**3GPP TSG- Meeting #**

**, , - revision of S4-250019**

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

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| ***Title:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | **Selected MBMS Functionalities not supported in MBS:** In completing TS 26.502 and TS 26.517, it is obvious that only a subset of the MBMS functionalities is supported in Rel-17. While many MBMS functionalities are likely not important to be supported for MBS, a systematic analysis of MBMS User Services features and their potential relevance for MBS should be completed and recommendations made on which ones to migrate to MBS User Services specifications and how best to achieve this. For details refer to TR 26.802.In TR 26.802, *Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 and based on the conclusions in clause 5.11.4 are motivated.This CR addresses specifically the issue on Time Synchronization.LSs were also received for this meeting.

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| [S4-250279](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Docs/S4-250279.zip) | LS in | Reply LS on Time Synchronization for MBS | RAN2 | To: SA4, SA2 |
| [S4-250275](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Docs/S4-250275.zip) | LS in | Reply LS on Time Synchronization for MBS | SA2 | To: SA4, RAN2 |

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| ***Summary of change:*** | *Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 of TR 26.802:iv. Add the necessary functional extensions and call flows to support time Synchronization as defined in TS 26.346 in clause 4.6 based on the discussion in clause 5.11.3.6. |
|  |  |
| ***Consequences if not approved:*** | Features not supported |
|  |  |
| ***Clauses affected:*** | 2, 4.2.7 (new), 4.3.4, 4.3.5, 4.4.1, 4.5.7 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |

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| [**S4-250019**](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Docs/S4-250019.zip) | [AMD-ARCH-MED] Selected MBMS Functionalities not supported in MBS | Qualcomm Germany | Thomas Stockhammer |

**Revisions**:

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| icon | [S4-250019\_BBC.docx](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Inbox/Drafts/MBS/S4-250019_BBC.docx) | 2025/02/12 18:46 |
| icon | [S4-250019\_BBC\_Ericsson.docx](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Inbox/Drafts/MBS/S4-250019_BBC_Ericsson.docx) | 2025/02/19 11:02 |
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| icon | [S4-250019r01.docx](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Inbox/Drafts/MBS/S4-250019r01.docx) | 2025/02/20 5:34 |

**Presenter**: Thomas Stockhammer**Online Discussion**:* \_BBC version presented.
* Thorsten: In 4.2.7, maybe we could have this more generic.
	+ Thomas: This comes from SA2, these are their recommendations.
	+ Thorsten: We should check on eMBMS. In my understanding SIB9 uses the same time as SIB16.
	+ Frederic: OK, we need to check the SA2 LS. In this LS, NG-RAN Node, MBSF and MBSTF shall be synchronised and SIB9 is optional.
* Frederic: There is no shall requirement on maintaining +-1s.
	+ Thomas: How can you check it?
* rev01 presented.
	+ Thorsten: Are we taking some decisions implicitly in stage-2?
	+ Thomas: Probably not here.

**Decision**:[S4-250019](https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_131_Geneva/Docs/S4-250019.zip) is **revised to 326** |

## ===== 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 23.501: "System architecture for the 5G System (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".

[6] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

[7] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

[8] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".

[9] IETF RFC 2250: "RTP Payload Format for MPEG1/MPEG2 Video".

[10] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[11] 3GPP TS 26.531: "Data Collection and Reporting; General Description and Architecture".

[12] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE\_LTE)".

[13] Void.

[14] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE\_LTE)".

[15] 3GPP TS 29.522: "5G System; Network Exposure Function Northbound APIs; Stage 3".

[16] OMA: "OMNA BCAST Service Class Registry", <https://technical.openmobilealliance.org/OMNA/bcast/bcast-service-class-registry.html>.

[17] IANA: "Reliable Multicast Transport (RMT) FEC Encoding IDs and FEC Instance IDs", <https://www.iana.org/assignments/rmt-fec-parameters/rmt-fec-parameters.xhtml#rmt-fec-parameters-1>.

