**3GPP TSG SA WG4#119e S4-220589**

**E-meeting, 11th – 20th May 2022 revision of S4-220545**

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| *CR-Form-v12.0* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26**.**348** | **CR** | draft | **rev** | **2** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *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] xMB 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 can be 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:*** | | To be added | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | It seems that no stage-3 updates in CT3 are needed on this for now which is good. | | | | | | | | |
|  | |  | | | | | | | | |
| ***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 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[3] 3GPP TS 26.234: "Transparent end-to-end Packet-switched Streaming Service (PSS); Protocols and codecs".

[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] 3GPP TS 33.310: "Network Domain Security (NDS); Authentication Framework (AF)".

[6] IETF RFC 6347: "Datagram Transport Layer Security Version 1.2", E. Rescorla, N. Modadugu.

[7] IETF RFC 4918: "HTTP Extensions for Web Distributed Authoring and Versioning (WebDAV)", L. Dusseault.

[8] IETF RFC 5795: "The Robust Header Compression (ROHC) Framework".

[9] IETF RFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed".

[10] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs".

[11] IETF Internet-Draft: "JSON Schema: A Media Type for Describing JSON Documents", draft-wright-json-schema-01, April 15, 2017.

[12] 3GPP TS 23.280, "Common functional architecture to support mission critical services; Stage 2".

[13] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[14] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE\_LTE); MB2 reference point; Stage 3".

[15] IETF RFC 5234 (January 2008): "Augmented BNF for Syntax Specifications: ABNF", D. Crocker and P. Overell.

[16] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[17] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

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## 3.2 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

ARP Allocation and Retention Priority

BM-SC Broadcast-Multicast - Service Centre

DASH Dynamic Adaptive Streaming over HTTP

DTLS Datagram Transport Layer Security

FEC Forward Error Correction

GBR Guaranteed Bitrate

HLS HTTP Live Streaming

MPD Media Presentation Description

QCI QOS Class Identifier

QOS Quality of Service

QOE Quality of Experience

ROM Receive Only Mode

RTSP Real-Time Streaming Protocol

RTP Real Time Transport Protocol

RTCP Real Time Transport Control Protocol

SACH Service Announcement Channel

SAI Service Area Identity

SCEF Service Capability Exposure Function

SDP Session Description protocol

TLS Transport Layer Security

TV Television

UE User Equipment

UDP User Datagram Protocol

URL Uniform Resource Locator

UTC Universal Time Coordinated

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## 4.1 General

As shown in Figure 4.1-1, the reference point between Content Provider and BM-SC is called the xMB interface. Using the xMB reference point, content provider can invoke procedures supported by BM-SC(s) to setup and manage MBMS user service from BM-SC to the MBMS clients. BM-SC defines an endpoint with all supported procedures on the xMB interface, which can then be converted to SGmb procedures for the interface between BM-SC and MBMS GW (not depicted).



Figure 4.1-1: The xMB reference model

The BM-SC may forward the received content for unicast delivery for appropriate functions (e.g., MBMS user service fallback).

The control plane (xMB-C) and the user plane (xMB-U) may be optionally terminated by 3GPP defined enabler / exposure functions such as an SCEF, which exposes the same or a different interface to content providers. The exposed API such as by SCEF is not specified in the present document.

The content provider may optionally exchange application level information like service metadata (e.g. serviceIds or URL(s) of USD(s) or other service identifier(s)) directly with the application.

The BM-SC may support CAPIF [10]. When CAPIF is supported, then:

- the BM-SC shall support the CAPIF API provider domain functions (i.e. CAPIF-2/2e (xMB), CAPIF-3, CAPIF-4 and CAPIF-5 as specified in TS 23.222 [10]);

- the BM-SC xMB authentication and authorization functions (as defined in Clause 5.2) are replaced by CAPIF equivalent core domain functions (i.e. CAPIF-1/1e).

The CAPIF and associated API provider domain functions are specified in TS 23.222 [10].

The content provider may be a mission critical service provider ([12]), which is arranging MC Services to Mission Critical Organizations. Providing MC Services may require additional control of the resource allocation (QoS, coverage area). For this purpose, the interface can be extended with the xMB mission critical extension. The xMB mission critical extension consists in:

- additional properties within the control plane procedures (Table 5.4-6),

- specific semantic and syntax for the geographical area (Clause 5.4.7).

