**3GPP TSG-S4 Meeting #120-e *S4-221124***

**Online, , 17th–26th August 2022** revision of S4-220928

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.502** | **CR** | **0007** | **rev** | **1** | **Current version:** | **17.1.1** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | |
| ***Title:*** |  | | | | | | | | |
|  |  | | | | | | | | |
| ***Source to WG:*** | BBC | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | |
|  |  | | | | | | | | |
| ***Work item code:*** | 5MBUSA | | | | |  | ***Date:*** | | 2022-08-22 |
|  |  | | | |  | |  | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | Rel-17 |
|  |  | | | | | | | | |
| ***Reason for change:*** | | Clarifications sought by CT3/CT4. | | | | | | | |
|  | |  | | | | | | | |
| ***Summary of change:*** | | * Strengthen specification of MBS User Service Announcement Channel. * Clarify modelling of location-dependent and local services. * Clarification on the circumstances in which baseline parameters can be changed by the MBS Application Provider. * Specify use of OMA BCAST Service Class controlled vocabulary to describe service class in MBS User Service entity. * Add concept of restricted membership services, mapping (inverted) to “any UE may join” concept in SA2. * Add MBS Frequency Selection Area (FSA) ID to MBS Distribution Session and MBS Distribution Session Announcement (applicable to Broadcast MBS Session only). * Provide baseline specification of AL‑FEC configuration parameters. * Provide explicit mapping between baseline parameters and parameters passed in *Nmbsmf\_MBSSession\_Create* service operation. * Outline the possibility of an MBS User Service Announcement rescinding procedure. * Allow event subscription update operation for both MBSF and MBSTF services. * Assorted minor corrections and clarifications. | | | | | | | |
|  | |  | | | | | | | |
| ***Consequences if not approved:*** | | CT3/CT4 cannot complete stage 3 OpenAPI specification corresponding to the stage 2 definitions. | | | | | | | |
| ***Q*** | |  | | | | | | | |
| ***Clauses affected:*** | | 2, 3.1, 3.3, 4.2.4, 4.3.2, 4.3.3.2, 4.5, 5.3, 5.4, 7.2, 7.3. | | | | | | | |
|  | |  | | | | | | | |
|  | | **Y** | **N** |  | | | |  | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 26.517, TS 29.580, TS 29.522, TS 29.581 | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | |
|  | |  | | | | | | | |
| ***Other comments:*** | | This CR has been drafted based on discussions between SA4/CT3/CT4 rapporteurs and contributors. | | | | | | | |
|  | |  | | | | | | | |
| ***This CR's revision history:*** | | S4-220928 -> S4-221124 | | | | | | | |

FIRST 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] 3GPP TS 26.517: " 5G Multicast–Broadcast User Services; Protocols and Formats".

[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".

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

[18] 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

NEXT CHANGE

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1], TS 23.501 [2], TS 23.502 [3], TS 23.247 [5] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

(SNIPPED)

**MBS User Service Announcement:** metadata entity consumed by the MBSF Client composed of one or more MBS Distribution Session Announcements.

**MBS User Service Announcement Channel:** MBS Distribution Session generated by the MBSF to carousel MBS User Service Announcements to the MBS Client using the Object Distribution Method.

**MBS User Service Control:**. control of an MBS User Service by an MBS-Aware Application interacting with an MBSF Client.

(SNIPPED)

NEXT CHANGE

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], TS 23.501 [2], TS 23.502 [3], TS 23.247 [4] 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].

5QI 5G QoS Identifier

AL‑FEC Application Level FEC

DN Data Network

FEC Forward Erasure Correction

MBS Multicast–Broadcast Services

MB‑SMF Multicast–Broadcast Session Management Function

MB‑UPF Multicast–Broadcast User Plane Function

MBSF Multicast–Broadcast Service Function

MBSTF Multicast–Broadcast Service Transport Function

LTE Long Term Evolution

NEF Network Exposure Function

PCF Policy and Charging Function

PDU Protocol Data Unit

QoS Quality of Service

SDU Service Data Unit

UE User Equipment

NEXT CHANGE

### 4.2.4 User Service Announcement

The User Service Announcement provides service access information needed by the MBS Client to discover and activate the reception of one or more MBS User Services. User Service Announcements may be delivered via MBS Distribution Sessions (either in the same MBS Distribution Session as the advertised content, or else via a dedicated MBS Distribution Session called the *MBS User Service Announcement Channel*) or via a regular unicast PDU Session.

