table 7.10.3.3-1 below:

Table 7.10.3.3-1: Definition of EASRequirements type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Type | Cardinality | Description |
| easProviderIds | array(string) | 1..1 | The set of acceptable providers of 5GMS EAS instances associated with this Provisioning Session.If empty, EAS instances from any provider are acceptable. |
| easType | String | 1..1 | The type of 5GMS EAS instances associated with this Provisioning Session. |
| easFeatures | array(string) | 1..1 | 5GMS EAS service features required to be supported by EAS instances associated with this Provisioning Session.If empty, 5GMS EAS instances of the specified easType with any feature set are acceptable. |
| serviceKpi | EASServiceKPI | 0..1 | Service characteristics required to be satisfied by 5GMS AS EAS instances associated with this Provisioning Session.If absent, 5GMS EAS instances with any service characteristics are acceptable. |
| serviceArea | Geographical‌Service‌Area | 0..1 | The list of geographical areas that 5GMS EAS instances associated with this Provisioning Session are required to serve.If absent, 5GMS EAS instances shall serve all geographical areas whenever possible. |
| service‌Availability‌Schedule | array(Scheduled‌Communication‌Time) | 1..1 | The required availability schedule for 5GMS EAS instances associated with this Provisioning Session.If empty, 5GMS EAS instances are required to be available at all times. |
| service‌Continuity‌Scenarios | array(ACRScenario) | 1..1 | The Application Context Relocation scenarios that 5GMS EAS instances associated with this Provisioning Session are required to support for service continuity.If empty 5GMS EAS instances are not required to support service continuity across EAS relocation. |
| NOTE: Data types ScheduledCommunicationTime, GeographicalServiceArea, EASServiceKPI, and ACRScenario are defined in TS 29.558 [43]. |

#### 7.10.3.4 M1EASRelocationRequirements type

The M1ACRRequirements type is specified in table 7.10.3.4-1 below:

Table 7.10.3.4-1: Definition of M1EASRelocationRequirements type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| tolerance | EAS‌Relocation‌Tolerance | 1..1 | Indicates whether the 5GMS EAS instance tolerates Application Context Relocation. (See clause 6.4.4.4.)If set to RELOCATION\_INTOLERANT, the other properties in this data type shall be ignored. |
| max‌Interruption‌Duration | UintegerRm | 0..1 | The maximum downtime (expressed in milliseconds) that an application can tolerate during EAS relocation.If the expected downtime of the application is expected to exceed this duration, relocation of the 5GMS EAS instance shall not be performed. |
| maxResponseTime‌Difference | UintegerRm | 0..1 | The maximum allowed difference between the previously experienced average User Plane network latency to the source 5GMS EAS instance and the expected latency to the target 5GMS EAS instance, expressed in milliseconds. |

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| **10th Change** |

### 11.2.2 Resource structure

The Service Access Information API is accessible through the following URL base path:

{apiRoot}/3gpp-m5/{apiVersion}/service-access-information/

The operations and the corresponding HTTP methods in Table 11.2.2-1 are supported. In each case, the sub-resource path specified in the second column shall be appended to the URL base path.

Table 11.2.2‑1: Operations supported by the Service Access Information API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub-resource path | Allowed HTTP method(s) | Description |
| Fetch Service Access Information | *{provisioningSessionId}* | GET | Used to acquire the Service Access Information resource for the specified Provisioning Session.The {provisioningSessionId} uniquely identifies the Service Access Information Resource and is allocated by the 5GMS AF during creation of a Provisioning Session. |

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| **10½th Change** |

### 11.2.3 Data model

#### 11.2.3.1 ServiceAccessInformation resource type

The data model for the ServiceAccessInformtion resource is specified in table 11.2.3.1-1 below. Different properties are present in the resource depending on the type of Provisioning Session from which the Service Access Information is derived (as indicated in the provisioningSessionType property) and this is specified in the Applicability column.

