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Technical Specification

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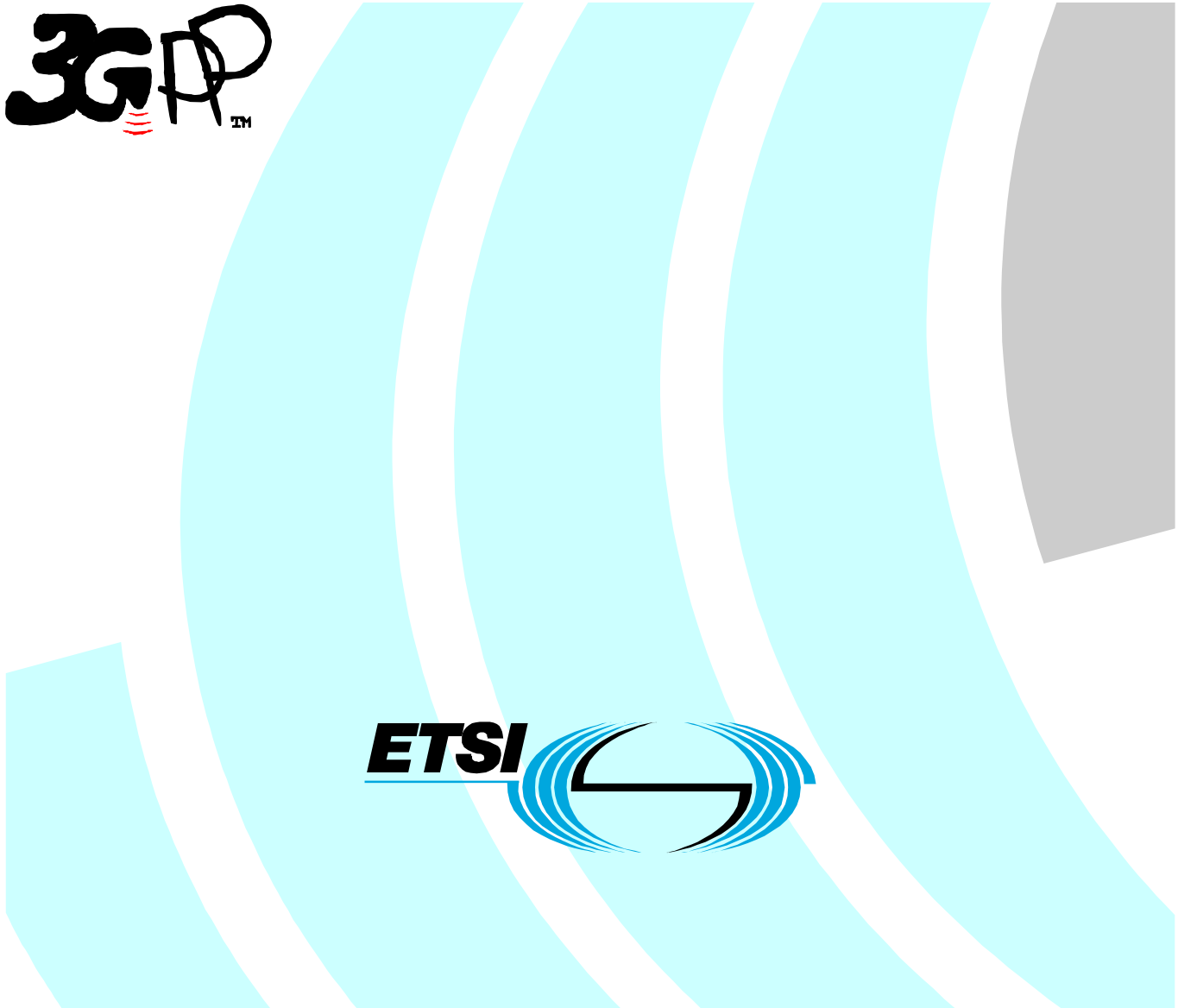
Charging management;
Multimedia Broadcast and Multicast Service (MBMS) charging
(3GPP TS 32.273 version 6.0.0 Release 6)



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Foreword

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, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

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

Contents

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

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  - 1 presented to TSG for information;
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- 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.

