**3GPP TSG-SA4 Meeting #131 *S4-250019r01***

**Geneva, , 17th Feb 2025 - 21st Feb 2025**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.502** | **CR** | **0035** | **rev** | **3** | **Current version:** | **18.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | [AMD-ARCH-MED] Time Synchronization | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Germany | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AMD-ARCH-MED | | | | |  | ***Date:*** | | | 2025-02-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-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.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | [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 | | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | *Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 of TR 26.802:  i. 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:*** | | |  |  |  |  | | --- | --- | --- | --- | | [**S4aI250057**](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/3GPP_SA4_AHOC_MTGs/SA4_MBS/Docs/S4aI250057.zip) | [AMD-ARCH-MED] Selected MBMS Functionalities not supported in MBS | Qualcomm Germany | Thomas Stockhammer |   **E-mail Discussion**: none  **Revisions**: none  **Presenter**: Thomas Stockhammer  **Online Discussion**: (February 6, 2025)  **Decision**:  [S4aI250057](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/3GPP_SA4_AHOC_MTGs/SA4_MBS/Docs/S4aI250057.zip) is **noted**  This document provides updates wrt to time synchronization.  For generic application service, see S4-250018  For selective unicast, see S4-250019   |  |  |  |  |  | | --- | --- | --- | --- | --- | | [**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 | The text discusses various reference documents related to 3GPP specifications, including system architecture, procedures, security, and multimedia services. It outlines the functions and interactions of entities like MBS AS and MBS Client in supporting MBS User Services. The MBS Client, part of the UE, is further divided into subfunctions that handle communication with MBS AF, MBSTF, and MBS AS for various tasks. Reference points relevant to MBS User Services architecture are defined, along with the parameters for MBS User Service Announcement. The text provides detailed information on the components and interactions involved in supporting multicast-broadcast services in the 5G system. | Thomas Stockhammer |   **Revisions**:   |  |  |  |  | | --- | --- | --- | --- | | 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 | 204,4 KB | | 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 | 205,2 KB |   **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?   **Decision**: | | | | | | | | |

## ===== 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 as for MBMS, two options are provided in order to achieve this functionality:

1. **The usage of SIB9**: As specified in TS 38.331 [38331], SIB9 conveys information in its timeInfo parameter related to a Coordinated Universal Time (UTC) wallclock to an accuracy of 10ms. 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 bearer carrying the MBS Distribution Session, the relevant MBS functions shall be time-synchronized to the same UTC wallclock a the NR SIB9 information to a tolerance of ±100 ms or better.

2. **Timing 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 synchronisation service no more often than needed to maintain time synchronization accurate to at least ±1s with the 5G System. Specific features may require tighter synchronization and tighter tolerances. If more than one time services are 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 SIB9 information.

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

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

### 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 file-based unicast repair and time synchronization.

**- 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 =====

### 4.5.7 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. |
| Time service endpoints | 0..N | MBSF | A set of time services provided by the MBS AS for the MBS Client to enable time synchronization with the needed precision. |
| 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. |