[18] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[19] 3GPP TS 33.246: "Security of Multimedia Broadcast/Multicast Service (MBMS)".

[26346] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[38331] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

## ===== CHANGE =====

### 4.2.7 Time synchronization

Aligned with the specification of time synchronization for MBMS specified in clause 4.6 of TS 26.346 [26346], the MBS Client is required to be time-synchronized with the 5G System (i.e. MBSF, MBSTF and/or the MBS AS) with a precision of at least ±1s to support certain MBS User Service functions.

Similar to MBMS, two options are provided in order to achieve this functionality:

1. **Usage of SIB9**: As specified in TS 38.331 [38331], NR SIB9 conveys information in its timeInfo parameter related to a Coordinated Universal Time (UTC) wallclock to an accuracy of 10 ms. The MBS Client may obtain time information from SIB9 to synchronize the system clock of the UE to UTC wallclock time. If SIB9 is carried in the radio frequency carrying the MBS Distribution Session, the relevant MBS functions shall be time-synchronized to the same UTC wallclock as the NR SIB9 information to a tolerance of ±100 ms or better.

2. **Time service**: The MBS AS hosts a time service. The MBS Client may obtain time information from this service to synchronize its clock. The MBS Client should use the time service no more often than needed to maintain time synchronization accurate to at least ±1 s with the 5G System. Specific features may require tighter synchronization and tighter tolerances. If more than one time service endpoint is provided to the MBS Client, the MBS Client may choose any of these.

At least one of the two above options shall be provided by the network.

If both options (i.e., SIB9 as well as the MBS AS time service in the MBS AS) are offered by the 5G System:

- The timing source in the MBS AS shall be time-synchronized to the same wallclock time as used for NR SIB9 information.

- The MBS Client should preferably use the information in NR SIB9.

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### 4.3.4 MBS AS

The MBS AS is an optional entity that performs the following optional functions to support MBS User Services:

- Providing a byte-range file repair service to the MBSTF Client (via reference point MBS‑4‑UC) for use with the Object Distribution Method.

- Providing a time service for MBS Clients.

The MBS AS is configured by the MBSF at reference point MBS‑9. The MBS AS may acquire content from the MBSTF. These interactions are not further defined by the present document.

The MBS AS may be deployed as a standalone entity, or its functions may be co-located with other Network Functions such as the MBSTF (see clause 4.3.3) or the 5GMS AS defined in TS 26.501 [7].

## ===== CHANGE =====

### 4.3.5 MBS Client

The MBS Client function is part of the UE. The functionality of the UE is defined in clause 5.3.2.8 of TS 23.247 [5].

The MBS Client is further divided into the following subfunctions:

- *MBSF Client:* Communicates with the MBS AF at reference point MBS‑5 on MBS User Service control aspects. Communicates with the MBSSF at reference point MBS‑10 to authenticate access to security-protected MBS data (see clause W.4 of TS 33.501 [18]) that it has received from reference point MBS‑4‑MC.

- *MBSTF Client:* Communicates with the MBSTF at reference point MBS‑4‑MC and/or with the MBS AS at reference point MBS‑4‑UC in order to provide an MBS Application Data Session to the MBS-Aware Application.

The MBS Client shall be time-synchronized with the 5G System according to the requirements defined in clause 4.2.7.

The MBS Client performs the following functions to support MBS User Services:

- Acquisition of MBSF-compiled User Service Announcements from the MBS AF at reference point MBS‑5 and/or from the MBSTF at reference point MBS-4-MC.

- Authorisation of access to security-protected MBS data by invoking the User Plane security procedure defined in clause W.4.1.3 of TS 33.501 [18] at reference point MBS‑10.

- Reception of MBS data via reference point MBS‑4‑MC from either a Multicast MBS Session or a Broadcast MBS Session.

- Exposure of MBS Application Data Sessions towards an MBS-Aware Application.