1 Scope

The present document is part of a series of documents that specify charging functionality and charging management in GSM/UMTS networks. The GSM/UMTS core network charging architecture and principles are specified in 3GPP TS 32.240 [1], which provides an umbrella for other charging management TSs that specify:

- the content of the CDRs per domain / subsystem / service (offline charging);
- the content of real-time charging messages per domain / subsystem / service (online charging);
- the functionality of online and offline charging for those domains / subsystems / services;
- the interfaces that are used in the charging framework to transfer the charging information (i.e. CDRs or charging events).

The complete document structure for these TSs is defined in 3GPP TS 32.240 [1].

The present document specifies the Offline and Online Charging description for the Multimedia Broadcast and Multicast Service (MBMS), based on the functional stage 2 description in 3GPP TS 23.246 [200]. This charging description includes the offline and online charging architecture and scenarios specific to MBMS, as well as the mapping of the common 3GPP charging architecture specified in 3GPP TS 32.240 [1] onto MBMS. It further specifies the structure and content of the CDRs for offline charging, and the charging events for online charging. The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in 3GPP TS 32.240 [1];
- The parameters, abstract syntax and encoding rules for the CDRs are specified in 3GPP TS 32.298 [51];
- A transaction based mechanism for the transfer of CDRs within the network is specified in 3GPP TS 32.295 [54];
- The file based mechanism used to transfer the CDRs from the network to the operator's billing domain (e.g. the billing system or a mediation device) is specified in 3GPP TS 32.297 [52];
- The 3GPP Diameter application that is used for MBMS offline and online charging is specified in 3GPP TS 32.299 [50].

All terms, definitions and abbreviations used in the present document, that are common across 3GPP TSs, are defined in the 3GPP Vocabulary, 3GPP TR 21.905 [100]. Those that are common across charging management in GSM/UMTS domains or subsystems are provided in the umbrella document 3GPP TS 32.240 [1] and are copied into clause 3 of the present document for ease of reading. Finally, those items that are specific to the present document are defined exclusively in the present document.

Furthermore, requirements that govern the charging work are specified in 3GPP TS 22.115 [102].

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 TS 32.240: "Telecommunication management; Charging management; Charging achitecture and principles".

[2]-[9] Void.

[10] 3GPP TS 32.250: "Telecommunication management; Charging management; Circuit Switched (CS) domain charging".

[11] 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[12]-[19] Void.

[20] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[21]-[29] Void.

[30] 3GPP TS 32.270: "Telecommunication management; Charging management; Multimedia Messaging Service (MMS) charging".

[31]-[49] Void.

[50] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[51] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) parameter description".

[52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".

[53] Void.

[54] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".

[55]-[99] Void.

[100] 3GPP TR 21.905: "Vocabulary for 3GPP specifications".

[101] Void.

[102] 3GPP TS 22.115: "Service aspects; Charging and billing".

[103]-[199] Void.

[200] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[201] 3GPP TS 22.146: "Multimedia Broadcast/Multicast Service (MBMS); Stage 1".

[202] 3GPP TS 22.246: "Multimedia Broadcast/Multicast Service (MBMS) user services; Stage 1".

[203] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[204] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [100], 3GPP TS 32.240 [1], 3GPP TS 23.246 [200] and the following apply:

2G- / 3G-: prefixes 2G- and 3G- refer to functionality that supports only GSM or UMTS, respectively, e.g. 2G-SGSN

refers only to the GSM functionality of an SGSN

accounting: process of apportioning charges between the Home Environment, Serving Network and Subscriber

Advice of Charge (AoC): real-time display of the network utilization charges incurred by the Mobile Station
The charges are displayed in the form of charging units. If a unit price is stored by the MS then the display may also include the equivalent charge in the home currency.