The baseline information conveyed in User Service Announcements is defined in clause 4.5.7.

NEXT CHANGE

### 4.3.2 MBSF

The functionality of the MBSF is defined in clause 5.3.2.11 of TS 23.247 [5]. It receives provisioning and control commands either directly at reference point Nmb10 or at reference point Nmb5 (via the NEF). The MBSF invokes MBS Session operations on the MB‑SMF at reference point Nmb1. The MBSF configures the MBSTF at reference point Nmb2.

The User Service Announcement function of the MBSF provides session access information which is consumed by the MBS Client and subsequently used to discover and initiate the reception of one or multiple MBS User Services. The session access information may contain information for presentation to the end-user, as well as application parameters used in generating service content for consumption by the MBS Client.

The present document defines additional Control Plane functionalities of the MBSF to support MBS User Services including:

1. Generating the User Service Announcement for each MBS Session.

2. Managing User Service Announcement updates.

3. Providing the User Service Announcement information to the MBS Client in a timely manner using one or more of the following mechanisms:

a) Unicast User Service Announcement via reference point MBS-5, including the possible use of push- or notification-based update mechanisms.

b) User Service Announcement via an MBS Distribution Session at reference point MBS-4-MC, optionally in the same MBS Distribution Session as the content it is advertising, or else via a dedicated MBS Distribution Session managed by the MBSF called the *MBS User Service Announcement Channel*.

c) User Service Announcement via application-private means at reference point MBS-8.

NEXT CHANGE

#### 4.3.3.2 MBSTF subfunctions to support Object Distribution Method

The MBSTF subfunctions supporting the Object Distribution Method are depicted in figure 4.3.3.2-1 below.



Figure 4.3.3.2-1: MBSTF architecture overview for Object Distribution Method

The *Object ingest* subfunction supports:

- Pull-based ingest at reference point Nmb2: The Object ingest subfunction in this case fetches one or more objects from the MBSF using HTTPS for inclusion in the MBS User Service Announcement Channel.

- Push-based ingest at reference point Nmb2: The Object ingest subfunction receives one or more objects from the MBSF using HTTPS for inclusion in the MBS User Service Announcement Channel.

- Pull-based ingest at reference point Nmb8: The Object ingest subfunction in this case fetches one or more objects from the MBS Application Provider (AF/AS) using HTTPS.

- Push-based ingest at reference point Nmb8: The Object ingest subfunction receives one or more objects from the MBS Application Provider (AF/AS) using HTTPS.

Object ingest procedures at reference point Nmb2 shall be a subset of those at reference point Nmb8.

The *Object segmentation subfunction* supports the partitioning of an object into payload units suitable for MBS transmission.

The optional *Application Layer FEC* subfunction supports object recovery when some packets are not received by the MBMS Client.

The *Packetisation* subfunction places the payload units (and, optionally, the FEC data) into Nmb9 transmission packets according to clause 6.1.

The *Packet scheduling* subfunction schedules the outgoing packet stream according to target bit rate configuration.

The *Control subfunction* offers support for MBSTF service configuration, status query and notifications at reference point Nmb2.

NEXT CHANGE

## 4.5 Domain model

(NO CHANGES TO CLAUSE 4.5.1)

### 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 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: 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: 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

### 4.5.3 MBS User Service parameters

This entity models an MBS User Service, as provisioned by the MBS Application Provider, and as managed by the MBSF. The baseline parameters of an MBS User Service are listed in table 4.5.3‑1 below.

With the exception of *Service type*, which is an immutable property of an MBS User Service, any of the parameters assigned by the MBS Application Provider may be updated by the MBS Application Provider at any time.

NOTE: Propagation of modified parameter values to the MBS Client in an updated MBS User Service Announcement is subject to implementation-dependent and operational latencies.