A shown in figure 4.1‑2 below, the content provider may be a 5GMS Application Provider as defined in clause 4.6 of TS 26.501 [17], providing 5G Media Streaming services to a 5GMS System as shown in Figure 4.1.2. In this case, *Content Receiver <APP>* includes a 5GMS Client that can be served at least partially by the MBMS Client. The 5GMS Application Function (5GMS AF) invokes xMB-C control plane procedures on the BM-SC as specified in clauses 5.3 and 5.4 and, as a result, content is ingested by the BM-SC from the 5GMS Application Server (5GMS AS) using the xMB-U File Distribution procedures specified in clause 5.5.2 to support delivery of xMB-C Session types *Application* or *Files*. Procedures for 5GMS content delivery via eMBMS, including the communication of the 5GMS AF and 5GMS AS with the BM-SC are defined in clause 5.10 of TS 26.501 [17].



Figure 4.1-2: 5GMS over eMBMS

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## 5.1 General

The xMB reference point defines procedures between a BM-SC and a content provider. The content provider may be external (i.e. 3rd party provider) or 3GPP defined API invokers.

The following procedures are available:

- Authentication and Authorization

NOTE: When CAPIF is used, the CAPIF 1 / CAPIF 1e procedures are used.

- Service Management Procedures

- Session Management Procedures

By default the BM-SC announces all the services including the different eMBMS parameters to MBMS Clients so that MBMS Clients can activate reception of the announced MBMS services. It is also possible that the Content Provider/API invoker is doing the service announcement by itself.

A set of different session types are supported, namely:

- Streaming: the BM-SC may use the MBMS Streaming delivery method for content distribution to MBMS Clients

- Files: the BM-SC may use the MBMS Download delivery method for content distribution to MBMS Clients

- Application: the BM-SC may use the MBMS Download delivery method for content distribution to MBMS Clients.

NOTE: This session type includes DASH and HLS streaming as well as 5GMS over MBMS.

- Transport-Mode: the BM-SC is transparent to the stream and passed data via MBMS bearers to UEs.

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### 5.2.3 Authorization Procedure

Before using any of the MBMS xMB procedures, the Content Provider shall first use the following authorization procedure to retrieve its authorization. After successful authorization based on the content provider's representative's credentials, operations such as service and session creation within the granted permissions become possible.

In this version of the specification, the BM-SC shall support at least one of the two following modes of authorization: *domain-based* or *user-based*.

Upon a successful authentication procedure, the absence of an access token provided to the content provider in response to an authorization request is an indication that the BM-SC only supports domain-based authorization, based on the previously-established (D)TLS connection between the Content Provider server and the BM-SC. This means that the same access rights to service or session resource requests across the xMB interface will be granted at the level of the business entity represented by the sender, independent of the end-user representative of that entity or administrative domain submitting the request. This requires the network operator to have already created and provided a unique certificate for storage by the BM-SC. If the certificate of the content provider is not contained in the BM-SC, then the authorization procedure shall fail.

Presence of an access token in the authorization response is an indication that the BM-SC supports user-based authorization, i.e., fine-grained authorization at the end-user representative level, of xMB resource requests. In this case, the content provider representative shall include this access token in each subsequent resource request made on xMB.

NOTE 1: It is up to the BM-SC to decide whether it supports domain-based or user-based authorization.

NOTE 2: In Figure 5-3 and subsequent clauses on Service Management and Session Management procedures and the associated message sequence diagrams, it is assumed that user-based authorization is supported by the BM-SC.

Figure 5.2-2 shows the procedure for content provider authorization by the BM-SC.



Figure 5.2-2: Authorization Procedure

1) If the content provider's representative is not in possession of a valid access token, it shall connect to the BM-SC using the authenticated TLS connection and perform the authorization procedure to retrieve the access token.

2) The BM-SC checks the credentials of the content provider and upon successful verification it will generate an access token that will be returned to the content provider. The link between the access token and the entitlement is outside of the scope of the specification.

3) The content provider may then use the access token on subsequent calls to the xMB interface.

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### 5.4.6 Session Properties

All Session properties, except for the resource id, are carried in the HTTPS message body. The access-token is always carried as part of HTTP Headers. Except for the session creation request (where the resource id is not present), the resource id shall be present in the URL of all requests that relate to a specific session.

