**3GPP TSG-S4 Meeting #119-e *S4-220634***

**Online, , 11th–20th May 2022** revision of S4-220568

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **TS 26.502** | **CR** | **0001** | **rev** |  | **Current version:** | **17.0.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | [5MBUSA] MBS User Service procedures |
|  |  |
| ***Source to WG:*** | BBC |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | 5MBUSA |  | ***Date:*** | 2022-05-04 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). |  |
|  |  |
| ***Reason for change:*** | Provide procedures describing how Nmbsf and Nmbstf are intended to be used. |
|  |  |
| ***Summary of change:*** | * Adjustment to static domain model to separate out MBS Distribution Session Announcement from MBS User Session Announcement.
* Provided call flows for MBS User Service.
 |
|  |  |
| ***Consequences if not approved:*** | The procedures model will not be clearly defined for stage 3 realisation. |
| ***Q*** |  |
| ***Clauses affected:*** | Figure 4.5.2-1, 4.5.3, 4.5.5, 4.5.7, 5.3, 5.4, 5.5, 5.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | S4aI221306 -> S4aI221310 -> S4aI221313 -> S4aI221326 -> S4-220346 -> S4-220568 -> S4-220634 |

FIRST 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 Distribution Session:** time, protocols and protocol state (i.e. parameters) which define sender and receiver configuration and which use an MBS Session for the delivery of an MBS User Data Ingest Session.

**MBS Distribution Session Announcement:** metadata entity consumed by the MBSTF Client that is used to advertise the current or imminent availability of an MBS Distribution Session in the MBS System that provides parameters needed by the MBSTF Client to receive it.

**MBS Session:** a multicast session or a broadcast session, as defined in TS 23.247 [4].

(SNIPPED)

**MBS User Service Announcement:** metadata entity consumed by the MBSF Client that is used to advertise the current or imminent availability of an MBS User Service in the MBS System .

(SNIPPED)

NEXT CHANGE

 

NOTE 1: 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 2: 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

NEXT CHANGE

### 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:

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 term identifier from a controlled vocabulary. |
| 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. |
| 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 Consumption Reporting Configuration (see clause 4.5.4 below) may be separately provisioned within the scope of an MBS User Service.]

NEXT CHANGE

### 4.5.4 MBS Reception Reporting Configuration parameters

Reception reporting for MBS User Services is for future study.

NEXT CHANGE

### 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:

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 period | 0..\* | MBS Application Provider | Period of time during which the MBS User Data Ingest Session is active in the MBS System.If omitted, the 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.

NEXT 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 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).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). |
| 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).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 the 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.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. |
|  |  | MBS Application Provider | Distribution SessionThe set of service areas 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. |
| QoS information | 0..1 | A 5G QoS Identifier (5QI) [2] to be applied to the traffic flow for this MBS Distribution Session.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.This parameter is not relevant to the MBSTF. |
| Maximum bit rate | 1..1 | The maximum bit rate for this MBS Distribution Session. |
| Maximum delay | 0..1 | The maximum end-to-end 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. |
| Distribution 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 FEC information added by the MBSTF to protect this MBS Distribution Session. |
| Traffic marking information | 0..1 | MBS Application Provider or MBSF | Information (e.g. a DS Code Point) used by the MBSTF to mark the multicast packets that it conveys to the MB‑UPF at reference point Nmb9. |
| NOTE: Internal parameter not exposed to the MBS Application Provider. |

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 | A URL prefix substituted by the MBSTF with the *Object distribution base URL* prior to distribution of ingested objects.If omitted, nothing is removed from the content ingest URL when forming the object distribution URL |
| Object distribution base URL | 0..1 | 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 *Content 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 parameters 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.In the case of multicast ingest, the MBSTF shall join a Source-Specific Multicast (SSM) group indicated in *MBSTF ingest endpoint addresses* parameter.In the case of unicast ingest, 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 and RTP Streaming 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. |
|  |  |  |  |

NEXT CHANGE

### 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. |
| 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.An MBS Distribution Session Announcement is present only when the state of the corresponding MBS Distribution Session is ESTABLISHED or ACTIVE. |

NEXT CHANGE

### 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. |
| 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. |

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

|  |  |  |  |
| --- | --- | --- | --- |
| 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 identifers* 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. |

NEXT CHANGE

## 5.3 Procedures for User Service provisioning

The procedure begins with the MBS Application Provider provisioning an MBS User Service and, within its scope, a set of MBS User Data Ingest Sessions, as shown in figures 5.3‑1 and 5.3.‑2 below.



