**3GPP TSG SA WG4#119e S4-220592**

**E-meeting, 11th – 20th May 2022 revision of S4-220547**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **26**.**512** | **CR** | draft | **rev** |  | **Current version:** | **17.0.0** |  |
|  |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | **[5MBP3] 5GMS Protocol Extensions for 5GMS via eMBMS** |
|  |  |
| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | 5MBP3 |  | ***Date:*** | 30/03/2022 |
|  |  |  |  |  |
| ***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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | See work item  |
|  |  |
| ***Summary of change:*** | Add 5GMS via eMBMS |
|  |  |
| ***Consequences if not approved:*** | Work Item objectives not complete |
|  |  |
| ***Clauses affected:*** | See attached |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS/TR ... CR  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Serves as baseline for future work |
|  |  |
| ***This CR's revision history:*** |  |

**===== CHANGE =====**

# 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 26.501: "5G Media Streaming (5GMS); General description and architecture".

[3] DASH Industry Forum, "Specification of Live Media Ingest",
<https://dashif-documents.azurewebsites.net/Ingest/master/DASH-IF-Ingest.pdf>

[4] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[5] Standard ECMA-262, 5.1 Edition: "ECMAScript Language Specification", June 2011.

[6] IETF RFC 6234: "US Secure Hash Algorithms (SHA and SHA-based HMAC and HKDF)".

[7] 3GPP TS 23.003: "Numbering, addressing and identification".

[8] ITU-T Recommendation X.509 (2005) | ISO/IEC 9594-8:2005: "Information Technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks".

[9] IETF RFC 7230: "Hypertext-Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[10] IETF RFC 4648: "The Base16, Base32, and Base64 Data Encodings".

[11] IEEE Standard 1003.1™, Issue 7: "The Open Group Base Specifications", 2018.
<https://pubs.opengroup.org/onlinepubs/9699919799/>

[12] 3GPP TS 29.571: "Common Data Types for Service Based Interfaces; Stage 3".

[13] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[14] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[15] 3GPP TS 27.007: "AT Command set for User Equipment (UE)".

[16] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3", August 2018.

[17] IETF RFC 7468: "Textual Encodings of PKIX, PKCS, and CMS Structures", April 2015.

[18] ISO 3166‑1: "Codes for the representation of names of countries and their subdivisions — Part 1: Country codes".

[19] ISO 3166‑2: "Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code".

[20] IETF RFC 5280: "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", May 2008.

[21] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[22] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[23] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[24] IETF RFC 7230: "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[25] IETF RFC 7231: "Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content".

[26] IETF RFC 7232: "Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests".

[27] IETF RFC 7233: "Hypertext Transfer Protocol (HTTP/1.1): Range Requests".

[28] IETF RFC 7234: "Hypertext Transfer Protocol (HTTP/1.1): Caching".

[29] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[30] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol V8rsion 1.2".

[31] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[32] ISO/IEC 23009-1: "Information technology; Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats".

[33] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[34] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[35] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, codecs and formats".

[36] Void.

[37] 3GPP TS 26.244: "Transparent end-to-end packet switched streaming service (PSS); 3GPP file format (3GP)".

[38] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format", December 2017.

[39] ISO 14496-12: "Information technology – Coding of audio-visual objects – Part 12: ISO base media file format".

[40] ISO 23000-19: "Information technology – Coding of audio-visual objects – Part 19: Common media application format (CMAF) for segmented media".

[41] IETF RFC 3986: "URI Generic Syntax".

[42] 3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

[43] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[44] 3GPP TS 26.347: "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

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## 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].

5GMS 5G Media Streaming

5GMSd 5GMS downlink

5GMSu 5GMS uplink

5GMSA 5GMS Architecture

BMFF (ISO) Base Media File Format

ABR Adaptive Bit Rate

AF Application Function

ANBR Access Network Bit rate Recommendation

AS Application Server

CDN Content Delivery Network / Content Distribution Network

CGI Cell Global Identifier

CMAF Common Media Application Format

CRUD Create, Read, Update, Delete

CNAME Canonical Name

CORS Cross-Origin Resource Sharing

CRL Certificate Revocation List

DASH Dynamic Adaptive Streaming over HTTP

DER Distinguished Encoding Rule

DNN Domain Name News

DNS Domain Name Server

ECGI E-UTRAN Cell Global Identifier

ECMA European Computer Manufacturers Association

eMBMS enhanced Multimedia Broadcast Multicast Services

FQDN Fully Qualified Domain Name

GPSI Generic Public Subscription Identifier

HLS HTTP Live Streaming

ISO International Organization for Standardization

JSON JavaScript Object Notation

LCID Logical Channel IDentifier

MFBR Maximum Flow Bit Rate

MIME Multipurpose Internet Mail Extensions

MNO Mobile Network Operator

MPD Media Presentation Description

MSISDN Mobile Subscriber ISDN number

NCGI NR Cell Global Identifier

NEF Network Exposure Function

OAM Operations, Administration and Maintenance

PCC Policy Control and Charging

PCF Policy Control Function

PEM Privacy-Enhanced Mail

PFD Packet Flow Description

PFDF Packet Flow Description Function

QoE Quality of Experience

QoS Quality of Service

SDF Service Data Flow

SHA Secure Hash Algorithm

TLS Transport Layer Security

URI Uniform Resource Identifier

URL Uniform Resource Locator

UTC Coordinated Universal Time

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## 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 |
| 5GMS via eMBMS | The 5GMSd AF provisions the delivery of content via eMBMS. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | DASH [4] or 3GP [37] or HLS | 10 |