Table 11.2.3.1‑1: Definition of ServiceAccessInformation resource

| Property name | Type | Cardinality | Usage | Description | Applicability |
| --- | --- | --- | --- | --- | --- |
| provisioningSessionId | ResourceId | 1..1 | RO | Unique identification of the M1 Provisioning Session. | All types |
| provisioningSession‌Type | Provisioning‌Session‌Type | 1..1 | RO | The type of Provisioning Session. | All types. |
| StreamingAccess | Object | 0..1 | RO |  | downlink |
| mediaPlayerEntry | Url | 0..1 | RO | A document or a pointer to a document that defines a media presentation e.g. MPD for DASH content or URL to a video clip file. |
| ClientConsumptionReporting‌Configuration | Object | 0..1 | RO |  | downlink |
| reportingInterval | DurationSec | 0..1 | RO | The time interval, expressed in seconds, between consumption report messages being sent by the Media Session Handler. The value shall be greater than zero.When this property is omitted, a single final report shall be sent immediately after the media streaming session has ended. |
| serverAddresses | Array(Url) | 1..1 | RO | A list of 5GMSd AF addresses (URLs) where the consumption reporting messages are sent by the Media Session Handler. See NOTE.(Opaque URL, following the 5GMS URL format.) |
| locationReporting | Boolean | 1..1 | RO | Stipulates whether the Media Session Handler is required to provide location data to the 5GMSd AF in consumption reporting messages (in case of MNO or trusted third parties). |
| samplePercentage | Percentage | 1..1 | RO | The percentage of media streaming sessions that shall send consumption reports, expressed as a floating point value between 0.0 and 100.0. |
| DynamicPolicyInvocation‌Configuration | Object | 0..1 | RO |  | downlink,uplink |
| serverAddresses | Array(Url) | 1..1 | RO | A list of 5GMSd AF addresses (URLs) which offer the APIs for dynamic policy invocation sent by the Media Session Handler. See NOTE.(Opaque URL, following the 5GMS URL format.) |
| validPolicyTemplateIds | Array(ResourceId) | 1..1 | RO | A list of Policy Template identifiers which the 5GMS Client is authorized to use. |
| sdfMethods | Array(SdfMethod) | 1..1 | RO | A list of recommended service data flow description methods (descriptors), e.g. 5-Tuple, ToS, 2-Tuple, etc., which should be used by the Media Session Handler to describe the service data flows for the traffic to be policed. |
| externalReferences | Array(String) | 0..1 | RO | Additional identifier for this Policy Template, unique within the scope of its Provisioning Session, that can be cross-referenced with external metadata about the media streaming session.Example: "HD\_Premium". |
| ClientMetricsReporting‌Configurations | Array(Object) | 0..1 | RO |  | downlink,uplink |
| serverAddresses | Array(Url) | 1..1 | RO | A list of 5GMS AF addresses to which metrics reports shall be sent. See NOTE.(Opaque URL, following the 5GMS URL format.) |
| dataNetworkName | Dnn | 0..1 | RO | The DNN which shall be used when sending metrics reports. If not specified, the name of the default DN shall be used. |
| reportingInterval | DurationSec | 0..1 | RO | The time interval, expressed in seconds, between metrics reports being sent by the Media Session Handler. The value shall be greater than zero.When this property is omitted, a single final report shall be sent immediately after the media streaming session has ended. |
| samplePercentage | Percentage | 1..1 | RO | The percentage of media streaming sessions that shall report metrics, expressed as a floating point value between 0.0 and 100.0. |
| urlFilters | Array(String) | 0..1 | RO | A non-empty list of URL patterns for which metrics reporting shall be done. The format of each pattern shall be a regular expression as specified in [5].If not specified, reporting shall be done for all sessions. |
| metrics | Array(String) | 1..1 | RO | A list of metrics which shall be reported. |
| NetworkAssistanceConfiguration | Object | 0..1 | RO |  | downlink,uplink |
| serverAddress | Url | 1..1 | RO | Address of the 5GMS AF that offers the APIs for 5GMS AF-based Network Assistance, for access by the 5GMSd Media Session Handler. See NOTE.This address shall be an opaque URL, following the 5GMS URL format. |
| Client‌EdgeResources‌Configuration | Object | 0..1 | RO | Present only for Provisioning Sessions with client-driven edge computing management mode provisioned. | downlink,uplink |
|  eligibilityCriteria | Edge‌Processing‌Eligibility‌Criteria | 0..1 | RO | Conditions for activating edge resources for media streaming sessions in the scope of this Service Access Information. (See clause 6.4.3.8.) |
|  easDiscoveryTemplate | EAS‌Discovery‌Template | 1..1 | RO | A template for the EAS discovery filter that shall be used by the EEC to discover and select a 5GMS EAS instance to serve media streaming sessions in the scope of this Service Access Information. (See clause 11.2.3.2.) |
|  easRelocation‌Requirements | M5EAS‌Relocation‌Requirements | 0..1 | RO | EAS relocation tolerance and requirements.If absent, the EEC shall assume that relocation is tolerated by all 5GMS EAS instances in the scope of this Service Access Information. (See clause 11.2.3.3.) |
| NOTE: In deployments where multiple instances of the 5GMSd AF expose the Media Session Handling APIs at M5, the 5G System may use a suitable mechanism (e.g. HTTP load balancing or DNS resolution) to direct requests to a suitable AF instance. |