Figure 5.3‑1: Call flow for MBS User Service provisioning by MBS Application Provider

First, the MBS Application Provider provisions a new MBS User Service Session in the MBS System:

1. To support Use Cases (e.g. Group Communication) where there is a requirement for TMGI allocation to be managed outside the MBS System, the MBS Application Provider may pre-allocate a TMGI for some or all of the MBS Distribution Sessions declared in step 3 below by invoking the Nmbsmf\_‌TMGI\_‌Allocate service operation on the MB‑SMF at reference point Nmb13 (or N33+N29mb, if invoked via the NEF), as specified in clause 9.1.2.2 of TS 23.247 [5].

2. The MBS Application Provider invokes the Nmbsf\_MBSUserService\_Create service operation at reference point Nmb10 (or N33+Nmb5 if invoking via the NEF) to create a new MBS User Service, as defined in clause 4.5.3.

Immediately, or at some later time, the MBS Application Provider creates at least one MBS User Data Ingest Session (as defined in clause 4.5.5) within the scope of the MBS User Service created in step 2 above:

3. The MBS Application Provider creates an MBS User Data Ingest Session by invoking the Nmbsf\_‌MBSUserData‌Ingest‌Session\_‌Create service operation at reference point Nmb10 (or N33+Nmb5, if invoked via the NEF).

The MBS User Data Ingest Session optionally includes a schedule of start and end times referred to as *active periods*.

The MBS User Data Ingest Session comprises the details of one or more MBS Distribution Session(s), as defined in clause 4.5.6. Each such MBS Distribution Session fully specifies one of the distribution methods defined in clause 6 and may optionally nominate a TMGI to be used if one was pre-allocated in step 1 above.

4. The MBS Application Provider subscribes to status events from the MBSF relating to the MBS User Data Ingest Session just created by invoking Nmbsf\_‌MBSUserDataIngestSession\_‌StatusSubscribe service operation at reference point Nmb10 (or N33+Nmb5, if invoked via the NEF).

5. The MBSF may notify the status of each created MBS User Data Ingest Session to the MBS Application Provider by invoking the Nmbsf\_‌MBSUserDataIngestSession\_‌StatusNotify callback service operation at reference point Nmb10 (or N33+Nmb5, if invoked via the NEF).

Shortly before a provisioned MBS User Data Ingest session is scheduled to become active (see clause 4.5.5), or immediately if no schedule of active periods is provisioned, the MBSF establishes in the MBSTF all MBS Distribution Sessions comprising that MBS User Data Ingest Session as shown in figure 5.3‑2 below.



Figure 5.3‑2: Call flow for MBS User Service internal provisioning

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.

8. The MBSF creates the MBS Distribution Session in the MBSTF by invoking the Nmbstf\_‌MBSDistribution‌Session\_‌Create service operation at reference point Nmb2. This is a mirror of the entity in the MBSF (see clause 4.5.6). In the case of the Packet Distribution Method, the response may include additional content ingest parameters chosen by the MBSTF for this MBS Distribution Session (see *MBSTF ingest endpoint addresses* in table 4.5.6‑3).

9. In the case of the Packet Distribution Method, the MBSF invokes the Nmbsf\_‌MBSUserDataIngestSession\_‌StatusNotify callback service operation at reference point Nmb10 (or Nmb5+N33, if invoked via the NEF) to inform the MBS Application Provider of the content ingest parameters that have been chosen for this MBS Distribution Session (see *MBSTF ingest endpoint addresses* in table 4.5.6‑3).

10. The MBSF subscribes to status events from the MBSTF relating to the MBS Distribution Session just created by invoking the Nmbstf\_‌MBSDistributionSession‌StatusSubscribe service operation at reference point Nmb2.

11. The MBSTF attempts to establish content ingest from the MBS Application Provider at reference point Nmb8 according to the ingest parameters and distribution method provisioned for the MBS Distribution Session in question (see table 4.5.6‑1).

On success, the state of the MBS Distribution Session in the MBSTF becomes ESTABLISHED; on failure, it remains INACTIVE (see step 2 in clause 4.6.1).

NOTE: Success of this step varies according to the provisioned distribution method and its configuration. Success may, for example, be defined as establishing a network association with the MBS Application Provider (using the additional parameters defined in table 4.5.6‑3), or it may require successful ingest of an initial object from the MBS Application Provider (using the additional parameters defined in table 4.5.6‑2).

12. The MBSTF invokes the Nmbstf\_‌MBSDistributionSession\_‌StatusNotify callback service operation at reference point Nmb2 to inform the MBSF of the (un)successful establishment of content ingest.

On success, the state of the MBS Distribution Session in the MBSF becomes ESTABLISHED; on failure, it remains INACTIVE (see step 2 in clause 4.6.1).