In the table below, the following assertions are made:

- Table header: C stands for Create Session, G is for Get Session, U is for Update Session and T is for Terminate Session. "I", and "O" respectively denote "request" (going **I**nto the BM-SC), and response (going Out of the BM-SC).

- Optional ("O") means that the property may or may not be sent/received during a REST transaction. It does not necessarily mean that the property is optional. It is possible, for example, that a session is not yet started because the Content Provider has not set it in any Update transaction using the PUT or PATCH HTTP method as opposed to representing a hint on the importance of the property for the BM-SC.

- A property marked as optional (O) in a request message may be present in the request. When not present in the request body, the property, if present in the BM-SC, will not be updated.

- A property marked as optional (O) in a response message is only present in the response when a value is assigned in the BM-SC.

- A property marked as mandatory (M) in a response message is always present in the response. The BM-SC provides default values for the session, which may be modified subsequently by the content provider.

- A blank cell in the cell shall means "forbidden" (the property cannot be added to the request or returned by the BM-SC, depending on the transaction direction).

Table 5.4-1: List of Session Properties

| Property Name | | Property Description | | C I | | C O | | G I | | G O | | U I | | U O | | T I | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| id | | Resource Id of the Session.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | None | N/A | | |  | | M | |  | |  | |  | |  | |  | |
| Session start | | Start time when the MBMS Bearer become active.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | UTC Date timestamp (with second precision) | Session creation date + 1h | | |  | |  | |  | | M | | O | |  | |  | |
| Session stop | | End time at which the MBMS bearer becomes inactive.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | UTC Date timestamp (with second precision) | Session start + 1h | | |  | |  | |  | | M | | O | |  | |  | |
| Max Bitrate | | The requested bitrate excludes FEC overhead and transport overhead. The BM-SC calculates the MBMS Bearer bitrate from it, considering overhead like FEC and other transport overheads. The session bitrate is always larger or equal to the payload bitrate.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | kbps | 0 | | |  | |  | |  | | M | | O | |  | |  | |
| Max Delay | | Specifies the maximum delay the MBMS System should add, i.e. from the time a packet is received by the BM-SC to the time by when the packet is received by the MBMS client.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | ms | -1 |   Note, that the value -1 indicates that the content provider has no specific delay requirement. | |  | |  | |  | | O | | O | |  | |  | |
| Session State | | The BM-SC may automatically change the state of the session.  Possible states: Session Idle, Session Announced, Session Active   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | Idle | | |  | |  | |  | | M | |  | |  | |  | |
| Service Announcement start time | | When present, this time at which the BM-SC shall start service announcement. If absent, the BM-SC may automatically start service announcement when it has all data needed to perform such service announcement.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | UTC Date timestamp (with second precision) | None | | |  | |  | |  | | O | | O | |  | |  | |
| Geographical Area | | Geographical Area, at which the service is to be provided, either through unicast or through MBMS Bearers. The BM-SC derives the MBMS Service Area and the SAI list for the availability information from Geographical Area as provided by the content provider.  The Geographical Area contains the following information:   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | List of String | None | Empty list |   The content of each string item is left to the business agreement between the Content Provider and the Operator. | |  | |  | |  | | M | | O | |  | |  | |
