

# ETSI TS 123 246 V15.1.0 (2019-10)



**Universal Mobile Telecommunications System (UMTS);  
LTE;  
Multimedia Broadcast/Multicast Service (MBMS);  
Architecture and functional description  
(3GPP TS 23.246 version 15.1.0 Release 15)**

STANDARD PREVIEW  
https://standards.itec.ai/standards/sist/bbaf-9b-b0b0-4bde-ad29-4472f48a16d0/etsi-ts-123-246-v15.1.0-2019-10



---

**Reference**RTS/TSGS-0223246v10

---

**Keywords**LTE,UMTS

---

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

# Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

---

# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	6
1 Scope .....	7
2 References .....	7
3 Definitions and abbreviations.....	8
3.1 Definitions .....	8
3.2 Abbreviations .....	9
4 MBMS Architecture .....	9
4.1 Overview .....	9
4.2 Reference Architecture Model .....	10
4.2.1 GPRS .....	10
4.2.2 EPS .....	10
4.3 MBMS Specific Reference points .....	11
4.3.1 Gmb .....	11
4.3.1a SGmb .....	11
4.3.2 Mz.....	11
4.3.3 Reference Points for Evolved Packet System.....	12
4.4 MBMS Service Provision.....	12
4.4.1 MULTICAST MODE.....	12
4.4.1.1 Subscription .....	14
4.4.1.2 Service announcement .....	14
4.4.1.3 Joining.....	15
4.4.1.4 Session Start.....	15
4.4.1.5 MBMS notification .....	15
4.4.1.6 Data transfer .....	15
4.4.1.7 Session Stop .....	15
4.4.1.8 Leaving .....	15
4.4.2 Multicast Mode timeline .....	15
4.4.2.1 Period between Service Announcement and Session Start .....	15
4.4.2.2 Period between Service Announcement and Service Subscription .....	15
4.4.2.3 Period between Service Announcement and Joining .....	16
4.4.2.4 Period between Joining and Session Start.....	16
4.4.2.5 Period between Session Start and First Data Arrival .....	16
4.4.2.6 Period between Session Start and Session Stop .....	16
4.4.2.7 Session Update.....	16
4.4.3 BROADCAST MODE .....	16
4.4.3.1 Service announcement .....	18
4.4.3.1a UE local service activation.....	18
4.4.3.2 Session Start .....	18
4.4.3.3 MBMS notification .....	18
4.4.3.4 Data transfer .....	18
4.4.3.5 Session Stop .....	19
4.4.3.6 Session Update.....	19
4.4.4 Broadcast Mode timeline .....	19
4.4.4.1 Period between Service Announcement and Session Start .....	19
4.4.4.2 Period between Session Start and First Data Arrival .....	19
4.4.4.3 Period between Session Start and Session Stop .....	19
5 Functional Entities To Support MBMS.....	19
5.0 General .....	19
5.1 Broadcast-Multicast Service Centre (BM-SC) .....	19
5.1.0 General.....	19