- Using AL-FEC to recover packets or objects, if this optional feature is provisioned for the MBS Session.

- Unicast recovery via reference point MBS‑4‑UC of the application payload data carried in multicast/broadcast packets that are not successfully received via MBS-4-MC, if unicast repair is provisioned for the MBS Session.

NOTE: Roaming of the MBS Client is for further study.

## ===== CHANGE =====

### 4.4.1 Overview

The following reference points defined in clause 5.1 of TS 23.247 [5] are relevant to MBS User Services architecture: Nmb1, Nmb2, Nmb5, Nmb8, Nmb9, Nmb10 and Nmb12.

The following additional reference points are defined by the present document:

**- MBS-3:** Used by the MBSF to configure the MBS AF and to publish User Service Announcements to it. This reference point is not described further in the present document.

**- MBS-4-MC:** Unidirectional multicast distribution of content from the MBSTF to the MBS Client.

**- MBS-4-UC:** User Plane interactions between the MBSTF Client and the MBS AS for the purpose of time synchronization and file-based unicast repair.

**- MBS-5:** User Plane interactions between the MBSF Client and the MBS AF for the purpose of MBS control plane and service handling.

**- MBS-6:** API exposed by the MBSF Client and used by the MBS-Aware Application to manage and control MBS User Services.

**- MBS-7:** API exposed by the MBSTF Client and used by the MBS-Aware Application to receive user data information distributed using MBS User Services.

**- MBS-8:** Announcement of MBS User Services to the MBS-Aware Application by the MBS Application Provider. The procedures at this reference point are beyond the scope of 3GPP specification.

**- MBS-9:** Used by the MBSF to configure the MBS AS. This reference point is not described further in the present document.

**- MBS-10:** User Plane interactions between the MBSF Client and the MBSSF for the purpose of authorising access to security-protected MBS data by means of the User Plane security procedure specified in clause W.4.1.3 of TS 33.501 [18].

**- MBS-11:** Used by the MBSTF to retrieve object manifests and User Service Announcements listed in object manifests from the MBS AF.

In addition, the following reference points are defined inside the MBS Client function:

- **MBS‑6′:** API exposed by the MBSTF Client and used by the MBSF Client to (de)activate reception of an MBS Session by the MBSTF. The reception parameters are supplied by the MBSF Client.

 This reference point is outside the scope of MBS User Services and is not described further in the present document.

- **MBS‑7′:** API exposed by the MSTF Client and used by the MBSTF to supply MBS Session configuration information that has been received from reference point MBS‑4‑MC.

 This reference point is outside the scope of MBS User Services and is not described further in the present document.

## ===== CHANGE =====

4.5.2 Static information model

Figure 4.5.2‑1 shows how the different service and session concepts depicted in figure 4.5.1‑1 above relate to each other. In this figure:

1. The MBS Application Provider provisions the parameters of a new MBS User Service by invoking the *Nmbsf* service either directly, or via the NEF. This specifies which of the *Service announcement modes* are to be used to advertise the MBS User Service, as well as descriptive metadata for inclusion in the MBS User Service Announcement.

2. The MBS Application Provider provisions a number of time-bound MBS User Data Ingest Sessions within the scope of the MBS User Service by invoking the *Nmbsf* service either directly, or via an equivalent *Nnef* service provided by the NEF. Each MBS User Data Ingest Session includes the details of one or more MBS Distribution Sessions.

- To indicate that it has a restricted MBS service area (i.e. corresponding to a local MBS Service, as defined in clause 6.2.2 of TS 23.247 [5]), an MBS Distribution Session may specify one or more *Target service areas*. In line with [5], MBS data is not transmitted outside the MBS service area derived from the indicated *Target service areas*.

- To provision location-dependent variants of an MBS User Service (see clause 6.2.3 of TS 23.247 [5]), a number of MBS Distribution Sessions conveying different MBS data may be provisioned within the scope of the same MBS User Service by setting the *Location-dependent service flag* on the MBS Distribution Sessions of each variant. Location-dependent MBS Distribution Session variants shall have the same *MBS Session Identifier*, but they shall have disjoint *Target service areas*.