| QoE Reporting | | List of QoE metrics that the content provider recommends the BM-SC to collect. The QoE metrics shall be derived from the QoE metrics in Clause 8.4 of TS 26.346 [2] and in Clause 10.2 of 26.247 [4] and depend on the delivery method that is used for the session. | |  | |  | |  | | O | | O | |  | |  | |
| QoE Report URL | | Resource location at which the BM-SC will provide the QoE reports.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | Operator selected default | | |  | |  | |  | | O | |  | |  | |  | |
| Session Type | | The Session Type represents the method used by the content provider in providing content to the BM-SC (via xMB-U). The BM-SC shall select the appropriate delivery method based on the Session Type value.  Valid values: Streaming, Files, Application, Transport-Mode  When Session Type is set to Streaming, the BM-SC expects a Streaming type input (RTP) whose format is compliant to MBMS streaming (as defined in TS 26.346).  When Session Type is set to Files, the BM-SC expects generic files as input. The files can be provided either by on-request pull interactions or continuous push ingest.  When Session Type is set to Application, then the ingest method depends on the application service description.  When the Application Service Description pertains to DASH, the BM-SC expects an MPD and optionally one or more Initialization Segments. The content is assumed to be 3GP-DASH compliant (as defined by 26.247 [4]). The BM-SC may either pull the media segments from the content provider or the content provider continuously pushes segments into the BM-SC.  When Session Type is set to Transport-Mode, the BM-SC shall provide transport of data/TV content according to the Transparent delivery method as described in clause 8B of TS 26.346[2]. The content provider may provide some of the session properties for the broadcast distribution.  The Session Type shall be extensible for further session types.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | Files | | |  | |  | |  | | M | | O | |  | |  | |
| Header Compression | | Requests the BM-SC to enable ROHC [8] and [9] on the input flow to save overhead space.  When this property is present, then header compression shall be processed on each described input flow. Each flow to be processed shall contain following parameters:  - Flow Description: Typically the IP/port of the input flow.  - Periodicity: number denoting the target periodicity for ROHC full header packets in units of seconds.  - Profile: Applicable ROHC profile (see IETF RFC 5795 [8].When the Content Provider does not explicitly set this property, the BM-SC decides on the usage. | |  | |  | |  | | O | | O | |  | |  | |
| FEC | | When present, requests the BM-SC to perform FEC protection of the input flow(s) when transmitting over the MBMS channel using the provided SDP.  The SDP should include FEC scheme according to the used delivery method as defined in TS 26.346.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | SDP description of FEC framework configuration information |   When the Content Provider does not explicitly set the property, the BM-SC decides on the usage and amount of FEC redundancy. | |  | |  | |  | | O | | O | |  | |  | |
| Get Sharing ID | | When present and set to "true", request the BM-SC to provide a unique identifier so that the transmission resources can be shared with other sessions.  Note, that other sessions will use the same Max Bitrate, Geographical Area and (in case of MC Services) QoS‑Information.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Boolean | None | False | | |  | |  | |  | | O | | O | |  | |  | |
| Sharing ID | | When present, the value of the field identifies an already existing session to share the transmission, where Max Bitrate, Geographical Area and (in case of MC Services) QoS‑Information are re-used  Note, the Max Bitrate, Geographical Area and (in case of MC Services) QoS‑Information cannot be changed since the values from the original session will be used.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" | | |  | |  | |  | | O | | O | |  | |  | |