5.1.1	Membership Function .....	20
5.1.2	Session and Transmission Function .....	20
5.1.3	Proxy and Transport Function .....	21
5.1.4	Service Announcement Function .....	21
5.1.4a	MBMS Security Function .....	22
5.1.5	MBMS Content Transfer for the same MBMS User Service for GPRS and EPS .....	22
5.1.5.1	General .....	22
5.1.5.2	Separate MBMS Bearer Services for the same MBMS User Service .....	22
5.1.5.3	Same MBMS Bearer Service for the same MBMS User Service .....	23
5.1.6	Location Dependent Content Transfer for the same MBMS User Service (Broadcast Mode only) .....	23
5.1.7	MBMS User Service Consumption Reporting (Broadcast mode only) .....	23
5.2	User Equipment .....	24
5.3	UTRAN/GERAN .....	24
5.4	SGSN .....	24
5.5	GGSN .....	25
5.6	MBMS Data Sources and Content Provider .....	25
5.7	Other Functional Element .....	25
5.7.1	Void .....	25
5.7.2	CBC .....	26
5.7.3	Void .....	26
5.8	Void .....	26
5.9	Functional Elements for the Evolved Packet System .....	26
5.9.1	MBMS GW .....	26
5.9.2	MBMS Control plane function .....	27
5.9.3	E-UTRAN .....	27
6	MBMS Attributes and Parameters .....	27
6.1	MBMS UE Context .....	27
6.2	MBMS Bearer Context .....	28
6.3	Quality-of-Service .....	31
6.3.1	Quality-of-Service for GPRS .....	31
6.3.2	Quality-of-Service for EPS .....	32
6.3.3	MBMS QoS distribution tree .....	33
6.4	Temporary Mobile Group Identity .....	34
6.5	IP Multicast distribution .....	34
6.5.1	General .....	34
6.5.2	IP Multicast distribution for GERAN Iu-mode and UTRAN for GPRS .....	34
6.5.3	IP Multicast distribution for E-UTRAN and UTRAN for EPS .....	35
7	Architectural Aspects of MBMS User Services .....	35
7.1	Alternative User Service Support .....	36
7.2	Avoid overload in SGSN, GGSN and BM-SC caused by Joining .....	36
7.3	Access aspects of MBMS user services .....	36
7.4	MBMS operation on Demand .....	36
7.5	Enhanced TV services support over E-UTRAN .....	36
8	MBMS Procedures .....	37
8.1	MBMS Notification .....	37
8.1.1	Iu mode notification (UTRAN and GERAN) for GPRS .....	37
8.1.2	A/Gb mode notification (GERAN) .....	38
8.2	MBMS Multicast Service Activation .....	38
8.2.1	Void .....	40
8.3	MBMS Session Start Procedure .....	40
8.3.0	General .....	40
8.3.1	MBMS Session Start Procedure for GERAN and UTRAN for GPRS .....	41
8.3.2	MBMS Session Start Procedure for E-UTRAN and UTRAN for EPS .....	42
8.4	MBMS Registration Procedure .....	45
8.5	MBMS Session Stop Procedure .....	47
8.5.0	General .....	47
8.5.1	MBMS Session Stop Procedure for GERAN and UTRAN for GPRS .....	47
8.5.2	MBMS Session Stop Procedure for E-UTRAN and UTRAN for EPS .....	48
8.6	MBMS De-Registration Procedure .....	49
8.6.0	Common MBMS De-Registration procedure .....	49

8.6.1	BM-SC initiated MBMS De-Registration Procedure .....	50
8.7	MBMS Multicast Service Deactivation.....	51
8.8	MBMS Session Update procedure .....	53
8.8.1	General.....	53
8.8.2	SGSN initiated Session Update for GERAN and UTRAN for MBMS Multicast service.....	54
8.8.3	BM-SC initiated Session Update for GERAN and UTRAN for MBMS Broadcast service.....	54
8.8.4	BM-SC initiated Session Update for EPS with E-UTRAN and UTRAN .....	55
8.9	MBMS UE Context Synchronisation Procedure .....	58
8.9a	MBMS feature support indication .....	58
8.10	Inter SGSN Routeing Area Update .....	59
8.10a	Inter-system Intra-SGSN change.....	60
8.11	Inter SGSN Serving RNS Relocation Procedure.....	60
8.12	MBMS Broadcast Service Activation .....	62
8.13	MBMS Broadcast service de-activation .....	62
8.14	Void.....	62
8.15	MBMS UE Linking/De-linking mechanism.....	62
8.16	MBMS Service Request Procedure .....	63
8.17	Notification in case of parallel services.....	64
8.17.1	Notification of incoming CS domain call during an ongoing MBMS session.....	64
8.17.2	Notification of additional MBMS session during an ongoing MBMS session.....	64
8.17.3	Notification of Mobile Terminating PS data during an ongoing MBMS session .....	64
8.17.4	Notification of MBMS session during an ongoing CS or PS domain "connection" .....	64
9	Security.....	65
10	Charging requirement.....	65
10.1	General .....	65
10.2	Bearer level charging for MBMS .....	65
10.3	Application level charging for MBMS.....	65
10.4	Generation of charging records in the VPLMN.....	66
11	Roaming Support for MBMS user services.....	66
11.1	Scenarios description.....	66
11.2	Scenario signalling flow .....	66
11.2.1	APN selection .....	66
<b>Annex A (Informative):</b>	<b>Void .....</b>	<b>68</b>
<b>Annex B (Informative):</b>	<b>Void .....</b>	<b>69</b>
<b>Annex C (normative):</b>	<b>TV services delivery using unicast mode &amp; switching between broadcast &amp; unicast modes for E-UTRAN.....</b>	<b>70</b>
<b>Annex D (normative):</b>	<b>Shared MBMS Network over E-UTRAN .....</b>	<b>72</b>
D.1	General .....	72
D.2	Architecture.....	72
D.2.1	Architecture for per PLMN MBSFN synchronization area.....	72
D.2.2	Reference Points.....	73
D.2.3	UE Aspects .....	73
D.2.4	TMGI for shared MBMS networks .....	74
<b>Annex E (normative):</b>	<b>UE behaviour in Receive Only Mode.....</b>	<b>75</b>
<b>Annex C (Informative):</b>	<b>Change history .....</b>	<b>77</b>
History .....		78