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### 4.3.1 General

A 5GMS Application Provider may use the procedures in this clause to provision the network for media streaming sessions that are operated by that 5GMS Application Provider. For downlink media streaming, these sessions may be DASH streaming sessions, progressive download sessions, or any other type of media streaming or distribution (e.g. HLS) sessions. For uplink media streaming, the content format and delivery protocol are defined by the 5GMSu Application Provider, and may be either non-fully standardized or employ standardized HTTP-based streaming of ISO BMFF content fragments as profiled by CMAF [39].

The M1 interface offers three different sets of procedures:

- For downlink media streaming, configuration of content ingest at M2d for onward distribution by the 5GMSd AS over M4d or via other distribution systems such as eMBMS: designed as an API that is equivalent to the functionality of a public CDN. For uplink media streaming, configuration of content egest at M2u for the media content received by the 5GMSu AS from the 5GMSu Client over M4u. The resource types involved in content hosting configuration are provisioning session (see clause 4.3.2), content hosting procedures (see clause 4.3.3), ingest protocols (see clause 4.3.4), content preparation template (see clause 4.3.5), and server certificates (see clause 4.3.6).

- Configuration of dynamic policies: allows the configuration of Policy Templates at M5 that can be applied to M4 downlink/uplink media streaming sessions.

- Configuration of reporting: permits the MNO to collect, at M5, QoE metrics and consumption reports about M4 downlink sessions, as well as permits the MNO to collect, at M5, QoE metrics reports about M4 uplink sessions.

A 5GMS Application Provider may use any of these procedures, in any combination, to support its media streaming sessions.

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#### 4.3.6.1 General

Each X.509 server certificate [8] presented by the 5GMSd AS at reference point M4d or at reference point xMB-U is represented by a Server Certificate resource at M1d. The Server Certificates Provisioning API as specified in clause 7.3 enables a Server Certificate resource to be created within the scope of a Provisioning Session, and subsequently referenced by a Content Hosting Configuration created in the scope of the same Provisioning Session. That API supports two alternative provisioning methods for Server Certificate resources: one in which a certificate is generated by the 5GMS System operator on behalf of the 5GMSd Application Provider; the other in which a certificate is generated by the 5GMSd Application Provider from a Certificate Signing Request solicited from the 5GMSd AF. Both methods shall be supported by implementations of the 5GMSd AF.

NOTE: As a consumer of media from the 5GMSd AS in a combined architecture using 5GMS and eMBMS, the BM-SC needs to be able to trust the content it is receiving comes from a *bona fide* source. This issue is left to implementation.

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#### 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.

For downlink media streaming exclusively via eMBMS and for hybrid 5GMSd/eMBMS services as defined in clauses 5.10.2 and 5.10.5 respectively of TS 26.501 [2], the Service Access Information indicates that the 5GMSd Client acts as an MBMS-Aware Application.

For dynamically provisioned downlink media streaming via eMBMS as defined in clause 5.10.6 of TS 26.501 [2], the 5GMSd AS creates a presentation manifest that is regularly polled by the Media Player for a potential update. When an eMBMS User Service carrying the 5GMSd content is dynamically provisioned or removed by the 5GMSd AF, the 5GMSd AS shall update the presentation manifest with the locations where the updated manifest and the media segments are now available, for example to add or change to the media server in the MBMS Client.

- 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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### 4.7.4 Procedures for consumption reporting

These procedures are used by the Media Session Handler and the Consumption Reporting functions of the 5GMSd Client to submit a consumption report via the M5d interface if Consumption Reporting is applied for a downlink streaming session.

The Service Access Information indicating whether Consumption Reporting is provisioned for downlink streaming sessions is described in clause 11.2.3. When the ClientConsumptionReportingConfiguration.samplePercentage value is 100, the Media Session Handler shall activate the consumption reporting procedure. If the samplePercentage is less than 100, the Media Session Handler shall generate a random number which is uniformly distributed in the range of 0 to 100, and the Media Session Handler shall activate the consumption report procedure when the generated random number is of a lower value than the samplePercentage value.

If the consumption reporting procedure is activated, the Media Session Handler shall submit a consumption report to the 5GMSd AF when any of the following conditions occur:

- Start of consumption of a downlink streaming session;

- Stop of consumption of a downlink streaming session;

- Upon determining the need to report ongoing 5GMS consumption at periodic intervals determined by the ClientConsumptionReportingConfiguration.reportingInterval property.