#### 11.2.3.2 EASDiscoveryTemplate type

Table 6.4.3.10-1  Definition of EASDiscoveryTemplate type

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Type | Cardinality | Description |
| easType | string | 1..1 | The type of 5GMS EAS required to support media streaming sessions in the scope o.Corresponding to EASProfile.type, as specified in clause 8.1.5.2.3 of TS 29.558 [43]. |
| easProviderIds | array(string) | 1..1 | The set of acceptable EAS provider identifiers.If empty, 5GMS EAS instances of the specified easType from any provider are acceptable.Corresponding to EASProfile.provId, as specified in clause 8.1.5.2.3 of TS 29.558 [43]. |
| easFeatures | array(string) | 1..1 | The required service features for the EAS to serve this session.If empty, 5GMS EAS instances of the specified easType with any feature set are acceptable.Corresponding to EASProfile.easFeats, as specified in clause 8.1.5.2.3 of TS 29.558 [43] |

#### 11.2.3.3 M5EASRelocationRequirements type

Table 11.2.3.3-1: Definition of M5EASRelocationRequirements type

| Property name | Type | Cardinality | Description |
| --- | --- | --- | --- |
| tolerance | EASRelocation‌Tolerance | 1..1 | Indicates whether the 5GMS EAS instance tolerates relocation. (See clause 6.4.4.4.) |
| maxInterruptionDuration | UintegerRm | 0..1 | The maximum downtime (expressed in milliseconds) that an application can tolerate during EAS relocation.If the expected downtime of the application is expected to exceed this duration, relocation of the 5GMS AS EAS instance shall not be performed. |

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| **11th Change** |

# C.2 Data Types applicable to several APIs

For the purpose of referencing entities defined in this clause, it shall be assumed that the OpenAPI definitions below are contained in a physical file named "TS26512\_CommonData.yaml".