---

# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

**PREVIEW**  
iTech STANDARD  
(standards.itih.ai)  
Full standard d:  
<https://standards.itih.ai/catalog/standards/sist/bbaa5e9b-b0bb-4bde-ad29-4472f48a16dd/etsi-ts-123-246-v15.1.0-2019-10>

---

# 1 Scope

The present document describes the stage 2 description (architectural solution and functionalities) for the MBMS Bearer Service, which includes, together with MBMS User Services defined in TS 26.346 [7], all the elements necessary to realise the stage 1 requirements in TS 22.146 [2] and TS 22.246 [6]. This document encompasses both GPRS and EPS.

The present document also includes considerations on the manner in which User Services should make use of the MBMS Bearer Service described herein. It should be noted that the specification of MBMS User Services in TS 26.346 [7] takes precedence over User Service aspects described in this document.

The present document includes information applicable to network operators, service providers and manufacturers.

---

# 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 22.146: "Multimedia Broadcast/Multicast Service; Stage 1".
- [3] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".
- [4] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".
- [5] 3GPP TS 33.246: "Security of Multimedia Broadcast/Multicast Service".
- [6] 3GPP TS 22.246: "Multimedia Broadcast/Multicast Service (MBMS) user services".
- [7] 3GPP TS 26.346: "MBMS: Protocols and Codecs".
- [8] void.
- [9] void.
- [10] 3GPP TS 25.346: "Introduction of the Multimedia Broadcast Multicast Service (MBMS) in the Radio Access Network".
- [11] 3GPP TS 43.246: "Technical Specification Group GSM/EDGE Radio Access Network; Multimedia Broadcast Multicast Service (MBMS) in the GERAN".
- [12] 3GPP TS 23.125: "Overall high level functionality and architecture impacts of flow based charging; Stage 2".
- [13] 3GPP TS 23.003: "Numbering, addressing and identification".
- [14] 3GPP TS 32.422: "Subscriber and equipment trace; Trace control and Configuration Management (CM)".
- [15] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [16] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN Access".



- [17] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN)".
- [18] 3GPP TS 25.446: "MBMS synchronisation protocol (SYNC)".
- [19] IETF RFC 3376: "Internet Group Management Protocol, Version 3".
- [20] IETF RFC 3810: "Multicast Listener Discovery Version 2 (MLDv2) for IPv6".
- [21] IETF RFC 4607: "Source-Specific Multicast for IP".
- [22] IETF RFC 4604: "Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source specific Multicast".
- [23] 3GPP TS 23.203: "Policy and charging control architecture".
- [24] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE\_LTE)".
- [25] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".
- [26] 3GPP TS 23.007: "Restoration procedures".
- [27] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE\_LTE); MB2 reference point; Stage 3".
- [28] 3GPP TS 36.444: "M3 Application Protocol (M3AP)".
- [29] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".
- [30] 3GPP TS 22.101: "Service aspects; Service principles".

---

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions defined in TR 21.905 [1] and TS 22.146 [2] and the following apply:

**MBMS Service Announcement:** Mechanism to allow users to be informed about the MBMS user services available.

**MBMS Bearer Service:** the service provided by the PS Domain to MBMS User Services to deliver IP multicast datagrams to multiple receivers using minimum network and radio resources.

**MBMS User Service:** the MBMS service provided to the end user by means of the MBMS Bearer Service and possibly other capabilities.