- Upon determining a location change, if the ClientConsumptionReportingConfiguration.locationReporting property is set to True.

- Upon determining an access network change (e.g. unicast to eMBMS, or *vice versa*), if the ClientConsumptionReportingConfiguration.accessReporting property is set to True.

Whenever a consumption report is sent, the Media Session Handler shall reset its reporting interval timer to the value of the reportingInterval property and it shall begin countdown of the timer again. Whenever the Media Session Handler stops the consumption of a downlink streaming session, it shall disable its reporting interval timer.

In order to submit a consumption report, the Media Session Handler shall send an HTTP POST message to the 5GMSd AF. If several 5GMSd AF addresses are listed in the ClientConsumptionReportingConfiguration.‌serverAddresses array (see table 11.2.3.1-1), the Media Session Handler shall choose one and send the message to the selected. The request body shall be a ConsumptionReport structure, as specified in clause 11.3.3.1. The server shall respond with a 200 (OK) message to acknowledge successful processing of the consumption report.

NOTE: If the connection via M5d for consumption reporting is temporarily unavailable, the consumption reports reports are expected to be stored on the UE for some time until connectivity to 5GMSd AF is restored and send as collection later to the 5GMSd AF. Details are left to implementation.The Consumption Reporting API, defining the data formats and structures and related procedures for consumption reporting, is described in clause 11.3.

A reporting client identifier shall be included in the consumption report. If available to the Media Session Handler, its value should be a GPSI value as defined by TS 23.003 [7]. Otherwise, the reporting client identifier should be represented by a stable and globally unique string.

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### 4.7.5 Procedures for metrics reporting

The M5 procedures for QoE metrics reporting pertain to the combination of the provisioning of metrics collection and reporting in the Media Session Handler using relevant Service Access Information, and the sending of collected metrics by the Media Session Handler to the 5GMS AF in accordance with the configured metrics scheme(s). A metrics scheme may be 3GPP-defined or non-3GPP-defined.

When the metrics collection and reporting feature is activated for a downlink media streaming session, one or more metrics configuration sets, each associated with a metrics scheme, may be provided to the 5GMS Client. A given metrics configuration set contains information such as the 5GMS AF address(es) to which metrics are to be sent by the Media Session Handler, metrics reporting interval, target percentage of media streaming sessions for which reports should be sent, and the set of metrics to be collected and reported. See TS 26.501 [2] for additional details.

For progressive download and DASH streaming services, the listed metrics in a given metrics configuration set are associated with the 3GPP metrics scheme and shall correspond to one or more of the metrics as specified in clauses 10.3 and 10.4, respectively, of TS 26.247 [4]. Metrics related to virtual reality media, as specified in clause 9.3 of TS 26.118 [42], may also be listed in the metrics configuration. Metrics related to eMBMS delivery, as specified in clause 9.4.6 of TS 26.346 [43], may also be listed in the metrics configuration.

NOTE: If the connection via M5d for metrics reporting is temporarily unavailable, the consumption reports are expected to be stored on the UE for some time until connectivity to 5GMSd AF is restored and send as collection later to the 5GMSd AF. Details are left to implementation.

Details of the metrics reporting API are provided in clause 11.4, and for 3GP-DASH based downlink media streaming services, the 3GPP-defined metrics reporting scheme and metrics report format are defined in clause 11.4.3.

A reporting client identifier may be included in the metrics report. If available to the Media Session Handler, its value should be a GPSI value as defined by TS 23.003 [7]. Otherwise, the reporting client identifier should be represented by a stable and globally unique string.

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## 4.X Procedures for downlink media streaming via eMBMS

This procedure is used by a 5GMSd Client to establish a 5GMSd session either completely, or at least partially, through eMBMS.

- For downlink media streaming exclusively via eMBMS and for hybrid 5GMSd/eMBMS services, as defined in clauses 5.10.2 and 5.10.5 respectively of TS 26.501 [2]:

- The 5GMSd Application Provider shall provision a supplementary distribution network of type DISTRIBUTION\_‌NETWORK\_‌EMBMS in the Content Hosting configuration at reference point M1d, as specified in clause 7.6.3.1, with either MODE\_EXCLUSIVE or MODE\_HYBRID (as appropriate).

- The 5GMSd Application Provider may additionally provision access reporting in the Consumption Reporting Configuration at M1d, as specified in clause 7.7.3.1.

- The MBMS Client shall host an MPD as defined in ISO/IEC 23009‑1 [32] or in TS 26.247 [4], or any other presentation manifest as the 5GMSd Media Entry Point such as an HLS Master Playlist.

- The URL of this presentation manifest shall be signalled to the 5GMSd Client through the 5GMSd session establishment procedure.

- The MBMS Client shall be invoked by the Media Session Handler via reference point MBMS-API-C using the procedures defined in TS 26.347 [44].