|  |
| --- |
| openapi: 3.0.0info:  title: 5GMS Common Data Types  version: 2.0.0  description: |    5GMS Common Data Types    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: 5GMS Common Data Types    description: '5G Media Streaming: Common Data Types'externalDocs:  description: 'TS 26.512 V16.2.0; 5G Media Streaming (5GMS); Protocols'  url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.512/'paths: {}components:  schemas:    #################################    # Clause 6.4.2: Simple data types    #################################    ResourceId:      type: string      description: String chosen by the 5GMS AF to serve as an identifier in a resource URI.    Percentage:      type: number      minimum: 0.0      maximum: 100.0    #DurationSec is defined in TS29571\_CommonData    #DateTime is defined in TS29571\_CommonData    #Uri is defined in TS29571\_CommonData    Url:      type: string      format: uri      description: Uniform Resource Locator, comforming with the URI Generic Syntax specified in IETF RFC 3986.     #####################################    # Clause 6.4.3: Structured data types    #####################################    IpPacketFilterSet:      type: object      required:        - direction      properties:        srcIp:          type: string        dstIp:          type: string        protocol:          type: integer        srcPort:          type: integer        dstPort:          type: integer        toSTc:          type: string        flowLabel:          type: integer        spi:          type: integer        direction:          type: string    ServiceDataFlowDescription:      type: object      properties:        flowDescription:          $ref: '#/components/schemas/IpPacketFilterSet'        domainName:          type: string    M5QoSSpecification:      type: object      required:        - marBwDlBitRate        - marBwUlBitRate        - mirBwDlBitRate        - mirBwUlBitRate      properties:        marBwDlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        marBwUlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        minDesBwDlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        minDesBwUlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        mirBwDlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        mirBwUlBitRate:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        desLatency:          type: integer          minimum: 0        desLoss:          type: integer          minimum: 0    M1QoSSpecification:      type: object      properties:        qosReference:          type: string        maxBtrUl:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        maxBtrDl:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        maxAuthBtrUl:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        maxAuthBtrDl:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/BitRate'        defPacketLossRateDl:          type: integer          minimum: 0        defPacketLossRateUl:          type: integer          minimum: 0    ChargingSpecification:      type: object      properties:        sponId:          type: string        sponStatus:          $ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/SponsoringStatus'        gpsi:          type: array          items:            $ref: 'TS29571\_CommonData.yaml#/components/schemas/Gpsi'    TypedLocation:      type: object      required:        - locationIdentifierType        - location      properties:        locationIdentifierType:          $ref: '#/components/schemas/CellIdentifierType'        location:          type: string    OperationSuccessResponse:      type: object      required:      - success      properties:        success:          type: boolean        reason:          type: string    CellIdentifierType:      anyOf:        - type: string          enum: [CGI, ECGI, NCGI]        - type: string          description: >            This string provides forward-compatibility with future            extensions to the enumeration but is not used to encode            content defined in the present version of this API.    SdfMethod:      anyOf:        - type: string          enum: [5\_TUPLE, 2\_TUPLE, TYPE\_OF\_SERVICE\_MARKING, FLOW\_LABEL, DOMAIN\_NAME]        - type: string          description: >            This string provides forward-compatibility with future            extensions to the enumeration but is not used to encode            content defined in the present version of this API.    ProvisioningSessionType:      anyOf:        - type: string          enum: [DOWNLINK, UPLINK]        - type: string          description: >            This string provides forward-compatibility with future            extensions to the enumeration but is not used to encode            content defined in the present version of this API.    EdgeProcessingEligibilityCriteria:      type: object      required:        - serviceDataFlowDescriptions        - ueLocations        - timeWindows        - appRequest      properties:        serviceDataFlowDescriptions:          type: array          items:            $ref: '#/components/schemas/ServiceDataFlowDescription'        ueLocations:          type: array          items:            $ref: 'TS29122\_CommonData.yaml#/components/schemas/LocationArea5G'        timeWindows:          type: array          items:            $ref: 'TS29122\_CommonData.yaml#/components/schemas/TimeWindow'        appRequest:          type: Boolean    EASRelocationTolerance:      anyOf:        - type: string          enum: [RELOCATION\_UNAWARE, RELOCATION\_TOLERANT, RELOCATION\_INTOLERANT]        - type: string          description: >            This string provides forward-compatibility with future            extensions to the enumeration but is not used to encode            content defined in the present version of this API. |