- When the *Multiplexed service flag* is set on the MBS Distribution Session, all MBS Distribution Sessions with an identical (or empty) set of *Target service areas* shall be multiplexed onto the same MBS Session. The *MBS Session Identifier* shall be the same for all MBS Distribution Sessions within the multiplex. This feature may be combined with the *Location-dependent service flag*, in which case each location-dependent multiplex of MBS Distribution Sessions is mapped into a separate MBS Session.

- The MBS Application Provider may set the *Transport security protection* flagto indicate that transport security protection (as specified in annex W of TS 33.501 [18]) is required for the MBS Distribution Session. When the flag is set, the MBSSF chooses between the control plane or user plane security procedure.

- The MBS Application Provider may indicate in *Target UE classes* whether a broadcast MBS Distribution Session is intended for consumption by UEs of reduced capability ("NR RedCap UE" as defined in clause 6.19 of TS 23.247 [5]), by reduced capability UEs and full capability UEs, or by full capability UEs only.

 The MBSF provisions additional MBS Distribution Session parameters (denoted in table 4.5.6‑1 as assigned by the MBSF) and exposes some of them back to the MBS Application Provider (as indicated by the NOTE to table 4.5.6‑1).

NOTE 1: The MBSF typically allocates an *MBS Session Identifier*, such as a Temporary Mobile Group Identity (TMGI) for each MBS Distribution session (see step 4 below) as a side-effect of provisioning, but it is also possible for the *Nmbsf* service invoker to nominate a particular value during this provisioning step if TMGI allocations are managed externally to the MBSF.

3. The MBS Application Provider may additionally provision an MBS Consumption Reporting Configuration within the scope of the MBS User Service by invoking the *Nmbsf* service either directly, or via the NEF.

NOTE 2: Reception reporting for MBS User Services is for future study.

Shortly before the current time enters the time window of a provisioned MBS User Data Ingest Session:

4. The MBSF provisions an MBS Session in the MBS System by invoking the *Nmbsmf* service on the MB‑SMF (see clause 9 of TS 23.247 [5]) to allocate a TMGI (if one has not already been allocated) for each MBS Distribution Session and to create an MBS Session Context for each one. The parameters of the MBS Session Context shall be populated as specified in clause 4.5.9. In response, the MB-SMF provides the MB-UPF ingest information (specifically, the MB‑UPF tunnel endpoint address and traffic flow information to be used by the MBSTF) to the MBSF.

5. The MBSF provisions an MBS Distribution Session in the MBSTF by invoking the *Nmbstf* service at reference point Nmb2 using the parameters from the newly created MBS Session Context.

6. Using the parameters from the MBS Distribution Session and from the newly created MBS Session Context, the MBSF compiles an MBS User Service Announcement to advertise the availability of the MBS User Service and makes this service access information available by one or more of the *Service announcement modes* provisioned in the MBS User Service.



NOTE 1 Square brackets after a parameter name indicate multiplicity; parameter names rendered in italics with parentheses are optional. See the following clauses for details.

NOTE 2: Parameters and entities not exposed to the MBS Application Provider via the *Nmbsf* service at reference point Nmb10 are annotated with the dagger symbol †.

NOTE 3: MBS Session Identifier is defined by clause 6.5.1 of TS 23.247 [5] as a Temporary Mobile Group Identity (TMGI) or a Source-Specific Multicast (SSM) IP address.

**Figure 4.5.2-1: MBS User Services static information model**

## ===== CHANGE =====

4.5.6 MBS Distribution Session parameters

This entity models an MBS Distribution Session, as provisioned by the MBS Application Provider and as managed by the MBSF. This MBSF subsequently uses this information to provision a corresponding MBS Distribution Session in the MBSTF.