AoC service: combination of one or more services, both basic and supplementary, together with a number of other charging relevant parameters to define a customized service for the purpose of advice of charge

billing: function whereby CDRs generated by the charging function(s) are transformed into bills requiring payment

Billing Domain: part of the operator network, which is outside the core network, that receives and processes CDR files from the core network charging functions
It includes functions that can provide billing mediation and billing or other (e.g. statistical) end applications. It is only applicable to offline charging (see "Online Charging System" for equivalent functionality in online charging).

CDR field categories: the CDR fields are defined in the present document. CDR fields may be operator provisionable and are divided into the following categories:

- **Mandatory (M):** field that shall always be present in the CDR.
- **Conditional (C):** field that shall be present in a CDR if certain conditions are met.
- **Operator Provisionable: Mandatory (O_M):** field that, if provisioned by the operator, shall always be present in the CDR.
- **Operator Provisionable: Conditional (O_C):** field that, if provisioned by the operator, shall be present in a CDR if certain conditions are met.

chargeable event: activity utilizing telecommunications network infrastructure and related services for:

- user to user communication (e.g. a single call, a data communication session or a short message); or
- user to network communication (e.g. service profile administration); or
- inter-network communication (e.g. transferring calls, signalling, or short messages); or
- mobility (e.g. roaming or inter-system handover); and
- that the network operator may want to charge for.

charged party: user involved in a chargeable event who has to pay parts or the whole charges of the chargeable event, or a third party paying the charges caused by one or all users involved in the chargeable event, or a network operator

charging: function within the telecommunications network and the associated OCS/BD components whereby information related to a chargeable event is collected, formatted, transferred and evaluated in order to make it possible to determine usage for which the charged party may be billed (offline charging) or the subscribers account balance may be debited (online charging)

Charging Data Record (CDR): formatted collection of information about a chargeable event (e.g. time of call set-up, duration of the call, amount of data transferred, etc.) for use in billing and accounting
For each party to be charged for parts of or all charges of a chargeable event a separate CDR shall be generated, i.e. more than one CDR may be generated for a single chargeable event, e.g. because of its long duration, or because more than one charged party is to be charged.

charging function: entity inside the core network domain, subsystem or service that is involved in charging for that domain, subsystem or service

Fully qualified Partial CDR (FQPC): partial CDR that contains a complete set of the fields specified in 3GPP TS 23.273
This includes all the mandatory and conditional fields as well as those fields that the PLMN operator has provisioned to be included in the CDR. The first Partial CDR shall be a Fully qualified Partial CDR.

GPRS: packet switched bearer and radio services for GSM and UMTS systems

GTP': GPRS protocol used for CDR transport. It is derived from GTP with enhancements to improve transport reliability necessary for CDRs

NOTE: This protocol is not used for tunnelling.

inter-system change: change of radio access between different radio access technologies such as GSM and UMTS

middle tier (charging) TS: term used for the 3GPP charging TSs that specify the domain / subsystem / service specific, online and offline, charging functionality
These are all the TSs in the numbering range from 3GPP TS 32.250 to 3GPP TS 32.279, e.g. 3GPP TS 32.250 [10] for the CS domain, or 3GPP TS 32.270 [30] for the MMS service. Currently, there is only one "tier 1" TS in 3GPP, which is 3GPP TS 32.240 [1] that specifies the charging architecture and principles. Finally, there are a number of top tier TSs in the 32.29x numbering range ([50] ff) that specify common charging aspects such as parameter definitions, encoding rules, the common billing domain interface or common charging applications.

near real time: near real time charging and billing information is to be generated, processed, and transported to a desired conclusion in less than 1 minute

offline charging: charging mechanism where charging information **does not** affect, in real-time, the service rendered

online charging: charging mechanism where charging information can affect, in real-time, the service rendered and therefore a direct interaction of the charging mechanism with bearer/session/service control is required