When the Session Type is set to "Transport-Mode", then the additional properties as defined in Table 5.4-2 apply. The properties in Table 5.4-2 are only present when the Session Type is set to "Transport-Mode".

Table 5.4-2: Additional properties for Transport-Mode

| Property Name | Property Description | C I | C O | G I | G O | U I | U O | T I |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Session Description Parameters for User Plane | This property provides information to the BM-SC on where and how to access the user plane content from the content provider, and comprises one or more of the following components:  - **Type**: the type of the content associated with the target resource, for example the Internet Media Type of the resource as identified by an HTTP/S URL. **Type** with the value "embedded" is defined in this version of the specification, as an indication that the xMB-U user plane parameters are embedded in the User Plane Parameters object described below.  - **Access URL**: A URL that enables BM-SC access to and possibly control of the ingest session. The URL could be, for example, a) an RTSP URL, b) a reference to an SDP that describes a multicast stream associated with the ingest session, or c) an HTTP/S URL to retrieve an already-packaged MPEG2-TS stream.  - **User Plane Parameters**: Object provided by the Content Provider to the BM-SC, which when set to "embedded", contains the session description information for the following purposes:  - If the *property* Delivery Mode Configuration for user plane is set to **Forward Only**, the **User Plane Parameters** object may contain a ready-made Session Description and the indication of a single xMB-U reception UDP port, in which case the BM-SC shall use it for Service Announcement over SACH.  - If such Session Description is not present in this object, the Content Provider is directly performing the Service Announcement, i.e., it corresponds to the case where *Service Announcement Mode* property, as defined in Table 5.3-1, is set to **Content Provider**.  - If this property *Delivery Mode Configuration for user plane* is set to **Proxy**, the object shall contain a Session Description template and a list of the transmitted UDP flows to be forwarded on the established MBMS bearer for the session. For each list entry, the content provider shall indicate whether a) this UDP flow is directly associated with a media description entry in the Session Description Template – i.e., an "m=" line is present in the template and which contains a port field, or b) this UDP flow is related to a media description entry – e.g., it corresponds to an RTCP flow affiliated with the RTP flow as described by the RTP/AVP profile). If the flow is directly associated with a media description entry, then the BM-SC shall modify the port field of the media description entry in the Session Description Template. If the flow is related to a media description entry, then the BM-SC shall simply forward the flow onto a port whose value is equal to the port of the related media session plus an offset.  Note the BM-SC may get input on session properties from the content provider, e.g. bitrate, depending on the ingest session. |  |  |  | O | O |  |  |
| Delivery Mode Configuration for user plane | This property defines how the session needs to be delivered to the application, i.e. it basically establishes the delivery mode.  - Mode Enumeration: Specifies the delivery mode.  - **Forward-only**: The BM-SC receives complete IP Multicast packets for to be forwarded. The content provider will create the IP multicast packets.  - **Proxy**: The BM-SC proxies the incoming UDP payloads to the outgoing UDP payloads. The BM-SC will create the IP multicast packets.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | – None – | Forward-only | |  |  |  | M | O |  |  |
| Delivery Session Description Parameters | The contents of this property depend on the setting of the *Service Announcement Mode* property as defined in Table 5.3-1. If *Service Announcement Mode* is set to **Content Provider**, then at minimum the following session parameters shall be provided by the BM-SC:  - TMGI of the MBMS Bearer  Note that additional parameters may be provided, based on the configuration options of the delivery method when *Session Type* is set to **Transport-Mode**. |  |  |  | O |  |  |  |

When the Session Type is set to "Streaming", then the additional properties as defined in Table 5.4-3 apply. The properties in Table 5.4-3 are only present when the Session Type is set to "Streaming".

Table 5.4-3: Additional properties for Streaming

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Property Name | Property Description | C I | C O | G I | G O | U I | U O | T I |
| SDP URL | A URL to the SDP that describes the streaming session between the content provider and the BM-SC which will be used for ingesting the streaming session via xMB-U. The SDP shall include the RTSP links for every media session as part of the "a=control" attribute to enable RTSP control of the session. The SDP shall also contain the required bitrate for each of the media sessions.  The content shall conform to the constraints of the present document.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | – None – | "" |   Note that the session will not be activated without a valid SDP URL. |  |  |  | M | O |  |  |
| TimeShifting | Indicates if and for how long time shifting access to the content (using unicast) may be provided for this session.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | second | 0 |   If not set (so defaulted to 0), there shall be no time shifting access. |  |  |  | O | O |  |  |

The BM-SC starts the streaming session when the session state becomes active. When the BM-SC adds FEC redundancy, then the BM-SC may start the ingest session sufficiently earlier.

When the Session Type is set to "Application", then the additional properties as defined in Table 5.4-4 apply. The properties in Table 5.4-4 are only present when the Session Type is set to "Application".

Table 5.4-4: Additional properties for Application, incl. DASH Service Descriptions