The following parameters assigned by the MBS Application Provider may be updated by the MBS Application Provider at any time:

- Target service areas,

- MBS Frequency Selection Area (FSA) Identifier (applicable only to broadcast Service type),

- QoS information,

- Target UE classes as defined in clause 6.19 of TS 23.247 [5].

With the exception of the *MBS Session Identifier* (which is immutable after initial assignment) and the *Location-dependent service flag* (which is immutable after creation), all other parameters assigned by the MBS Application Provider may be updated by the MBS Application Provider when the MBS Distribution Session is in the *INACTIVE* state.

The baseline parameters for an MBS Distribution Session that are common to all distribution methods are listed in table 4.5.6‑1 below. All parameters are exposed to the MBS Application Provider except where noted otherwise.

**Table 4.5.6‑1: Common baseline parameters of MBS Distribution Session entity**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Cardinality** | **Assigner** | **Description** |
| Distribution Session Identifier | 1..1 | MBSF | An identifier for this MBS Distribution Session that is unique within the scope of the MBS User Service (see clause 4.5.3). |
| State | 1..1 |  | The current state of the MBS Distribution Session: *INACTIVE*, *ESTABLISHED*, *ACTIVE* or *DEACTIVATING* (see clause 4.6.1). |
| MBS Session Context | 1..\* |  | As defined in clause 6.9 of TS 23.247 [5] (see NOTE 1).There shall be one MBS Session Context associated with the MBS Distribution Session unless multiple *Target service areas* are specified (see below). |
| MB‑UPF tunnel endpoint address | 0..1 |  | The tunnel endpoint address of the MB‑UPF that supports this MBS Distribution Session at reference point Nmb9 (see NOTE 1, NOTE 4). |
| MBMS GW tunnel endpoint address | 0..1 |  | The tunnel endpoint address of the MBMS GW that supports this MBS Distribution Session at reference point SGi‑mb (see NOTE 1, NOTE 4). |
| User Plane traffic flow information | 0..1 |  | Details of the MBS-4-MC User Plane traffic flow to be used by the MBSTF for this MBS Distribution Session, including the multicast group destination address and port number to be used inside the unicast tunnel at reference point Nmb9 (see NOTE 1).This parameter is mandatory except in the case of Packet Distribution Method operating in Forward-only mode, in which case multicast-addressed packets ingested at reference point Nmb8 are relayed to Nmb9 without changing their address. |
| MBS Session Identifier | 0..1 | MBSF or MBS Application Provider | The Temporary Mobile Group Identity (TMGI) or Source-Specific Multicast (SSM) IP address of the MBS Session supporting this MBS Distribution Session (see NOTE 2).Multiple MBS Distribution Sessions within the scope of the same MBS User Service may share the same value if they are location-dependent MBS Services, as defined in clause 6.2.3 of TS 23.247[5].TMGI values are allocated by the MBSF in conjunction with the MB‑SMF unless supplied by the MBS Application Provider at the time of provisioning. |
| Target service areas | 0..\* | MBS Application Provider | The set of regions comprising the MBS service area in which this MBS Distribution Session is to be made available (see NOTE 2).The provided set of regions shall be disjoint with that of every other MBS Distribution Session sharing the same MBS Session Identifier.A unique MBS Session Context shall be associated with the MBS Distribution Session for each declared service area, distinguishable by its Area Session Identifier. |
| MBS Frequency Selection Area (FSA) Identifier | 0..1 |  | (Applicable only to broadcast *Service type*.) Identifies a preconfigured area within which, and in proximity to, the cell(s) announce the MBS FSA ID and the associated frequency corresponding to this MBS Distribution Session (see NOTE 3). |