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| 12th Change |

## C.3.9 M1\_EdgeResourcesProvisioning API

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| --- |
| openapi: 3.0.0info:  title: M1\_EdgeResourcesProvisioning  version: 2.0.0  description: |    5GMS AF M1 Edge Resources Provisioning API    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: M1\_EdgeResourcesProvisioning    description: '5G Media Streaming: Provisioning (M1) APIs: Edge Resources Provisioning'externalDocs:  description: 'TS 26.512 V17.1.0; 5G Media Streaming (5GMS); Protocols'  url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.512/'servers:  - url: '{apiRoot}/3gpp-m1/v2'    variables:      apiRoot:        default: https://example.com        description: See 3GPP TS 29.512 clause 7.10.paths:  /provisioning-sessions/{provisioningSessionId}/edge-resources-configurations:    parameters:      - name: provisioningSessionId        in: path        required: true        schema:           $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        description: 'The resource identifier of an existing Provisioning Session.'    get:      operationId: retrieveEdgeResourcesConfiguration      summary: 'Retrieve the Edge Resources Configuration of the specified Provisioning Session'      responses:        '200':          description: 'Success'          content:            application/json:              schema:                $ref: '#/components/schemas/EdgeResourcesConfiguration'    put:      operationId: updateEdgeResourcesConfiguration      summary: 'Update an Edge Resources Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of an Edge Resources Configuration'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/EdgeResourcesConfiguration'      responses:        '204':          description: 'Updated Edge Resources Configuration'        '404':          description: 'Not Found'    patch:      operationId: patchEdgeResourcesConfiguration      summary: 'Patch the Edge Resources Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Edge Resources Configuration'        required: true        content:          application/merge-patch+json:            schema:              $ref: '#/components/schemas/EdgeResourcesConfiguration'          application/json-patch+json:            schema:              $ref: '#/components/schemas/EdgeResourcesConfiguration'      responses:        '200':          description: 'Patched Edge Resources Configuration'          content:            application/json:              schema:                $ref: '#/components/schemas/EdgeResourcesConfiguration'        '404':          description: 'Not Found'    delete:       operationId: destroyEdgeResourcesConfiguration      responses:        '204':          description: 'Destroyed Edge Resources Configuration'        '404':          description: 'Not Found'components:  schemas:        EdgeResourcesConfiguration:      type: object      required:        - edgeResourcesConfigurationId        - edgeManagementMode        - easRequirements      properties: edgeResourcesConfigurationId: $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        edgeManagementMode:          $ref: '#/components/schemas/EdgeManagementMode'        eligibilityCriteria:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/EdgeProcessingEligibilityCriteria'        easRequirements:          $ref: '#/components/schemas/EASRequirements'        easRelocationRequirements:          $ref: '#/components/schemas/M1EASRelocationRequirements'    M1EASRelocationRequirements:      type: object      required:        - tolerance      properties:        tolerance:          $ref: '#/components/schemas/EASRelocationTolerance'        maxInterruptionDuration:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/UintegerRm'        maxResponseTimeDifference:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/UintegerRm'    EASRequirements:        type: object        required:          - easProviderIds          - easType          - easFeatures          - serviceAvailabilitySchedule          - serviceContinuityScenarios        properties:          easProviderIds:            type: array              items:              type: string          easType:            type: string          easFeatures:            type: array            items:              type: string          serviceKpi:            $ref: 'TS29558\_Eees\_EASRegistration.yaml#/components/schemas/EASServiceKPI'          serviceArea:            $ref: 'TS29558\_Eecs\_EESRegistration.yaml#/components/schemas/GeographicalServiceArea'          serviceAvailabilitySchedule:            type: array            items:              $ref: 'TS29122\_CpProvisioning.yaml#/components/schemas/ScheduledCommunicationTime'          serviceContinuityScenarios:            type: array            items:              $ref: 'TS29558\_Eecs\_EESRegistration.yaml#/components/schemas/ACRScenario'          serviceContinuitySupport:            type: array            items:              $ref: 'TS29558\_Eecs\_EESRegistration.yaml#/components/schemas/ACRScenario'    EdgeManagementMode:      anyOf:        - type: string          enum: [EM\_AF\_DRIVEN, EM\_APP\_DRIVEN]        - type: string          description: >            This string provides forward-compatibility with future            extensions to the enumeration but is not used to encode            content defined in the present version of this API. |