13. The MBSF invokes the Nmbsf\_‌MBSUserDataIngestSession\_‌StatusNotify callback service operation at reference point Nmb10 (or Nmb5+N33, if invoked via the NEF) to inform the MBS Application Provider of the (un)successful establishment of content ingest for the MBS Distribution Session in the context of its parent MBS User Data Ingest Session.

14. If content ingest was established successfully in step 11 above, the MBSF compiles the metadata relating to this MBS Distribution Session into an MBS Distribution Session Announcement, as defined in clause 4.5.8.

## 5.4 Procedures for User Service initiation/terminationadvertisement/discovery

At this point, the MBS User Service Session is advertised to the MBSF Client, as shown in figure 5.4‑1 below.



Figure 5.4‑1: Call flow for MBS User Service advertisement/discovery

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.

## 5.5 Procedures for User Service data transfer

At the next start time indicated in the MBS User Data Ingest Session schedule of active periods, or immediately if no schedule is provisioned, the MBSF activates all MBS Distribution Sessions comprising that MBS User Data Ingest Session, as shown in figures 5.5‑1 and 5.5‑2 below.



Figure 5.5‑1: Call flow for MBS Distribution Session activation by MBSF

For each such MBS Distribution Session:

1. The MBSF invokes the Nmbstf\_‌MBSDistributionSession\_‌Update service operation on the MBSTF at reference point Nmb2, updating the current state of the MBS Distribution Session to ACTIVE (see step 3 in clause 4.6.1).

2. As a direct result of the previous step, the MBSTF begins to ingest content from the MBS Application Provider.

3. The MBSTF processes the ingested content according to the provisioned distribution method, as defined in clause 4.3.3. This may optionally include the computation of Application Level FEC (AL‑FEC) information.

4. The MBSTF distributes the resulting MBS data at reference point MBS‑4‑MC. This is achieved by passing the MBS data to the MB‑UPF at reference point Nmb9, according to the protocol stacks defined in clause 8.2 of TS 23.247 [5].

5. On successful content ingest and MBS data distribution, the state of the MBS Distribution Session in the MBSTF becomes and remains ACTIVE (see step 3 in clause 4.6.1); on failure, it transitions through DEACTIVATING to INACTIVE (see step 4 in clause 4.6.1).

The MBSTF invokes the Nmbstf\_‌MBSDistributionSession\_‌StatusNotify callback service operation at reference point Nmb2 to inform the MBSF of any changes to the state of the MBS Distribution Session.

6. The MBSF invokes the Nmbsf\_‌MBSUserDataIngestSession\_‌StatusNotify callback service operation at reference point Nmb10 (or Nmb5+N33, if invoked via the NEF) to inform the MBS Application Provider of any changes to the state of the MBS Distribution Session in the context of its parent MBS User Data Ingest Session.

The MBS Client in the UE activates reception of an MBS User Service by establishing an MBS User Service Session between the MBSF Client and the MBSF, and consequently activating reception of one or more MBS Distribution Sessions by the MBSTF Client that are currently being distributed by the MBSTF. This call flow is shown in figure 5.5‑2 below:



Figure 5.5‑2: Call flow for MBS User Service activation by MBS Client

The steps are as follows:

7. The MBS-Aware Application invokes a client API exposed by the MBSF Client at reference point MBS-6 to activate the MBS User Service Session.

If the MBS User Service Announcement was received by the MBS-Aware Application in step 2c in clause 5.4, this is passed as one of the parameters in the API call.

Otherwise, the target service is identified by one of the service identifiers in the MBS User Service entity (see clause 4.5.3) and this identifier is used by the MBSF Client to locate an MBS User Service Announcement obtained according to step 2a or step 2b in clause 5.4.

For each MBS Distribution Session listed in the composite MBS User Service Announcement:

8. The MBSF Client invokes a client API exposed by the MBSTF Client at reference point MBS‑6′ to activate reception of the MBS Distribution Session in question. The Session Description parameters needed to receive the MBS Distribution Session are taken from the relevant MBS Distribution Session Announcement which, in turn, is extracted from the composite MBS User Service Announcement.

9. MBS data from the MBSTF is received by the MBSTF Client at reference point MBS‑4‑MC.

## 5.6 Procedure for User Service data repair

In the case of the Object Distribution Method (as defined in clause 6.1), the MBSTF Client may collaborate with the MBS AS at reference point MBS‑4‑UC to recover lost portions of content corresponding to MBS data that was not successfully received by the MBSTF Client at reference point MBS‑4‑MC (see step 9 in clause 5.5).

The procedure for data repair is illustrated in figure 5.6‑1 below:



Figure 5.6-1: Call flow for MBS User Service data repair

END OF CHANGES