- For dynamically provisioned downlink media streaming via eMBMS as defined in clause 5.10.6 TS 26.501 [2]:

- The 5GMSd Application Provider shall provision a supplementary distribution network of type DISTRIBUTION\_‌NETWORK\_‌EMBMS in the Content Hosting configuration at reference point M1d, as specified in clause 7.6.3.1, with MODE\_DYNAMIC.

- The 5GMSd Application Provider shall additionally provision access reporting in the Consumption Reporting Configuration at M1d, as specified in clause 7.7.3.1.

- The 5GMSd AS shall host an MPD as defined in ISO/IEC 23009‑1 [32] or in TS 26.247 [4], or any other presentation manifest as the 5GMSd Media Entry Point.

- The URL of this presentation manifest shall be signalled to the 5GMSd Client through the 5GMSd session establishment procedure. If the 5GMSd service is currently available as an MBMS User Service, the 5GMSd Client forwards the manifest request to the MBMS Client; otherwise, it forwards the request to the 5GMSd AS via reference point M4d.

NOTE: The detailed execution of dynamically handling this decision is left to implementation.

- The MBMS Client shall be invoked dynamically, paused or destroyed by the Media Session Handler via reference point MBMS-API-C using the procedures defined in TS 26.347 [44].

Additional procedures for reactions to different HTTP status codes are provided in clause A.7 of TS 26.247 [4] and clause A.7 of ISO/IEC 23009‑1 [32].

Additional procedures for handling partial file responses are provided in clause A.9 of TS 26.247 [4].

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### 7.6.3 Data model

#### 7.6.3.1 ContentHostingConfiguration resource

The data model for the ContentHostingConfiguration resource is specified in table 7.6.3.1-1 below:

Table 7.6.3.1-1: Definition of ContentHostingConfiguration resource

| Property name | Data Type | Cardinality | Description |
| --- | --- | --- | --- |
| name | String | 1..1 | A name for this Content Hosting Configuration. |
| IngestConfiguration | Object | 1..1 | Describes the 5GMSd Application Provider's origin server from which media resources will be ingested via interface M2d. |
|  path | String | 1..1 | The relative path which will be used to address the media resources at interface M2d.This path is provided by the 5GMSd AF in the case of Push-based ingest. |
|  pull | Boolean | 1..1 | Indicates whether to the 5GMSd AS shall use Pull or Push for ingesting the content. |
|  protocol | Uri | 1..1 | A fully-qualified term identifier allocated in the name space urn:3gpp:5gms:content-protocol that identifies the content ingest protocol.The set of supported protocols is defined in clause 8. |
|  entryPoint | Url | 1..1 | An entry point to ingest the content. The semantics of the entry point are dependent on the selected ingest protocol.In the case of Push ingest (pull flag is set to False), this parameter is returned by the 5GMSd AF to the 5GMSd Application Provider and indicates the entry point for pushing the content.In case of Pull (pull flag is set to True), the entryPoint shall be provided to the 5GMSd AF to indicate the location from which content is to be pulled. In this case, the entryPoint shall be used as the base URL. A request received by the 5GMSd AS is mapped to a URL using the provided base URL to fetch the content from the origin server. |
| DistributionConfigurations | Array(Object) | 1..1 | Specifies the distribution method and configuration for the ingested content.More than one distribution may be configured for the ingested content, e.g. to offer different distribution configurations such as DASH and HLS. |
|  contentPreparationTemplateId | ResourceId | 0..1 | Indicates that content preparation prior to distribution is requested by the 5GMSd Application Provider. It identifies the Content Preparation Template that shall be used as defined in clause 7.4 |
|  supplementary‌Distribution‌Networks | Array(Map(Distribution‌NetworkType -> DistributionMode) | 0..1 | Specifies that the content for this distribution configuration is to be distributed via one of more supplementary networks. Each member of the array maps a type of distribution network to a mode of distribution. |
|  canonicalDomainName | String | 1..1 | All resources of the current distribution shall be accessible through this default FQDN assigned by the 5GMSd AF. |
|  domainNameAlias | String | 1..1 | The 5GMSd Application Provider may assign another FQDN through which media resources are additionally accessible at M4d.This domain name is used by the 5GMSd AS to select an appropriate Server Certificate to present at M4d, and to set appropriate CORS HTTP response headers at M4d.If this property is present, the 5GMSd Application Provider is responsible for providing in the DNS a CNAME record that resolves domainNameAlias to canonicalDomainName. |
|  PathRewriteRules | Array(Object) | 0..1 | An ordered list of rules for rewriting the request URL paths of media resource requests handled by the 5GMSd AS.If multiple rules match a particular resource's path, only the first matching rule, in order of appearance in this array, shall be applied. |
|  requestPathPattern | String | 1..1 | A regular expression [5] against which the path part of each 5GMSd AS request URL, including the leading "/", and up to and including the final "/", shall be compared. (Any leaf path element following the final "/" shall be excluded from this comparison.)In the case of Pull-based ingest, the M4d download request path is used in the comparison.In the case of Push-based ingest, the M2d upload request path is used in the comparison.In either case, if the request path matches this pattern, the path mapping specified in the corresponding mappedPath shall be applied. |
|  mappedPath | String | 1..1 | A replacement for the portion of the 5GMSd AS request path that matches requestPathPattern.In the case of Pull-based ingest, IngestConfiguration.entryPoint is concatenated with the mapped path and any leaf path element from the original M4d download request to form the M2d origin request URL.In the case of Push-based ingest, canonicalDomainName (and, optionally, domainNameAlias) are concatenated with the mapped path and any leaf path element from the original M2d upload request to form the distribution URL(s) exposed over M4d. |
|  CachingConfigurations | Array(Object) | 0..1 | Defines a configuration of the 5GMSd AS cache for a matching subset of media resources ingested in relation to this Content Hosting Configuration. |
|  urlPatternFilter | String | 1..1 | A pattern that will be used to match media resource URLs to determine whether a given media resource is eligible for caching by the 5GMSd AS. The format of the pattern shall be a regular expression as specified in [5]. |
|  CachingDirectives | Object | 1..1 | If a urlPatternFilter applies to a resource, then the provided CachingDirectives shall be applied by the 5GMSd AS at M4d, potentially overwriting any origin caching directives ingested at M2d. |
|  statusCodeFilters | Array(Integer) | 0..1 | The set of HTTP origin response status codes to which these CachingDirectives apply. The filter shall be provided as a regular expression as specified in [5].If the list is empty, the CachingDirectives shall apply to all HTTP origin response status codes at M2d. |
|  noCache | Boolean | 1..1 | If set to True, this indicates that the media resources matching the filters shall not be cached by the 5GMSd AS and shall be marked as not to be cached when served by the 5GMSd AS at M4d. |
|  maxAge | Integer | 0..1 | The caching time-to-live period that shall be set on ingested media resources matching the filters. This determines the minimum period for which the 5GMSd AS shall cache matching media resources as well as the time-to-live period signalled by the 5GMSd AS at interface M4d when it serves such media resources.The time-to-live for a given media resource shall be calculated relative to the time it was ingested. |
|  GeoFencing | Object | 0..N | Limit access to the content to the indicated geographic areas. |
|  locatorType | Uri | 1..1 | The type of the locators shall be indicated using a fully-qualified term identifier URI from the controlled vocabulary urn:3gpp:5gms:‌locator‑type, as specified in clause 7.6.4.6, or else from a vendor-specific vocabulary. |
|  locators | Array(String) | 1..1 | Array of locators from which access to the resources is to be allowed. The format of the locator strings shall be determined by the value of locatorType, as specified in clause 7.6.4.6. |
|  UrlSignature | Object | 0..1 | Defines the URL signing scheme. Only correctly signed and valid URLs will be allowed to access the content resource at M4d. |
|  urlPattern | String | 1..1 | A pattern that shall be used to match M4d media resource URLs. The 5GMSd AS shall not serve a matching media resource at M4d unless it includes a valid authentication token. The format of the pattern shall be a regular expression as specified in [5]. |
|  tokenName | String | 1..1 | The name of the M4d request query parameter that the Media Player should use to present the authentication token when required to do so. |
|  passphraseName | String | 1..1 | The name of the query parameter that is used to refer to the passphrase when constructing the authentication token.Note that the token is not included in the cleartext part of the M4d URL query component. |
|  passphrase | String | 1..1 | The shared secret between the 5GMSd Application Provider and the 5GMSd AS for this DistributionConfiguration.The passphrase is used in the computation and verification of the M4d authentication token but is never sent in-the-clear over that interface. |
|  tokenExpiryName | String | 1..1 | The name of the M4d request query parameter that the Media Player should use to present the token expiry field. |
|  useIPAddress | Boolean | 1..1 | If set to True, the IP address of the UE is included in the computation of the authentication token for resources that match urlPattern and access to matching media resources shall be allowed by the 5GMSd AF only when the M4d request is made from a UE with this IP address. |
|  ipAddressName | String | 0..1 | The name of the M4d request query parameter that is encoded as part of the authentication token if the useIPAddress flag is set to True.Note that the IP address is not passed in the cleartext part of the M4d URL query component. |
|  certificateId | ResourceId | 0..1 | When content is distributed using TLS [16], the X.509 [8] certificate for the origin domain is shared with the 5GMSd AF so that it can be presented by the 5GMSd AS in the TLS handshake at M4d. This attribute indicates the identifier of the certificate to use. |

#### 7.6.3.2 DistributionNetworkType enumeration

The data model for the DistributionNetworkType enumeration is specified in Table 7.6.3.2-1 below:

Table 7.6.3.2‑1: Definition of DistributionNetworkType enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| DISTRIBUTION\_NETWORK\_EMBMS | Downlink media streaming via eMBMS. |