Online Charging System: the entity that performs real-time credit control
Its functionality includes transaction handling, rating, online correlation and management of subscriber account balances.

packet switched domain: domain within GSM / UMTS in which data is transferred in packet switched mode
Corresponds to the term "GPRS".

partial CDR: CDR that provides charging information on part of a subscriber session
A long session may be covered by several partial CDRs. Two formats are considered for Partial CDRs. One that contains all of the necessary fields; the second has a reduced format.

real time: real time charging and billing information is to be generated, processed, and transported to a desired conclusion in less than 1 second

Reduced Partial CDR (RPC): partial CDRs that only provide mandatory fields and information regarding changes in the session parameters relative to the previous CDR

EXAMPLE: Location information is not repeated in these CDRs if the subscriber did not change its location.

settlement: payment of amounts resulting from the accounting process

subscriber: entity (associated with one or more users) that is engaged in a subscription with a service provider
The subscriber is allowed to subscribe and unsubscribe services, to register a user or a list of users authorized to enjoy these services, and also to set the limits relative to the use that associated users make of these services.

successful call: connection that reaches the communication or data transfer phase e.g. the "answered" state for speech connections
All other connection attempts are regarded as unsuccessful.

tariff period: part of one (calendar) day during which a particular tariff is applied
Defined by the time at which the period commences (the switch-over time) and the tariff to be applied after switch-over.

tariff: set of parameters defining the network utilization charges for the use of a particular bearer / session / service

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Bmb	Reference point for the CDR file transfer from the MBMS CGF to the BD
Bo	Reference point for the CDR file transfer from the OCF CGF to the BD
Bp	Reference point for the CDR file transfer from the GPRS CGF to the BD
Bx	Reference point between any (generic) 3GPP domain, subsystem or service CGF and the BD

Ga	Reference point for CDR transfer between a CDF and the CGF
Gi	Interface between the Packet-Switched domain and an external packet data network
Gn	Interface between two GSNs within the same PLMN
Gp	Interface between two GSNs in different PLMNs
kbit/s	Kilobits per second. 1 kbit/s = 2^{10} bits per second
Mbit/s	Megabits per second. 1 Mbit/s = 2^{20} bits per second
Rf	Offline charging reference point between a BM-SC and the CDF
Ro	Online charging reference point between a BM-SC and the OCS

3.3 Abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TR 21.905 [50], 3GPP TS 32.240 [1], 3GPP TS 23.246 [200] and the following apply:

ABNF	Augmented Backus-Naur Form
ACA	ACcounting Answer
ACR	ACcounting Request
AF	Application Function
AMF	Account balance Management Function
AoC	Advice of Charge
AVP	Attribute Value Pair
BCF	Bearer Charging Function
BCSM	Basic Call State Model
BD	Billing Domain
BMD	Billing Mediation Device
BM-SC	Broadcast Multicast - Service Centre
BS	Billing System
CAI	Charge Advice Information
CCA	Credit Control Answer
CCR	Credit Control Request
CDF	Charging Data Function
CDR	Charging Data Record
CG	Charging Gateway
CGF	Charging Gateway Function
CSE	CAMEL Service Environment
CTF	Charging Trigger Function
DRP	Data Record Packet
ECF	Event Charging Function
ECUR	Event Charging with Unit Reservation
EDP	Event Detection Point
FCI	Furnish Charging Information
FQPC	Fully Qualified Partial CDR
FTAM	File Transfer, Access and Management
GTP'	The GPRS protocol used for CDR transport. It is derived from GTP with enhancements to improve transport reliability necessary for CDRs
IEC	Immediate Event Charging
IHOSS:OSP	Internet Hosted Octet Stream Service: Octet Stream Protocol
M-CDR	Mobility management generated - Charging Data Record
OCS	Online Charging System
PT	Protocol Type (Field in GTP' header)
RF	Rating Function
RPC	Reduced Partial CDR
SCI	Subscriber Controlled Input
SCI	Send Charging Information
SCUR	Session Charging with Unit Reservation
TAP	Transferred Account Procedure
TDP	Trigger Detection Point
TID	Tunnel IDentifier
TLV	Type, Length, Value (GTP header format)
TMGI	Temporary Mobile Group Identifier
TV	Type, Value