| Target UE classes | 0..\* |  | Indicates whether this MBS Distribution Session is suitable for consumption by NR RedCap UEs and/or non-NR RedCap UEs as defined in clause 6.19 of TS 23.247 [5]. |
| Location-dependent service flag | 0..1 |  | An indication that this MBS Distribution Session corresponds to a location-dependent MBS Session.If the flag is unset or omitted, the MBS Distribution Session is not location-dependent. |
| Multiplexed service flag | 0..1 |  | If set, all MBS Distribution Sessions in the scope of the same parent MBS User Data Ingest Session with identical or empty sets of *Target service areas* shall be multiplexed onto the same MBS Session.All MBS Distribution Sessions in the multiplex shall be assigned the same MBS Session Identifier. |
| Restricted membership flag | 0..1 |  | (Applicable only to multicast *Service type*.) An indication that this MBS Distribution Session is restricted to a set of UEs according to their current subscription status in the MBS System.If the flag is set, only UEs in the restricted set are permitted to join thls MBS Distribution Session; otherwise, any UE is permitted to join. |
| QoS information | 0..1 |  | A 5G QoS Identifier (5QI) [2] to be applied to the traffic flow for this MBS Distribution Session (see NOTE 2).The 5QI information is used by the MBSF to set the Quality of Service for the MBS Session by interacting with the PCF at reference point Nmb12. |
| Maximum content bit rate | 1..1 |  | The maximum bit rate for content in this MBS Distribution Session. |
| Maximum content delay | 0..1 |  | The maximum end-to-end content distribution delay that is tolerated for this MBS Distribution Session by the MBS Application Provider. |
| Distribution method | 1..1 |  | The distribution method for this MBS Distribution Session, as defined in clause 6. |
| Operating mode | 0..1 |  | The operating mode in the case where multiple modes are defined in clause 6 for the indicated distribution method. |
| FEC configuration | 0..1 |  | Configuration for Application Layer FEC (AL-FEC) information added by the MBSTF to protect this MBS Distribution Session.The AL‑FEC scheme shall be identified using a term from the Reliable Multicast Transport (RMT) controlled vocabulary of FEC Encoding IDs [17] expressed as a fully-qualified URI, e.g. *urn:ietf:rmt:fec:encoding:0*.The overhead of AL‑FEC protection shall be specified as a proportion of the (unprotected) MBS data, e.g. 1.1 for 10% overhead.Additional scheme-specific parameters may be signalled in the form of uncontrolled name–value pairs. |
| Transport security protection | 1..1 |  | A flag indicating whether transport security protection is required by the MBS Application Provider for this MBS Distribution Session.The MBSSF determines whether the control plane security procedure (see NOTE 5) or the user plane security procedure is selected. (See annex W of TS 33.501 [18] for details of these procedures.) |
| Traffic marking information | 0..1 | MBS Application Provider or MBSF | Information (e.g. a Differentiated Services Code Point) used by the MBSTF to mark the multicast packets that it conveys to the MB‑UPF at reference point Nmb9. |
| Time service endpoints | 0..N | MBSF | A set of endpoints provided by the MBS AS and used by the MBS Client to synchronise its clock with the needed precision (see NOTE 2). |
| NOTE 1: Internal parameter not exposed to the MBS Application Provider.NOTE 2: Parameter not relevant to the MBSTF.NOTE 3: Used to guide frequency selection by the UE for a broadcast MBS Session.NOTE 4: At least one of *MB‑UPF tunnel endpoint address* or *MBMS GW tunnel endpoint address* shall be present.NOTE 5: The control plane security procedure (see clause W.4.1.2 of TS 33.501 [18]) is applicable only to Multicast MBS Session(s). |

An MBS Distribution Session Announcement (see clause 4.5.8 below) shall be associated with an MBS Distribution Session when the latter is in the *ESTABLISHED* or *ACTIVE* state.