#### 7.6.3.3 DistributionMode enumeration

The data model for the DistributionMode enumeration is specified in Table 7.6.3.2-1 below:

Table 7.6.3.2‑1: Definition of DistributionMode enumeration

|  |  |
| --- | --- |
| Enumeration value | Description |
| MODE\_EXCLUSIVE | Downlink media streaming content ingested by the 5GMSd AS is distributed exclusively via a supplementary network and is not available at reference point M4d. |
| MODE\_HYBRID | Downlink media streaming content ingested by the 5GMSd AS is available at reference point M4d and is additionally distributed via a supplementary network. |
| MODE\_DYNAMIC | Downlink media streaming content ingested by the 5GMSd AS is available at reference point M4d and is additionally distributed via a supplementary network only when reported client demand exceeds a configured threshold. |

**===== CHANGE =====**

### 7.7.3 Data model

#### 7.7.3.1 ConsumptionReportingConfiguration resource

The data model for the ConsumptionReportingConfiguration resource is specified in table 7.7.3.1‑1.

Table 7.7.3.1-1: ConsumptionReportingConfiguration resource

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Type | Cardinality | Description |
| reportingInterval | DurationSec | 0..1 | The interval between two consecutive consumption reports. The value shall be greater than zero.If absent, a single final report shall be sent immediately after the media streaming session has ended. |
| samplePercentage | Percentage | 0..1 | The proportion of media streaming clients that shall report media consumption, expressed as a floating point value between 0.0 and 100.0.If not specified, all clients shall send consumption reports. |
| locationReporting | boolean | 0..1 | 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).If omitted, location reporting is disabled. |
| accessReporting | boolean | 0..1 | Stipulates whether the Media Session Handler is required to provide consumption reporting messages to the 5GMSd AF when the access network changes during a media streaming session.If omitted, access reporting is disabled. |

**===== CHANGE =====**

## 10.1 General

This clause deals with the interface and APIs for media streaming for different distribution formats and protocols.

TS 26.511 [35] defines the integration of several media codecs into 5G Media Streaming, and provides requirements and recommendations for the support of these media profiles in specific 5G Media Streaming profiles. However, 5GMS is not restricted to the media profiles defined in [35]: any CMAF media profile may be used and distributed within 5G Media Streaming as long as it can be used with APIs and interfaces defined in this specification.

**===== CHANGE =====**

#### 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. |
| eMBMS‌Service‌Announcement‌Locator | Url | 0..1 | RO | A pointer to a document that defines a User Service Announcement for eMBMS where the service announcement file is available. | downlink |
| 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). |
| accessReporting | Boolean | 1..1 | RO | Stipulates whether the Media Session Handler is required to provide consumption reporting messages to the 5GMSd AF when the access network changes during a media streaming session. |
| 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.) |
| scheme | Uri | 1..1 | RO | The metrics reporting scheme that metrics reports shall use (see clause 4.7.5). |
| 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. |
| 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. |

**===== CHANGE =====**

#### 11.3.3.2 ConsumptionReportingUnit type

This type represents a single consumption reporting unit.

Table 11.3.3.2-1: Definition of type ConsumptionReportingUnit

|  |  |  |  |
| --- | --- | --- | --- |
| Property name | Data type | Cardinality | Description |
| mediaConsumed | string | 1..1 | Identifies the media consumed.In the case of DASH, the value of the **Representation**@id attribute shall be quoted. |
| mediaEndpointAddress | EndpointAddress | 0..1 | The IP address and port number of the endpoint used to access the media consumed.Present only if access reporting is enabled in the Consumption Reporting Configuration. |
| startTime | DateTime | 1..1 | The time when this consumption reporting unit started. |
| duration | DurationSec | 1..1 | The duration of this consumption reporting unit. |
| locations | Array(TypedLocation) | 0..1 | A time-ordered list of UE location(s) where the media was consumed during the period of this consumption reporting unit.Present only if location reporting is enabled in the Consumption Reporting Configuration (only for trusted AF).The cardinality of objects in this array is 1..N. |