| Property Name | Property Description | CI | CO | GI | G O | U I | U O | T I |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Application Service Description | MIME type of the Application Service, for example application/dash+xml for DASH or application/vnd.apple.mpegurl for HLS.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | MIME type | application/dash+xml |   To refer to 5GMS DASH content, the MIME content type may include a profiles parameter as defined in DASH, including the profile for 5G Media Streaming as defined by clause 7.3.11 of TS 26.247 [4], as “"urn:3GPP:5GMS:iop:DASH". |  |  |  | M | O |  |  |
| Alternative ApplicationService Description | Alternative MIME type of the Application Service, for services which can be described by different MIME types, as DASH/HLS hybrid services.  This parameter is only used for DASH/HLS hybrid services.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | MIME type | "" | |  |  |  | O | O |  |  |
| Ingest Mode | The ingest mode enumerates how resources are ingested into the BM-SC via xMB-U.  **Pull**: The BM-SC pulls the resources as described by the application entry point document.  **Push**: The content provider pushes resources. The BM-SC needs to provide a push URL.  In case of DASH, resources are media segments:  **Pull**: The BM-SC pulls the media segments as described by the segment availability start time from a DASH MPD.  **Push**: The content provider pushes media segments, so that the media segment is available on the BM-SC according to segment availability start time. The BM-SC needs to provide a push URL.  In the case of HLS, resources are media playlists and media segments:  **Pull**: The BM-SC pulls the media playlists as described by the master playlist and pulls the media segments as described by the pulled media playlists.  **Push**: The content provider pushes media playlists and media segments. The BM-SC needs to provide a push URL.  In the case of a DASH/HLS hybrid service, resources are HLS media playlists and DASH/HLS media segments. Only the Push mode is authorized.  **Push**: The content provider pushes HLS media playlists and media segments. The BM-SC needs to provide a push URL.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | Push | |  |  |  | M | O |  |  |
| Application Entry Point URL | The application entry point refers to an MPD when Application Service Description pertains to DASH or to a master playlist when Application Service Description pertains to HLS.  When the Ingest Mode is set to **Push** for a DASH service,, then the MPD Url refers to a DASH MPD which should be fetched, optionally conditioned and inserted into Service Announcement.  When the Ingest Mode is set to **Push** for a HLS service, then the master playlist Url refers to a HLS master playlist which should be fetched, optionally conditioned and inserted into Service Announcement.  When the Ingest Mode is set to **Pull**, then the BM-SC starts fetching the segments using unicast.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" |   Note that if not set to a valid URL, the session will not be started. |  |  |  | M | O |  |  |
| Alternative Application Entry Point URL | The alternative application Entry Point provides the application entry point with repect to the MIME type given by the Alternative Service Description parameter.  This parameter is only used for DASH/HLS hybrid services.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" |   Note that if not set to a valid URL, the session will not be started.  The alternative application Entry Point should be added to the service Announcement. |  |  |  | O | O |  |  |
| Push URL | A resource locator for ingesting media segments using HTTPS via xMB-U. The content provider may create additional sub-resources using WebDAV procedures.  This is a read-only property managed by the BM-SC and only present when Ingest Mode is set to Push.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" |   This property is mandatory if the Session type is set to **Application** and Ingest Mode is set to **Push**. |  |  |  | O |  |  |  |
| Unicast Delivery | Indicator whether the content is also available for unicast retrieval.  If set true, the application client may access the content referenced in the application entry point from a unicast content server or a 5GMS AS.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Boolean | None | False | |  |  |  | M | O |  |  |
| Components | List of Components of the application, which are recommended to be made available on MBMS Bearers.  If the value of the Application Service Description parameter is set to "application/dash+xml", each component is identified by a representation identifier.  If the value of the Application Service Description parameter is set to "application/vnd.apple.mpegurl", each component is identified by the URL of the Media Playlist.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | List of String | None | Empty list | |  |  |  | O | O |  |  |

When the Session Type is set to "Files", then the additional properties as defined in Table 5.4-5 apply. The properties in Table 5.4-5 are only present when the Session Type is set to "Files".