**MBMS Service Area:** The area within which data of a specific MBMS session are sent. Each individual MBMS session of an MBMS Bearer Service may be sent to a different MBMS Service Area. This MBMS Service Area is the same or a subset of the Multicast or Broadcast Service Area as defined in TS 22.146 [2]. An MBMS Service Area smaller than the Multicast or Broadcast Service Area is typically used for localized services.

**MBMS over a Single Frequency Network:** See TS 25.346 [10].

**Receive Only Mode:** A UE configuration option that allows a UE to receive only eMBMS broadcast service without the need to access and register with the PLMN offering the eMBMS service. A UE configured to operate in Receive Only Mode receives MBMS service only on a standardised TMGI value range. The UE uses the acquired system information to receive MBMS broadcast. Use of Receive Only Mode does not require USIM for the UE.

**Shared MBMS Network:** A network shared by multiple PLMNs that provides MBMS services. The Shared MBMS network consists of the following shared network elements: BM-SC(s) and MBMS-GW(s). The shared MBMS network may also include eNB(s), MCE(s), and shared MME(s) for MBMS operation.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations in TR 21.905 [1] and TS 22.146 [2] apply.

EPS	Evolved Packet System
C-TEID	Common TEID
MBSFN	MBMS over a Single Frequency Network
MCE	Multi-cell/Multicast Coordination Entity
SSM	Source Specific Multicast
TMGI	Temporary Mobile Group Identity
TPF	Traffic Plane Function
SMN	Shared MBMS Network

---

## 4 MBMS Architecture

### 4.1 Overview

MBMS is a point-to-multipoint service in which data is transmitted from a single source entity to multiple recipients. Transmitting the same data to multiple recipients allows network resources to be shared.

The MBMS bearer service offers two modes:

- Broadcast Mode;
- Multicast Mode.

Broadcast Mode is supported for EPS and GPRS, and Multicast Mode is supported for GPRS. MBMS for EPS supports E-UTRAN and UTRAN. MBMS for GPRS supports UTRAN and GERAN.

MBMS architecture enables the efficient usage of radio-network and core-network resources, with an emphasis on radio interface efficiency.

MBMS is realised by the addition of a number of new capabilities to existing functional entities of the 3GPP architecture and by addition of a number of new functional entities.

The existing PS Domain functional entities (GGSN, SGSN, MME, E-UTRAN, UTRAN, GERAN and UE) are enhanced to provide the MBMS Bearer Service. In the EPS a functional entity MBMS GW exists at the edge between the CN and the BM-SC. In the bearer plane, this service provides delivery of IP Multicast datagrams from the Gi and SGI-mb reference points to UEs with a specified Quality of Service. In the control plane, this service provides mechanisms for:

- managing the MBMS bearer service activation status of UEs (in the case of multicast mode);
- outsourcing authorisation decisions to the MBMS User Service (i.e. to the BM-SC) (in the case of multicast mode);
- providing control of session initiation/modification/termination by the MBMS User Service and managing bearer resources for the distribution of MBMS data (in the case of multicast and broadcast modes).

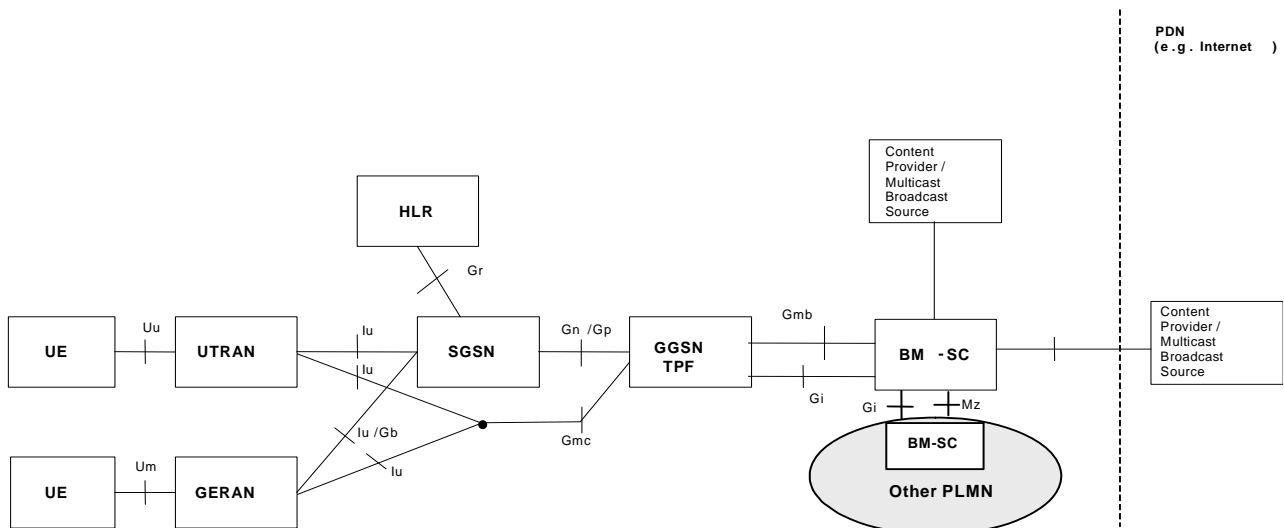
A particular instance of the MBMS Bearer Service is identified by an IP Multicast Address and an APN Network Identifier. A TMGI also can be used to identify one MBMS Bearer Service inside one PLMN.