Table 4.5.3‑1: Baseline parameters of MBS User Service entity

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Cardinality | Assigner | Description |
| User Service Identifier | 1..1 | MBSF | A unique identifier for this MBS User Service in the MBSF. |
| External service identifiers | 1..\* | MBS Application Provider | A unique identifier for this MBS User Service that is also present in the MBS User Service Announcement.  If assigned in a globally unique manner, this identifier may be useful in correlating this MBS User Service with the same service delivered by a different system. |
| Service type | 1..1 |  | Indicates whether this MBS User Service is distributed via Multicast MBS Session(s) or Broadcast MBS Session(s) |
| Service class | 1..1 |  | The class of this MBS User Service, expressed as a fully-qualified term identifier from a controlled vocabulary such as the OMNA BCAST Service Class [17], e.g. urn:oma:bcast:oma\_bsc:st:1.0. |
| Service announcement modes | 1..\* |  | Determines whether the MBS User Service Announcement compiled by the MBSF is advertised to the MBSF Client at reference point MBS‑5 and/or advertised to the MBSF Client via the MBS Distribution Session and/or passed back to the MBS Application Provider via reference point Nmb10. |
| Service names | 1..\* |  | A set of distinguishing names for this MBS User Service, one per language. |
| Service descriptions | 1..\* |  | A set of descriptions of this MBS User Service, one per language. |
| Main service language | 0..1 |  | The main language of this MBS User Service. |

MBS User Data Ingest Sessions (see clause 4.5.5) are separately provisioned within the scope of an MBS User Service. It is valid for an MBS User Service to have no MBS User Data Ingest Sessions currently provisioned.

An MBS Reception Reporting Configuration (see clause 4.5.4 below) may be separately provisioned within the scope of an MBS User Service.

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

### 4.5.4 MBS Reception Reporting Configuration parameters

Reception reporting for MBS User Services is for future study.

### 4.5.5 MBS User Data Ingest Session parameters

This entity models an MBS User Data Ingest Session, as provisioned by the MBS Application Provider, and as managed by the MBSF. The baseline parameters for an MBS User Data Ingest Session are listed in table 4.5.5‑1 below.

NOTE: A linkage from the MBS User Data Ingest Session to its parent MBS User Service is additionally required at stage 3. The *User Service identifier* defined in table 4.5.3‑1 serves this purpose.

The set of active periods may be updated by the MBS Application Provider at any time. The state of constituent MBS Distribution Sessions (and their corresponding MBS Distribution Session Announcements) may need to change as a consequence.

Table 4.5.5‑1: Baseline parameters of MBS User Data Ingest Session entity

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Cardinality | Assigner | Description |
| User Data Ingest Session Identifier | 1..1 | MBSF | An identifier for this MBS User Data Ingest Session that is unique in the scope of the parent MBS User Service (see clause 4.5.3). |
| MBS User Service Announcement | 0..1 |  | The MBS User Service Announcement (see clause 4.5.7) currently associated with this MBS User Data Ingest Session.  Present only if all constituent MBS Distribution Sessions are in the ESTABLISHED or ACTIVE state. |
| Active periods | 0..\* | MBS Application Provider | Periods of time during which the MBS User Data Ingest Session is active in the MBS System.  If omitted, the MBS User Data Ingest session is intended to be active until further notice. |

The MBS User Data Ingest Session is composed of one or more MBS Distribution Sessions (see clause 4.5.6 below) and these shall be provisioned in the same operation as the enclosing MBS User Data Ingest Session. It is not valid for an MBS User Data Ingest Session to have no MBS Distribution Sessions defined.

MBS Distribution Sessions may be added to or removed from an MBS User Data Ingest Session by the MBS Application Provider at any time, subject to the minimum number specified above. The MBS User Service Announcement may need to change as a consequence to refer to a revised set of corresponding MBS Distribution Session Announcements.

### 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].*

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 | 1..1 |  | The tunnel endpoint address of the MB‑UPF that supports this MBS Distribution Session at reference point Nmb9 (see NOTE 1). |
| 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. |
| MBS Frequency Selection Area (FSA) Identifier | 0..1 |  | (Applicable only to broadcast *Service type*.) Identifies a preconfigured set of cell(s) to announce the MBS Session corresponding to this MBS Distribution Session. |
| 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 Level 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 [18] 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. |
| 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. |
| NOTE 1: Internal parameter not exposed to the MBS Application Provider.  NOTE 2: Parameter not relevant to the MBSTF. | | | |