Table 5.4-5: Additional properties for Files

| Property Name | Property Description | C I | C O | G I | G O | U I | U O | T I |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ingest Mode | The ingest mode enumerates how resources are ingested into the BM-SC via xMB-U.  **- Push**: The Content Provider shall push the file to the BM-SC that will immediately process and deliver as soon as it is ready. The BM-SC may be configured to ignore all files that are pushed before session active time, or stage them. In case of Push mode, the BM-SC shall provide back to the content provider the URL the Content Provider shall use to push the files.  **- Pull**: In this case, the Content Provider provides the resource location from which the BM-SC will fetch the file. The Content Provider may tell the BM-SC when to start fetching the file   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | Pull | |  |  |  | M | O |  |  |
| File List | List of files to be sent.  In the **Push** mode, the file list is not used since the BM-SC will monitor its push folder and send the files it receives on a first-come first-served basis.  In **Pull** mode, the file list contains the following information per file entry:  **- file URL**: the URL to the file the BM-SC will use to fetch the content  **- file display UR**L: the URL to the file as seen by the UE  **- file earliest fetch time**: The BM-SC shall fetch the file no sooner than this UTC timestamp. If absent, then the file shall be present on the Content Provider server and the BM-SC may fetch it at a time of its choosing.  **- file latest fetch time**: The BM-SC shall fetch the file no later than this UTC timestamp. If absent, then the file shall be present on the Content Provider server and the BM-SC may fetch it at a time of its choosing.  **- file size (optional):** Thecontent provider may provide the precise or a file size estimate as input. The BM-SC may update the file size once it has started to fetch the file.  **- file status:** Enumeration stating the state of the file. Possible values are pending, fetching, fetched, fetch failed, preparing, prepared, prepare failed, in transmission queue, transmitting, transmission failed, sent.  **- Target reception completion time (on the MBMS Client):** hinton the target time, when the file should be completely received by the UE. The BM-SC should schedule and order the transmission etc accordingly.  **- Keep Update Interval:** The BM-SC checks the file resources with the given interval for changes.  **- Unicast availability**: Indication that the file is also available for unicast retrieval by the application at a Content Provider server whose location is given by the HTTP(S) URL corresponding to the value of "file display URL".  **- byteRange (optional):** If present and set to “true”, indicates that the HTTP(S) URL given in the fileDisplayURL parameter can be used for Byte-Range-Based file repair (subclause 9.3) otherwise fileDisplayURL parameter should not be used for Byte-Range-Based file repair  **- ETag (optional):** represents the value of the ETag as defined in RFC 2616 [18] which may also serve as the version identifier for the file in the Byte-Range-Based file repair requests. The ETag should only be supplied by the 3rd party content provider if it is expected that it is different from the one provided over xMB-U when fetching the file.  **- File repetition (optional):** The number of times the file shall be sent on the session (a value of 1 means the file shall be sent only once). This counter shall be decreased each time the file has been transmitted. When equals to zero, no more file repeat is scheduled. The BM-SC may send FEC instead of source information. Default value is 1.  - Note that the expected behavior is that the BM-SC will first send all files in the order of the File List, then decrement the file repetition counter for each file, and subsequently retransmit the list again (only files with counter > 0 are transmitted). This is repeated until all repetitions are completed, or the session stop time has elapsed, whichever event occurring first. |  |  |  | O | O |  |  |
| Carousel Mode | Provides information on carousel activation and mode. Possible values are none, back-to-back, scheduled.  When carousel is enabled, file repetition is ignored.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | none | |  |  |  | O | O |  |  |
| Carousel Scheduled Interval | When carousel mode is set to Scheduled, time interval between two consecutive sessions.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Integer | Seconds | 3600 | |  |  |  | O | O |  |  |
| File delivery manifest URL | Alternative to the file list. The resource may additionally describe scheduling information for the file.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" | |  |  |  | O | O |  |  |
| Push URL | A resource locator for ingesting content using HTTPS via xMB-U.  This is a read-only property managed by the BM-SC and only present when Ingest Mode is set to Push.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" | |  |  |  | O |  |  |  |
| Display Base URL | When ingest mode is set to Push, the Base URL is seen by the UE.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | String | None | "" | |  |  |  | O | O |  |  |
| SA file URL | When the service announcement mode is set to "Content provider", the BM-SC returns the URL of the SA file announcing the session. The BM-SC shall follow the profile 1c (Annex L.3 of 3GPP 26.346 [2]) |  |  |  | O |  |  |  |

For the xMB mission critical extension, the additional properties as defined in Table 5.4-6 apply. The properties *TMGI* and *QoS‑Information* in Table 5.4-6 are only present when the *MC-Extension* property is set to true.

Table 5.4-6: Additional properties in the xMB mission critical extension

| Property Name | Property Description | C I | C O | G I | G O | U I | U O | T I |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MC-Extension | (Optional) Set to true to use the mission critical extension.   |  |  |  | | --- | --- | --- | | Type | Unit | Default | | Boolean | None | False | | O |  |  | O |  |  |  |
| TMGI | TMGI of the MBMS session, as returned by the MBMS Session start procedure (3GPP TS 29.061 [13]). |  |  |  | M |  |  |  |
| QoS‑Information | Provides the QoS parameters for the MBMS bearer. The list of QoS parameters matches the composition of the QoS Information AVP specified in 3GPP TS 29.468 [14]: GBR, ARP, QCI.  The difference between the **Max Bitrate** (Table 5.4-1)and GBR can be used by the BM-SC as a budget for FEC. |  |  |  | M | O |  |  |

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

# A.5 HLS Media Presentation Delivery