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| 13th Change |

## C.4.1 M5\_ServiceAccessInformation API

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| openapi: 3.0.0info:  title: M5\_ServiceAccessInformation  version: 2.0.0  description: |    5GMS AF M5 Service Access Information API    © 2021, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: M5\_ServiceAccessInformation    description: '5G Media Streaming: Media Session Handling (M5) APIs: Service Access Information'externalDocs:  description: 'TS 26.512 V16.2.0; 5G Media Streaming (5GMS); Protocols'  url: 'https://www.3gpp.org/ftp/Specs/archive/26\_series/26.512/'servers:  - url: '{apiRoot}/3gpp-m5/v2'    variables:      apiRoot:        default: https://example.com        description: See 3GPP TS 29.512 clause 6.1.paths:  /service-access-information/{provisioningSessionId}:    parameters:      - name: provisioningSessionId        description: 'The resource identifier of an existing Provisioning Session.'        in: path        required: true        schema:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'    get:      operationId: retrieveServiceAccessInformation      summary: 'Retrieve the Service Access Information resource'      responses:        '200':          description: 'Success'          content:            application/json:              schema:                  $ref: '#/components/schemas/ServiceAccessInformationResource'        '404':          description: 'Not Found'components:  schemas:    ServerAddresses:      type: array      items:        $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url'      minItems: 1    ServiceAccessInformationResource:      type: object      required:      - provisioningSessionId      - provisioningSessionType      properties:        provisioningSessionId:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        provisioningSessionType:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ProvisioningSessionType'        StreamingAccess:          type: object          properties:            mediaPlayerEntry:              $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url'        ClientConsumptionReportingConfiguration:          type: object          required:            - serverAddresses            - locationReporting            - samplePercentage          properties:            reportingInterval:              $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'            serverAddresses:              $ref: '#/components/schemas/ServerAddresses'            locationReporting:              type: boolean            samplePercentage:              $ref: 'TS26512\_CommonData.yaml#/components/schemas/Percentage'        DynamicPolicyInvocationConfiguration:          type: object          required:            - serverAddresses            - validPolicyTemplateIds            - sdfMethods          properties:             serverAddresses:              $ref: '#/components/schemas/ServerAddresses'            validPolicyTemplateIds:              type: array              items:                 $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'              minItems: 0            sdfMethods:              type: array              items:                $ref: 'TS26512\_CommonData.yaml#/components/schemas/SdfMethod'              minItems: 0            externalReferences:              type: array              items:                type: string              minItems: 1        ClientMetricsReportingConfiguration:          type: array          items:            type: object            required:            - serverAddresses            - samplePercentage            - urlFilters            - metrics            properties:              serverAddresses:                $ref: '#/components/schemas/ServerAddresses'              dataNetworkName:                $ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnn'              reportingInterval:                $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'              samplePercentage:                              $ref: 'TS26512\_CommonData.yaml#/components/schemas/Percentage'              urlFilters:                type: array                items:                  type: string                minItems: 0              metrics:                type: array                items:                  type: string        NetworkAssistanceConfiguration:          type: object          required:             - serverAddress          properties:            serverAddress:              $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url' ClientEdgeResourcesConfiguration:          type: object          required:            - easDiscoveryTemplate          properties:            eligibilityCriteria:              $ref: 'TS26512\_CommonData.yaml#/components/schemas/EdgeProcessingEligibilityCriteria'            easDiscoveryTemplate:              $ref: '#/components/schemas/EASDiscoveryTemplate'            easRelocationRequirements:              $ref: '#/components/schemas/M5EASRelocationRequirements'    M5EASRelocationRequirements:       type: object      required:         - tolerance      properties:         tolerance:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/EASRelocationTolerance'         maxInterruptionDuration:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/UintegerRm'     EASDiscoveryTemplate:      type: object       required: - easType         - easProviderIds         - serviceFeatures      properties:         easType:          type: string         easProviderIds:          type: array           items:            type: string         serviceFeatures:          type: array           items:            type: string |

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| 14th Change |  |

Table D-1: Index of Provisioning (M1) APIs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTTP request path element hierarchy | Description | Allowed HTTP methods | Resource | OpenAPI |
| Create | Retrieve | Update | Destroy | Non-RESTful operation | structure definition clause | definition clause |
| provisioning-sessions | Provisioning Sessions collection | POST |  |  |  |  | 7.2.2 | C.3.1 |
|  {provisioningSessionId} | Provisioning Session resource |  | GET |  | DELETE |  |
|  certificates | Server Certificates collection | POST |  |  |  |  | 7.3.2 | C.3.2 |
|  {certificateId} | Server Certificate resource |  | GET | PUT | DELETE |  |
|  content-preparation-templates | Content Preparation Templates collection | POST |  |  |  |  | 7.4.2 | C.3.3 |
|  {contentPreparationTemplateId} | Content Preparation Template resource |  | GET | PUT, PATCH | DELETE |  |
|  content-protocols-discovery | Content Protocols resource |  | GET |  |  |  | 7.5.2 | C.3.4 |
|  content-hosting-configuration | Content Hosting Configuration resource | POST | GET | PUT, PATCH | DELETE |  | 7.6.2 | C.3.5 |
|  purge | Content Hosting cache purge operation |  |  |  |  | POST |
|  consumption-reporting-configuration | Consumption Reporting Configuration resource | POST | GET | PUT, PATCH | DELETE |  | 7.7.2 | C.3.6 |
|  metrics-reporting-configuration | Metrics Reporting Configuration collection | POST |  |  |  |  | 7.8.2 | C.3.7 |
|  {metricsReportingConfigurationId} | Metrics Reporting Configuration resource |  | GET | PUT, PATCH | DELETE |  |
|  policy-templates | Policy Templates collection | POST |  |  |  |  | 7.9.2 | C.3.8 |
|  {policyTemplateId} | Policy Template resource |  | GET | PUT, PATCH | DELETE |  |
|  edge-resources-configurations | Edge Resources Configurations collection | POST |  |  |  |  | 7.10.2 | C.3.9 |
|  {edgeResourcesConfigurationId} | Edge Resources Configuration resource |  | GET | PUT, PATCH | DELETE |  |

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| **End of Changes** |