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) 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 as part of the corresponding MBS User Data Ingest Session.  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. |
| Object acquisition identifiers | 1..\* |  | 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, or the ingest URL of a manifest describing a set of objects, or a reference into a manifest describing a set of objects. |
| Object ingest base URL | 0..1 | MBS Application Provider or MBSF | A URL prefix substituted by the MBSTF with the *Object distribution base URL* prior to distribution of ingested objects.  Assigned by the MBS Application Provider for the pull-based *Object acquisition method*. Assigned by the MBSF for push-based object acquisition.  If omitted, nothing is removed from 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. The value shall point to the MBS AS.  Present only when object repair is provisioned for this MBS Distribution Session. |

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

|  |  |  |  |
| --- | --- | --- | --- |
| 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. |

### 4.5.7 MBS User Service Announcement parameters

This entity models an MBS User Service Announcement, which is compiled by the MBSF and used to advertise the current or imminent availability of an MBS User Service in the MBS System. The baseline parameters for an MBS User Service Announcement are listed in table 4.5.7‑1 below:

Table 4.5.7‑1: Baseline parameters of MBS User Service Announcement entity

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Cardinality | Assigner | Description |
| External service identifiers | 1..\* | MBS Application Provider | A unique identifier used by the MBSF Client to distinguish between MBS User Services.  If assigned in a globally unique manner, this identifier may be useful to the MBSF Client in correlating the MBS User Service with the same service delivered by a different system. |
| Service class | 1..1 |  | The class of the MBS User Service, expressed as a term identifier from a controlled vocabulary. |
| Start date–time | 0..1 |  | The point in time from which this MBS User Service Announcement is valid.  If not present, the announcement is already valid. |
| End date–time | 0..1 |  | The point in time after which this MBS User Service Announcement is no longer valid.  If not present, the announcement is valid indefinitely. |
| Service names | 1..\* |  | A set of distinguishing names for the MBS User Service, one per language. |
| Service descriptions | 1..\* |  | A set of descriptions of the MBS User Service, one per language. |
| Main service language | 0..1 |  | The main language of the MBS User Service. |
| MBS Distribution Session Announcements | 1..\* | MBSF | The set of MBS Distribution Session Announcements (see clause 4.5.8) currently associated with this MBS User Service Announcement. |

### 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

|  |  |  |  |
| --- | --- | --- | --- |
| 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 set of cell(s) that are announcing the MBS Session corresponding to this MBS Distribution Session Announcement. |
| 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. |

(NO FURTHER CHANGES IN THIS CLAUSE)

### 4.5.9 Mapping of MBS Distribution Session to MBS Session Context

Except when it is in the INACTIVE state, an MBS Distribution Session in the MBSF is associated with an MBS Session Context in the MB-SMF. When the MBSF invokes the Nmbsmf\_MBSSession service, the parameters defined in clause 6.9 of TS 23.247 [5] shall be populated as indicated in table 4.5.9‑1 below.

Table 4.5.9‑1: Mapping of baseline parameters to MBS Session Context parameters

|  |  |  |  |
| --- | --- | --- | --- |
| MBS Session Context parameter | Source | Clause | Source parameter |
| State | MBS Distribution Session. | 4.5.6 | State. |
| Source-Specific Multicast (SSM) IP address | MBS Distribution Session. | 4.5.6 | MBS Session Identifier |
| TMGI |
| MBS Service Area | MBS Distribution Session. | 4.5.6 | Target service area (see NOTE 2) |
| Area Session Identifier | Assigned by MB-SMF. | 4.5.6 | Location-dependent service flag |
| MBS Frequency Selection Area (FSA) ID (see NOTE 1) | MBS Distribution Session. | 4.5.6 | MBS Frequency Selection Area |
| MB-SMF | Not applicable to MB-SMF. | N/A | Not applicable. |
| AMF | Discovered by MB-SMF | N/A | Not applicable. |
| SMF | Selected by AMF. | N/A | Not applicable. |
| PCF | [Selected by MBSF or MB-UPF.] | N/A | Not applicable. |
| QoS (flow) information | MBS Distribution Session. | 4.5.6 | QoS information |
| Tunnel Endpoint Identifier (TEID) for distribution | Assigned by MB‑SMF. | N/A | Not applicable. |
| IP multicast and source address for data distribution | ? | N/A | Not applicable. |
| NG-RAN IP address for data distribution | Selected by MB‑SMF. | N/A | Not applicable. |
| NG-RAN Node ID(s) | Not applicable to MB-SMF. | N/A | Not applicable. |
| UE IDs | Not applicable to MB-SMF. | N/A | Not applicable. |
| NOTE 1: Applicable to Broadcast MBS Session only.  NOTE 2: Mapping to Tracking Area Identifier (TAI) list and/or Cell ID list performed by MBSF as required. | | | |

In addition, the following parameters to the Nmbsmf\_MBSSession\_Create service operation defined in clause 9.1.3.6 of TS 23.247 [5] shall be populated as indicated in table 4.5.9‑2 below.