The following MBS Distribution Session parameters are additionally relevant when the distribution method is the Object Distribution Method:

**Table 4.5.6‑2: Additional MBS Distribution Session parameters for Object Distribution Method**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Cardinality** | **Assigner** | **Description** |
| Object acquisition method | 1..1 | MBS Application Provider | Indicates whether the objects(s) to be acquired and possibly distributed as part of the corresponding MBS User Data Ingest Session are to be pushed into the MBSTF by the MBS Application Provider or whether they are to be pulled from the MBS Application Provider by the MBSTF.In the latter case, the *Object acquisition method* indicates whether the object(s) are to be retrieved once from the MBS Application Provider at the start of each active period of the corresponding MBS User Data Ingest Session, or whether the MBSTF is required to check their validity periodically, for example once per rotation of an object carousel.When a reference to an object manifest is provided as the *Object acquisition identifiers*, it is the responsibility of the MBSTF to check for updates to the object manifest itself in an efficient manner. |
| Object acquisition identifiers | 0..\* |  | Directly or indirectly identifies the object(s) to be ingested and distributed by the MBSTF during this MBS Distribution Session.This could be the ingest URL of the object, the ingest URL of a manifest describing a set of objects or the ingest URL of an Application Service Entry Point document.For both pull- and push-based object acquisition, values are expressed as URL paths to be resolved relative to the *Object ingest base URL*.Constraints on this parameter are specified in table 6.1-1. In particular, when referencing an object manifest, exactly one object acquisition identifier shall be present. |
| Object ingest base URL | 0..1 | MBS Application Provider or MBSF | In the case of push-based object acquisition, a URL indicating the host part and base path on the MBSTF to which objects are published. In this case, the value shall be nominated by the MBSF and shall be unique for all MBS Distribution Sessions within the MBS System.In the case of pull-based object acquisition, a URL indicating a host part and base path on the MBS Application Provider's origin server (or, in the case of the User Service Announcement Channel, on the MBS AF) relative to which objects lacking an absolute URL are acquired. In this case, the value shall be nominated by the MBS Application Provider (or, in the case of the User Service Announcement Channel, by the MBSF) and need not be unique.When present, this URL prefix is replaced by the MBSTF with the *Object distribution base URL* prior to distribution of ingested objects.If omitted, nothing is substituted in the content ingest URL when forming the object distribution URL |
| Object distribution base URL | 0..1 | MBS Application Provider | A URL prefix substituted by the MBSTF in place of the *Object ingest base URL* prior to distribution of ingested objects.If present, the optional *Object ingest base URL* shall also be present.If omitted, the object distribution URL is the same as the object ingest URL. |
| Object repair base URL | 0..1 | MBSF | A URL prefix substituted by the MBSTF Client in place of the *Object distribution base URL* when repairing objects not received completely intact from this MBS Distribution Session (see NOTE). The value shall point to the MBS AS.Present only when object repair is provisioned for this MBS Distribution Session. |
| NOTE: Parameter not relevant to the MBSTF. |

The following MBS distribution session are additionally relevant when the distribution method is the Packet Distribution Method:

**Table 4.5.6‑3: Additional MBS Distribution Session parameters for Packet Distribution Method**

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| **Parameter** | **Cardinality** | **Assigner** | **Description** |
| Packet ingest method | 1..1 | MBS Application Provider | Indicates whether packets are to be ingested using multicast ingest or unicast ingest.Multicast ingest is valid for Proxy mode only. In this case, the MBSTF shall join a Source-Specific Multicast (SSM) group indicated in *MBSTF ingest endpoint addresses* parameter.Unicast ingest is valid for Proxy mode and Forward-only mode. In this case, the MBSTF shall allocate a listening IP address and port number for packet ingest and shall return it to the MBSF in the *MBSTF ingest endpoint addresses* parameter below. |
| MBSTF ingest endpoint addresses | 1..1 | MBS Application Provider, MBSF, MBSTF | The endpoint addresses used by the MBS Application Provider and MBSTF to establish a connection at reference point Nmb8 prior to the commencement of this MBS User Data Ingest Session.In the case of Proxy mode, this shall be the Source-Specific Multicast (SSM) endpoint addresses (including the source IP address, destination multicast group address and destination UDP port) nominated by the MBS Application Provider or else by the MBSF.In the case of Forward-only mode, this shall be the IP addresses and UDP port numbers at the source and destination ends of the content ingest tunnel, nominated respectively by the MBS Application Provider and the MBSTF. |