For GPRS the boundary of the MBMS Bearer Service is the Gmb and Gi reference points as shown in Figure 1 below. The former provides access to the control plane functions and the latter the bearer plane. For EPS the boundary is the SGmb and the SGI-mb as shown in figure 1b below.

A functional entity, the Broadcast Multicast Service Centre (BM-SC) provides a set of functions for MBMS User Services. BM-SC functions for different MBMS User Services may be supported from the same or different physical network elements.

## 4.2 Reference Architecture Model

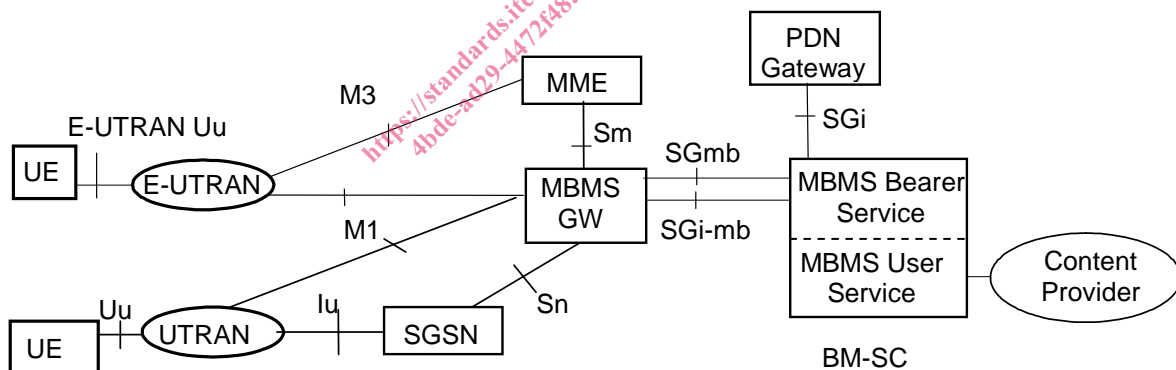
### 4.2.1 GPRS



- Note 1: Network entities and reference points solely used by the MBMS user service (e.g. for service announcement as described in clause 4.4.1.2) are not shown in this figure.
- Note 2: Gp applies only when SGSN and GGSN are in different PLMNs.
- Note 3: the Iu/Gn reference point above is a direct tunnel according to clause 5.6.2.2, figure 6b in TS 23.060 [15] with IP multicast based addressing according to RFC 4607 [21].

**Figure 1a: Reference architecture for GPRS to support the MBMS bearer service with GERAN and UTRAN**

### 4.2.2 EPS



**Figure 1b: Reference architecture for Evolved Packet System with E-UTRAN and UTRAN (MBMS Broadcast Mode only)**

- NOTE 1: In addition to MBMS Bearers (over SGmb/SGi-mb), the BM-SC may use EPS Bearers (over SGi) to realize an MBMS User Service as specified in TS 26.346 [7].
- NOTE 2: The MCE (see TS 36.300 [17]) is not shown in the figure.
- NOTE 3: MBMS service over Gn-SGSN is supported when the MBMS-GW is co-located with the PDN GW and this PDN GW has the necessary GGSN functions to control the MBMS Bearer Service over Gn.