Table 4.5.9‑2: Mapping of baseline parameters to Nmbsmf\_MBSSession\_Create parameters

|  |  |  |  |
| --- | --- | --- | --- |
| MBSSessionCreate input parameter | Source | Clause | Source parameter |
| MBS Service type | MBS User Service | 4.5.3 | Service type |
| MBS activation time | MBS User Data Ingest Session | 4.5.5 | Active period |
| MBS termination time |
| Indication that any UE may join (see NOTE) | MBS Distribution Session | 4.5.6 | Restricted membership flag |
| [MBS Service requirements or MBS Session information] | MBS Distribution Session | 4.5.3 | QoS information |
| Data Network Name (DNN) | Selected by MBSF based on MBS Application Provider authorisation. | N/A | Not applicable. |
| Single-Network Slice Selection Assistance Information (S-NSSAI) | N/A | Not applicable. |
| NOTE: Applicable to Multicast MBS Session only. | | | |

NEXT CHANGE

### 4.6.2 Notification events

During the lifecycle of a MBS User Service Session, a number of notification messages may be sent by different Network Functions. The MBSF may modify event information when passing on notifications from other Network Functions to the MBS Application Provider (AF/AS) at reference point Nmb10 or (via the NEF) at reference point Nmb5.

The events may originate from different sources:

- If the event originates in the MB-SMF at reference point Nmb1 or in the PCF at reference point Nmb12, it is propagated to the MBS Application Provider (AF/AS) at reference point Nmb10 (or via the NEF at reference point Nmb5). The MBSF conditions the event payload for external usage.

- If the event originates in the MBSTF at reference point Nmb2, it is propagated to the MBS Application Provider (AF/AS) at reference point Nmb10 (or via the NEF at reference point Nmb5). The MBSF conditions the event payload for external usage.

- If the event originates in the MBSF itself, it is propagated directly to the MBS Application Provider (AF/AS) at reference point Nmb10 (or via the NEF at reference point Nmb5).

The notification events listed in table 4.6.2-1 below are used by the MBSF to notify the MBS Application Provider (AF/AS) or NEF. The relevant stimulating reference point is indicated in brackets in the final column of the table.

Table 4.6.2-1: Notification events

|  |  |  |
| --- | --- | --- |
| Event | Description | Applicable reference point(s) |
| Distribution Session established | The MBS Distribution Session is established. | (Nmb2), Nmb10/Nmb5 |
| Distribution Session service management failure | The MBS Distribution Session could not be started, for example because the necessary resources could not be allocated by the MBS System. | (Nmb1), Nmb10/Nmb5 |
| Distribution Session policy control failure | The MBS Distribution Session could not be started because of a policy authorization/control failure or rejection. | (Nmb12), Nmb10/Nmb5 |
| Distribution Session activated | The MBS Distribution Session is activated successfully. | (Nmb2), Nmb10/Nmb5 |
| Distribution Session deactivated | The MBS Distribution Session is deactivated. | (Nmb2), Nmb10/Nmb5 |
| Distribution Session data ingest failure | The MBSTF is expecting ingest data for an active MBS Distribution session, but is not receiving data. | (Nmb2), Nmb10/Nmb5 |

NEXT CHANGE

## 5.3 Procedures for User Service provisioning

(SNIP)

For each such MBS Distribution Session:

6. If a TMGI was not nominated by the MBS Application Provider in step 1 above, the MBSF allocates one at this point for the MBS Distribution Session by invoking the Nmbsmf\_TMGI\_Allocate service operation on the MB‑SMF at reference point Nmb1, as specified in clause 9.1.2.2 of TS 23.247 [5].