## ===== CHANGE =====

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4.5.8 MBS Distribution Session Announcement parameters

This entity models an MBS Distribution Session Announcement, which is compiled by the MBSF and used to advertise the current or imminent availability of an MBS Distribution Session in the MBS System. The baseline parameters for an MBS Distribution Session Announcement are listed in table 4.5.8‑1 below:

**Table 4.5.8‑1: Baseline parameters of MBS Distribution Session Announcement entity**

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| --- | --- | --- | --- |
| **Parameter** | **Cardinality** | **Assigner** | **Description** |
| MBS Session Identifier | 1..1 | MB‑SMF | The Temporary Mobile Group Identity (TMGI) or Source-Specific Multicast (SSM) IP address of the MBS Distribution Session from which this announcement is derived. |
| MBS Frequency Selection Area (FSA) Identifier | 0..1 | MBS Application Provider or MB-SMF | (Broadcast MBS Session only.) Identifies a preconfigured area within which, and in proximity to, the cell(s) are announcing the MBS FSA ID and the associated frequency corresponding to this MBS Distribution Session Announcement (see NOTE) |
| Radio parameters | 0..\* | MBSF | (Broadcast MBS Session only.) Radio transmission parameters of this MBS Distribution Session in its target service areas. The values are obtained by the MBSF from the OAM using the *MBS Frequency Selection Area (FSA) Identifier* (see above) as the lookup key. |
| Target UE classes | 0..\* | MBS Application Provider | (Broadcast MBS Session only.) Indicates whether the MBS Distribution Session described by this announcement is suitable for consumption by NR RedCap UEs and/or non-NR RedCap UEs as defined in clause 6.19 of TS 23.247 [5]. |
| Distribution method | 1..1 | MBS Application Provider | The distribution method (as defined in clause 6) of the MBS Distribution Session from which this announcement is derived. |
| Session Description parameters | 1..\* | MBSF | Additional parameters needed to receive the MBS Distribution Session from which this announcement is derived, including relevant User Plane traffic flow parameters. |
| Service protection description | 0..1 | MBSSF | The security parameters for the MBS Distribution Session (see clause W.4.2 of TS 33.501), including:- Which form of transport security protection is in force, whether UICC key management (see TS 33.246 [19]) is selected and/or whether 2G GBA security (see TS 33.246 [19]) is selected.- The MBS Session Key (MSK) identifier and key domain.- The address of the key management server (FQDN of the MBSSF) when user plane security is in force. |
| Time service endpoints | 0..N | MBSF | A set of endpoints provided by the MBS AS and used by the MBS Client to synchronise its clock with the needed precision. |
| NOTE: Used to guide frequency selection by the UE for a broadcast MBS Session. |

The following session announcement parameters are additionally relevant when *Distribution method* above indicates the Object Distribution Method:

**Table 4.5.8‑2: Additional MBS Distribution Session Announcement parameters for Object Distribution Method**

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| **Parameter** | **Cardinality** | **Assigner** | **Description** |
| Object distribution schedule | 0..1 | MBS Application Provider | A schedule indicating when individual objects are to be delivered on the corresponding MBS Distribution Session.Present only when this information has been provided in the *Object acquisition identifiers* of the corresponding MBS Distribution Session (see table 4.5.6‑2). |
| Object distribution base URL | 0..1 |  | A URL prefix substituted by the MBSTF Client with the *Object repair base URL* when repairing objects not received completely intact from the corresponding MBS Distribution Session.Present only when object repair is provisioned for the corresponding MBS Distribution Session. |
| Object repair base URL | 0..1 | MBSF | The base URL of the MBS AS to be used for object repair of the corresponding MBS Distribution Session.Present only when object repair is provisioned for the corresponding MBS Distribution Session. |