## 4.3 MBMS Specific Reference points

### 4.3.1 Gmb

Signalling between GGSN and BM-SC is exchanged at Gmb reference point. This represents the network side boundary of the MBMS Bearer Service from a control plane perspective. This includes user specific Gmb signalling and MBMS bearer service specific signalling.

MBMS bearer service specific Gmb signalling:

- The GGSN establishes the MBMS bearer context and registers at BM-SC.
- The GGSN or the BM-SC releases the MBMS bearer context and de-registers the GGSN from the BM-SC.
- The BM-SC indicates session start, update and stop to the GGSN including session attributes like QoS and MBMS service area.

User specific Gmb signalling:

- The BM-SC authorises the user specific MBMS multicast service activation (join) at the GGSN.
- The GGSN reports to the BM-SC the successful user specific MBMS multicast activation (join) to allow the BM-SC to synchronise the BM-SC MBMS UE context with the MBMS UE contexts in the SGSN and GGSN.
- The GGSN reports to the BM-SC when a user specific MBMS multicast service is released or deactivated (e.g. at implicit detach). The GGSN makes this report in order to synchronise the BM-SC MBMS UE context with the MBMS UE contexts in the SGSN and GGSN.

The BM-SC initiates the deactivation of a user specific MBMS bearer service when the MBMS user service is terminated.

BM-SC functions for different MBMS bearer services may be provided by different physical network elements. Further, MBMS bearer service specific and user specific signalling for the same MBMS bearer service may also be provided by different physical network elements. To allow this distribution of BM-SC functions, the Gmb protocol must support the use of proxies to correctly route the different signalling interactions in a manner which is transparent to the GGSN.

#### 4.3.1a SGmb

The SGmb reference point has similar functions with the Gmb interface in control plane except for the Multicast Mode related functions. Specifically,

MBMS bearer service specific SGmb signalling:

- The BM-SC indicates session start, update and stop to the MBMS-GW including session attributes like QoS and MBMS service area, and some of attributes may be different from them in Gmb.

### 4.3.2 Mz

Mz is the roaming variant of the Gmb reference point with the same functionality as described under Gmb, i.e. with MBMS bearer and User specific signalling.

MBMS bearer and User specific Mz signalling is used between a BM-SC in the visited PLMN and a BM-SC in the home PLMN when MBMS services from the home PLMN are offered by the visited PLMN.

User specific signalling is used between a BM-SC in the visited PLMN and a BM-SC in the home PLMN when the visited PLMN offers MBMS user services to roaming users. This user specific Mz signalling provides home PLMN authorisation for MBMS user services that are provided by the visited PLMN. This mechanism supports only MBMS user service classes that are offered by the visited and by the home PLMN.

Mz may use proxying capabilities as described for Gmb, e.g. to proxy signalling between BM-SCs. An APN may be included in the signalling between BM-SCs, which is used to select an appropriate GGSN to access the MBMS service aiming for an optimized routing, resource saving, or operator policy.

NOTE: For EPS, the Mz reference point is not supported in this release.

### 4.3.3 Reference Points for Evolved Packet System

NOTE: The below listed reference points are applicable for the E-UTRAN and UTRAN MBMS Broadcast Mode (with or without counting) only.

**M1:** It is the reference point between MBMS GW and E-UTRAN/UTRAN for MBMS data delivery. IP Multicast is used on this interface to forward data.

**M3:** It is the reference point for the control plane between MME and E-UTRAN.

**Sm:** It is the reference point for the control plane between MME and MBMS GW.

**Sn:** It is the reference point between MBMS GW and SGSN (S4 based) for the control plane and for MBMS data delivery. Point-to-point mode is used on this interface to forward data..

**SGi-mb:** It is the reference point between BM-SC and MBMS GW function for MBMS data delivery.

**SGmb:** It is the reference point for the control plane between BM-SC and MBMS GW.

Protocol assumption:

- The Sm reference point is based on GTPv2-C.
- The Sn reference point is based on GTPv2-C and GTPv1-U.
- The M1 reference point is based on GTPv1-U.

## 4.4 MBMS Service Provision

### 4.4.1 MULTICAST MODE

Reception of an MBMS MULTICAST service is enabled by certain procedures that are illustrated in the Figure below.