**===== CHANGE =====**

## C.3.5 M1\_ContentHostingProvisioning API

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| openapi: 3.0.0info:  title: M1\_ContentHostingProvisioning  version: 1.1.0  description: |    5GMS AF M1 Content Hosting Provisioning API    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: M1\_ContentHostingProvisioning    description: '5G Media Streaming: Provisioning (M1) APIs: Content Hosting 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 6.1.paths:  /provisioning-sessions/{provisioningSessionId}/content-hosting-configuration:    parameters:      - name: provisioningSessionId        in: path        required: true        schema:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        description: 'The resource identifier of an existing Provisioning Session.'    post:      operationId: createContentHostingConfiguration      summary: 'Create (and optionally upload) the Content Hosting Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Content Hosting Configuration'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/ContentHostingConfiguration'      responses:        '201':          description: 'Content Hosting Configuration Created'          headers:            Location:              description: 'URL of the newly created Content Hosting Configuration (same as request URL).'              required: true              schema:                $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url'    get:      operationId: retrieveContentHostingConfiguration      summary: 'Retrieve the Content Hosting Configuration of the specified Provisioning Session'      responses:        '200':          description: 'Success'          content:            application/json:              schema:                $ref: '#/components/schemas/ContentHostingConfiguration'        '404':          description: 'Not Found'    put:      operationId: updateContentHostingConfiguration      summary: 'Update the Content Hosting Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Content Hosting Configuration'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/ContentHostingConfiguration'      responses:        '204':          description: 'Updated Content Hosting Configuration'        '404':          description: 'Not Found'    patch:      operationId: patchContentHostingConfiguration      summary: 'Patch the Content Hosting Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Content Hosting Configuration'        required: true        content:          application/merge-patch+json:            schema:              $ref: '#/components/schemas/ContentHostingConfiguration'          application/json-patch+json:            schema:              $ref: '#/components/schemas/ContentHostingConfiguration'      responses:        '200':          description: 'Patched Content Hosting Configuration'          content:            application/json:              schema:                $ref: '#/components/schemas/ContentHostingConfiguration'        '404':          description: 'Not Found'    delete:      operationId: destroyContentHostingConfiguration      summary: 'Destroy the current Content Hosting Configuration of the specified Provisioning Session'      responses:        '204':          description: 'Destroyed Content Hosting Configuration'        '404':          description: 'Not Found'            /provisioning-sessions/{provisioningSessionId}/content-hosting-configuration/purge:    parameters:        - name: provisioningSessionId          in: path          required: true          schema:            $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'          description: A unique identifier of the Provisioning    post:      operationId: purgeContentHostingCache      summary: 'Purge the content of the cache for the Content Hosting Configuration of the specified Provisioning Session'      requestBody:        description: 'The regular expression pattern for resources to purge from the cache'        required: true        content:          application/x-www-form-urlencoded:            schema:              properties:                pattern:                   description: 'Keyword'                  type: string                value:                  description: 'The regular expression'                  type: string      responses:        '200':          description: 'Content Purged'components:  schemas:    IngestConfiguration:      type: object      properties:        path:          type: string        pull:          type: boolean        protocol:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'        entryPoint:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url'    PathRewriteRule:      type: object      required:        - requestPattern        - mappedPath      properties:        requestPattern:          type: string        mappedPath:          type: string    CachingConfiguration:      type: object      properties:        urlPatternFilter:          type: string        CachingDirectives:          type: object          required:            - urlPatternFilter            - noCache          properties:            statusCodeFilters:              type: array              items:                type: integer            noCache:              type: boolean            maxAge:              type: integer              format: int32    DistributionConfiguration:      type: object      required:        - canonicalDomainName        - domainNameAlias      properties:        contentPreparationTemplateId:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        supplementaryDistributionNetworks:          type: object          properties:            default:              $ref: '#/components/schemas/DistributionNetworkType'          required:            - default          additionalProperties:            $ref: '#/components/schemas/DistributionMode'        canonicalDomainName:          type: string        domainNameAlias:          type: string        pathRewriteRules:          type: array          items:            $ref: '#/components/schemas/PathRewriteRule'        cachingConfigurations:          type: array          items:            $ref: '#/components/schemas/CachingConfiguration'        GeoFencing:          type: object          required:            - locatorType            - locators          properties:            locatorType:              $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'            locators:              type: array              items:                 type: string                description: 'Format of individual locators depends on the locatorType.'              minItems: 1        UrlSignature:          type: object          required:            - urlPattern            - tokenName            - passphraseName            - passphrase            - tokenExpiryName            - useIPAddress          properties:            urlPattern:              type: string            tokenName:              type: string            passphraseName:              type: string            passphrase:              type: string            tokenExpiryName:              type: string            useIPAddress:              type: boolean            ipAddressName:              type: string        certificateId:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'    # Schema for the resource itself    ContentHostingConfiguration:      type: object      required:        - name        - ingestConfiguration        - distributionConfigurations      properties:        name:          type: string        ingestConfiguration:          $ref: '#/components/schemas/IngestConfiguration'        distributionConfigurations:          type: array          items:            $ref: '#/components/schemas/DistributionConfiguration'    DistributionNetworkType:      anyOf:        - type: string          enum: [NETWORK\_EMBMS]        - 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.    DistributionMode:      anyOf:        - type: string          enum: [MODE\_EXCLUSIVE, MODE\_HYBBRID, MODE\_DYNAMIC]        - 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. |