VAS Value Added Service
VASP Value Added Service Provider

4 Architecture considerations

4.1 High level MBMS architecture

The high level MBMS architecture is as defined in 3GPP TS 23.246 [200].

The following clauses detail only service level charging. MBMS related aspects of bearer level charging is defined in 3GPP TS 32.251 [11].

Editor's Note: Bearer level charging aspects of MBMS need to be defined in 3GPP TS 32.251.

4.2 MBMS offline charging architecture

Figure 4.1 depicts the MBMS offline charging architecture. As defined in 3GPP TS 32.240 [1], the BM-SC contains an integrated CTF that generates charging events that are passed to the CDF via the Rf reference point.

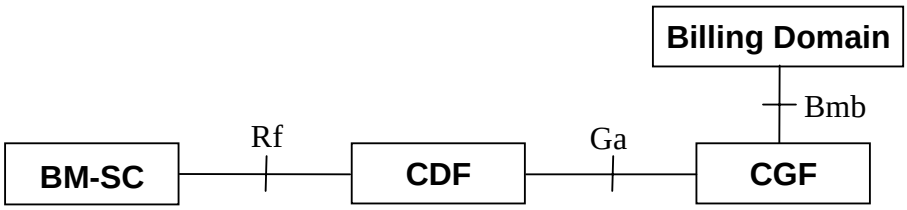

Figure 4.1: Charging architecture for MBMS offline charging

4.3 MBMS online charging architecture

Figure 4.2 depicts the MBMS online charging architecture.

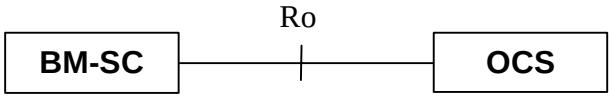

Figure 4.2: Charging architecture for MBMS online charging

For online charging, the BM-SC utilizes the Ro interface and the protocol and application towards the OCS is as specified in 3GPP TS 32.299 [50] and the present document.

5 MBMS charging principles and scenarios

5.1 MBMS charging principles

5.1.1 General principles

A Multimedia Broadcast and Multicast Service consists of an MBMS User service, as defined in 3GPP TS 22.246 [202] and 3GPP TS 26.346 [203], that is delivered over one or more MBMS bearer services, as defined in 3GPP TS 22.146 [201] and 3GPP TS 23.246 [200].

NOTE: MBMS bearer service is referred in 3GPP TS 22.246 [202] as MBMS transport service.

The BM-SC shall collect charging information for mobile subscribers receiving services through MBMS and/or for content providers delivering content through MBMS. Transactions involving the content provider (or VASP) shall be possible.

The BM-SC collects charging related information, such as:

- Identification of the source of content.
- Type of user service (streaming, download or carousel).
- Type of bearer service used to deliver content (broadcast or multicast).
- Identification of subscribers receiving service.
- Delivery notification from individual subscribers.

Editor's note: Carousel services are not considered in this release of the specification.

The following table shows the parties to be charged for the different MBMS bearer services used as identified by 3GPP TS 22.246 [202] and 22.146 [201].

Table 5.1.1: Charging requirements for service delivery

Service Aspects	MBMS Bearer Service used	
	Multicast (one or more)	Broadcast (one or more)
User Service (Content)	Receiving subscriber	Receiving subscriber
Bearer Service (Transport)	Content provider and/or receiving subscriber	Content provider

The user service, as shown in table 5.1.1, shall be charged either by subscription (out of scope of the present document) or as a one time event charge (e.g. key management). Charging associated with the user service may be treated independently from charging associated with the transport of the user service.