7. The MBSF creates an MBS Session to reserve resources in the MBS System for the MBS Distribution Session by invoking the *Nmbsmf\_MBSSession\_Create* service operation on the MB‑SMF at reference point Nmb1, as specified in clause 9.1.3.6 of TS 23.247 [5]). The TMGI reserved for the MBS Distribution Session in step 1 or step 6 above is provided as an input parameter. The MBSF determines the other input parameters as specified in clause 4.5.9.

(NO FURTHER CHANGES IN THIS CLAUSE)

NEXT CHANGE

## 5.4 Procedures for User Service advertisement/discovery

(SNIP)

The steps are as follows:

1. The MBSF compiles a composite MBS User Service Announcement from the set of individual MBS Distribution Session Announcements compiled in step 14 of clause 5.3. The compiled MBS User Service Announcement describes the current set of MBS Distribution Sessions that comprise the active MBS User Data Ingest Session. The advertised start date–time is the next start time indicated in the MBS User Data Ingest Session schedule of active periods, or the current date–time if no schedule is provisioned.

2. The MBS User Service Announcement is distributed using one or more of the following mechanisms:

a. The MBS User Service Announcement is made available for unicast retrieval by the MBSF Client at reference point MBS‑5.

b. The MBS User Service Announcement is made available via a suitable multicast/broadcast Session Announcement Channel at reference point MBS‑4‑MC.

c. The MBS User Service Announcement is passed back to the MBS Application Provider by invoking the Nmbsf\_MBSUserDataIngestSession\_StatusNotify callback service operation at reference point Nmb10 (or Nmb5+N33, if invoked via the NEF).

As a result, the MBS Application Provider advertises the MBS User Service Announcement to the MBS-Aware Application by private means at reference point MBS‑8.

The MBSF may rescind an MBS User Service Announcement at any time for operational reasons.

NEXT CHANGE

## 7.2 MBSF Services

### 7.2.1 General

The following table illustrates the set of Network Function services exposed by the MBSF.

Table 7.2-1: NF services provided by MBSF

|  |  |  |  |
| --- | --- | --- | --- |
| Service name | Service operation name | Operation semantics | Example consumer(s)  (see NOTE) |
| Nmbsf\_MBSUserService | Create | Request/Response | AF, NEF |
| Retrieve | Request/Response | AF, NEF |
| Update | Request/Response | AF, NEF |
| Destroy | Request/Response | AF, NEF |
| Nmbsf\_MBSUserDataIngestSession | Create | Request/Response | AF, NEF |
| Retrieve | Request/Response | AF, NEF |
| Update | Request/Response | AF, NEF |
| Destroy | Request/Response | AF, NEF |
| StatusSubscribe | Subscribe/Notify | AF, NEF |
| StatusUnsubscribe | AF, NEF |
| StatusNotify | AF, NEF |
|  | StatusSubscribeMod |  | AF, NEF |
| NOTE: When the MBS Application Provider (AF/AS) lies outside the trusted DN, these services shall be exposed via the NEF (N33+Nmb5) as *Nnef\_MBSUserService* and *Nnef\_MBSUserDataIngestSession* respectively, as specified in clauses ? and ? respectively of TS 29.522 [15]. | | | |

### 7.2.2 Nmbsf MBS User Service operations

(NO CHANGES IN THIS CLAUSE)

### 7.2.3 Nmbsf MBS User Data Ingest Session operation

(SNIPPED)

#### 7.2.3.5 Nmbsf\_MBSUserDataIngestSession\_StatusSubscribe operation

**Service operation name:** Nmbsf\_MBSUserDataIngestSession\_StatusSubscribe

**Description:** Invoked by AF/NEF on the MBSF when it needs to create a subscription to monitor at least one event relevant to the MBS User Data Ingest Session. The AF may subscribe to multiple events in a subscription.

**Input parameters (Required):** MBS User Data Ingest Session Identifier, Event ID(s) as described in table 4.6.2-1, notification target address.

**Output parameters (Required, Optional):** When the subscription is accepted: Subscription correlation ID.

(SNIPPED)

#### 7.2.3.7 Nmbsf\_MBSUserDataIngestSession\_StatusNotify operation

**Service operation name:** Nmbsf\_MBSUserDataIngestSession\_StatusNotify

**Description:** Used by the MBSF to notify the MBS Application Provider (AF/AS) or NEF about the status change of the MBS User Data Ingest Session.