**===== CHANGE =====**

## C.3.6 M1\_ConsumptionReportingProvisioning API

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| openapi: 3.0.0info:  title: M1\_ConsumptionReportingProvisioning  version: 1.1.0  description: |    5GMS AF M1 Consumption Reporting Provisioning API    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: M1\_ConsumptionReportingProvisioning    description: '5G Media Streaming: Provisioning (M1) APIs: Consumption Reporting 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 6.1.paths:  /provisioning-sessions/{provisioningSessionId}/consumption-reporting-configuration:    parameters:      - name: provisioningSessionId        in: path        required: true        schema:           $ref: 'TS26512\_CommonData.yaml#/components/schemas/ResourceId'        description: 'The resource identifier of an existing Provisioning Session.'    post:      operationId: activateConsumptionReporting      summary: 'Activate the consumption reporting procedure for the specified Provisioning Session by providing the Consumption Reporting Configuration'      requestBody:        description: 'A JSON representation of a Consumption Reporting Configuration'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/ConsumptionReportingConfiguration'      responses:        '201':          description: 'Consumption Reporting Configuration Created'          headers:            Location:              description: 'URL of the newly created Consumption Reporting Configuration (same as request URL).'              required: true              schema:                $ref: 'TS26512\_CommonData.yaml#/components/schemas/Url'    get:      operationId: retrieveConsumptionReportingConfiguration      summary: 'Retrieve the Consumption Reporting Configuration of the specified Provisioning Session'      responses:        '200':          description: 'Success'          content:            application/json:              schema:                $ref: '#/components/schemas/ConsumptionReportingConfiguration'    put:      operationId: updateConsumptionReportingConfiguration      summary: 'Update the Consumption Reporting Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Consumption Reporting Configuration'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/ConsumptionReportingConfiguration'      responses:        '204':          description: 'Updated Consumption Reporting Configuration'        '404':          description: 'Not Found'    patch:      operationId: patchConsumptionReportingConfiguration      summary: 'Patch the Consumption Reporting Configuration for the specified Provisioning Session'      requestBody:        description: 'A JSON representation of a Consumption Reporting Configuration'        required: true        content:          application/merge-patch+json:            schema:              $ref: '#/components/schemas/ConsumptionReportingConfiguration'          application/json-patch+json:            schema:              $ref: '#/components/schemas/ConsumptionReportingConfiguration'      responses:        '200':          description: 'Patched Consumption Reporting Configuration'          content:            application/json:              schema:                $ref: '#/components/schemas/ConsumptionReportingConfiguration'        '404':          description: 'Not Found'    delete:      operationId: destroyConsumptionReportingConfiguration      summary: 'Destroy the current Consumption Reporting Configuration of the specified Provisioning Session'      responses:        '204':          description: 'Destroyed Consumption Reporting Configuration'        '404':          description: 'Not Found'    components:  schemas:    ConsumptionReportingConfiguration:      type: object      properties:        reportingInterval:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'        samplePercentage:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/Percentage'        locationReporting:          type: boolean        accessReporting:          type: boolean |

**===== 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    © 2022, 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 V17.1.0; 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'            eMBMSServiceAnnouncementLocator:              $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            accessReporting:              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            - scheme            - samplePercentage            - urlFilters            - metrics            properties:              serverAddresses:                $ref: '#/components/schemas/ServerAddresses'              scheme:                $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'              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' |

**===== CHANGE =====**

## C.4.2 M5\_ConsumptionReporting API

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| openapi: 3.0.0info:  title: M5\_ConsumptionReporting  version: 2.0.0  description: |    5GMS AF M5 Consumption Reporting API    © 2022, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).    All rights reserved.tags:  - name: M5\_ConsumptionReporting    description: '5G Media Streaming: Media Session Handling (M5) APIs: Consumption Reporting'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-m5/v2'    variables:      apiRoot:        default: https://example.com        description: See 3GPP TS 29.512 clause 6.1.paths:  /consumption-reporting/{aspId}:    parameters:      - name: aspId        in: path        required: true        schema:          $ref: 'TS29514\_Npcf\_PolicyAuthorization.yaml#/components/schemas/AspId'        description: 'See 3GPP TS 26.512 clause 11.3.2.'    post:      operationId: submitConsumptionReport      summary: 'Submit a Consumption Report'      requestBody:        description: 'A Consumption Report'        required: true        content:          application/json:            schema:              $ref: '#/components/schemas/ConsumptionReport'      responses:        '204':          description: 'Consumption Report Accepted'        '400':          description: 'Bad Request'        '415':          description: 'Unsupported Media Type'components:  schemas:    ConsumptionReport:      type: object      required:        - mediaPlayerEntry        - reportingClientId        - consumptionReportingUnits      properties:        mediaPlayerEntry:          type: string        reportingClientId:          type: string        consumptionReportingUnits:          type: array          items:             $ref: '#/components/schemas/ConsumptionReportingUnit'    ConsumptionReportingUnit:      type: object      required:        - mediaConsumed        - startTime        - duration      properties:        mediaConsumed:          type: string        mediaEndpointAddress:          $ref: 'TS26512\_CommonData.yaml#/components/schemas/EndpointAddress'        startTime:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'        duration:          $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'        locations:          type: array          items:            $ref: 'TS26512\_CommonData.yaml#/components/schemas/TypedLocation'          minItems: 1 |