**Input parameters (Required):** MBS User Data Ingest Session Identifier, Event ID(s) as described in table 4.6.2-1, informative message.

**Output parameters:** Result indication.

#### 7.2.3.8 Nmbsf\_MBSUserDataIngestSession\_StatusSubscribeMod operation

**Service operation name:** Nmbsf\_MBSUserDataIngestSession\_StatusSubscribeMod

**Description:** Invoked by an MBS Application Provider (AF/AS) or NEF on the MBSF to modify an existing status subscription.

**Input parameters (Required):** Subscription correlation ID.

**Input parameters (Optional):** Event ID(s) as described in table 4.6.2-1, notification target address, subscription expiration time.

**Output parameters (Required, Optional):** Result indication.

NEXT CHANGE

## 7.3 MBSTF Services

### 7.3.1 General

The following table illustrates the set of NF services exposed by the MBSTF.

Table 7.3-1: NF services provided by MBSTF

|  |  |  |  |
| --- | --- | --- | --- |
| Service name | Service operation name | Operation semantics | Example consumer(s) |
| Nmbstf\_MBSDistributionSession | Create | Request/Response | MBSF |
| Retrieve | Request/Response | MBSF |
| Update | Request/Response | MBSF |
| Destroy | Request/Response | MBSF |
| StatusSubscribe | Subscribe/Notify | MBSF |
| StatusUnsubscribe | MBSF |
| StatusNotify | MBSF |
|  | StatusSubscribeMod |  | MBSF |

### 7.3.2 Nmbstf\_MBSDistributionSession service

(SNIPPED)

#### 7.3.2.2 Nmbstf\_MBSDistributionSession\_Retrieve service operation

**Service operation name:** Nmbstf\_MBSDistributionSession\_Retrieve

**Description:** Retrieve the parameters of an existing MBS Distribution Session.

**Input parameters (Required):** Distribution Session Identifier in request URL.

**Output parameters:** MBS Distribution Session resource entity, including parameters in table 4.5.6‑1 and either table 4.5.6‑2 or table 4.5.6‑3, depending on the distribution method.

#### 7.3.2.3 Nmbstf\_MBSDistributionSession\_Update service operation

**Service operation name:** Nmbstf\_MBSDistributionSession\_Update

**Description:** Update an existing MBS Distribution Session, for example to change the session stop time, object delivery session, application session, packets delivery session, files, and ancillary information.

**Input parameters (Required, Optional):** MBS Distribution Session Identifier. Parameters in table 4.5.6‑1 and either table 4.5.6‑2 or table 4.5.6‑3, depending on the distribution method.

**Output parameters (Required):** Result indication.

**Output parameters (Optional):** MBS Distribution Session resource entity.

(SNIPPED)

#### 7.3.2.5 Nmbstf\_MBSDistributionSession\_StatusSubscribe operation

**Service operation name:** Nmbstf\_MBSDistributionSession\_StatusSubscribe

**Description:** Invoked by MBSF on the MBSTF when it needs to monitor at least one event relevant to the MBS Distribution session. The MBSF may subscribe to multiple events in a subscription.

**Input parameters (Required):** MBS Distribution Session Identifier, Event ID(s) as described in table 4.6.2-1, notification target address.

**Output parameters:** When the subscription is accepted: Subscription correlation ID.

(SNIPPED)

#### 7.3.2.7 Nmbstf\_MBSDistributionSession\_StatusNotify operation

**Service operation name:** Nmbstf\_MBSDistributionSession\_StatusNotify

**Description:** Used by the MBSTF to notify the MBSF about the status change of the MBS Distribution Session.

**Input parameters (Required):** MBS Distribution Session Identifier, Event ID(s) as described in table 4.6.2-1, informative message.

**Output parameters:** Result indication.

#### 7.3.2.8 Nmbstf\_MBSDistributionSession\_StatusSubscribeMod operation

**Service operation name:** Nmbstf\_MBSDistributionSession\_StatusSubscribeMod

**Description:** Invoked by the MBSF on the MBSTF to modify an existing status subscription.

**Input parameters (Required):** Subscription correlation ID.

**Input parameters (Optional):** Event ID(s) as described in table 4.6.2-1, notification target address, subscription expiration time.

**Output parameters (Required, Optional):** Result indication.

END OF CHANGES