Charging for the bearer service may be based on the session information (e.g. QoS, media type, and service area) and one of the following, as described in 3GPP TS 22.146 [201]:

- Session duration (time from the MBMS Session Start procedure to MBMS Session Stop procedure as defined in 3GPP TS 23.246 [200]).
- Volume of data of a session.
- Duration of time whilst a subscriber is registered to receive a user service (or from Join to Leave).
- Volume of data transferred whilst a subscriber is registered to receive a user service (from Join to Leave).

Table 5.1.2 shows the applicability of the accounting measurements to the different bearer services used.

Table 5.1.2: Applicability of accounting measurements

Accounting measurement	Applicable to (Yes / No)	
	Broadcast Service	Multicast Service
Session Duration	Yes	Yes
Volume of data of a session	Yes	Yes
Duration of time whilst a subscriber is registered to receive a session	No	Yes
Volume of data transferred whilst a subscriber is registered to receive a session	No	Yes

5.1.2 Triggers for generation of charging information

Editor's Note: The following list is not complete and needs further explanation.

- Bearer service initiation/termination.
- Key management.

5.2 MBMS offline charging scenarios

5.2.1 Basic principles

As described in clause 5.1, charging may be based on events (such as key management) or based on MBMS sessions. However, as large numbers of users are expected to use services delivered using MBMS, generation of charging information should be performed in a manner that ensures the charging entities and billing domain are not overloaded.

Charging information shall be generated for subscribers and/or for content providers.

This reporting is achieved by sending Diameter Accounting Requests (ACR) [Start, Interim, Stop and Event] from the BM-SC to the CDF.

The Diameter client (BM-SC) uses ACR Start, Interim and Stop in procedures related to both subscriber and content provider charging

In tables 5.2.1 and 5.2.2, the terms "configurable" implies that operators may enable or disable the generation of an ACR message by the IMS node in response to a particular trigger.

Table 5.2.1: Accounting Request Messages for subscriber charging

Diameter Message	Trigger	Mandatory/ Configurable
ACR [Start]	Authorization of UE to MBMS Bearer Service (for multicast only)	Mandatory
	Reception of first Session Start Response from any GGSN (for broadcast only)	Configurable
ACR [Interim]	Reception of first Session Start Response from any GGSN (for multicast only)	Configurable
	Reception of first Session Stop Response from any GGSN (for multicast only)	Configurable
	Expiration of AVP [Acct-Interim-Interval]	Configurable
ACR [Stop]	Reception of Leave Indication from UE (for multicast only)	Mandatory
	Reception of first Session Stop Response from any GGSN (for broadcast only)	Configurable
	Implementation dependent for termination of MBMS User Service	Configurable
ACR [Event]	Implementation dependent for MBMS User Service charging	Configurable

Table 5.2.2: Accounting Request Messages for content provider charging

Diameter Message	Trigger	Mandatory/ Configurable
ACR [Start]	First Session Start Response from any GGSN	Mandatory
ACR [Interim]	Deregistration Response received from any GGSN	Configurable
	Expiration of AVP [Acct-Interim-Interval]	Configurable
ACR [Stop]	First Session Stop Response from any GGSN	Mandatory

5.2.2 Rf message flows

5.2.2.1 Broadcast Service

5.2.2.1.1 User service charging

A MBMS user service that is delivered using a broadcast bearer may be Event charged or Session charged. As there is no 3GPP specified signalling for a UE to activate or deactivate the broadcast service, it is MBMS user service dependent (e.g. key management) when the Accounting Request is triggered. The Event based and Session based offline charging flows are as defined in 3GPP TS 32.299 [50].

5.2.2.1.2 Session Start

Where charging for the content provider is applied, the following procedure applies as shown in figure 5.2.2.1.2.

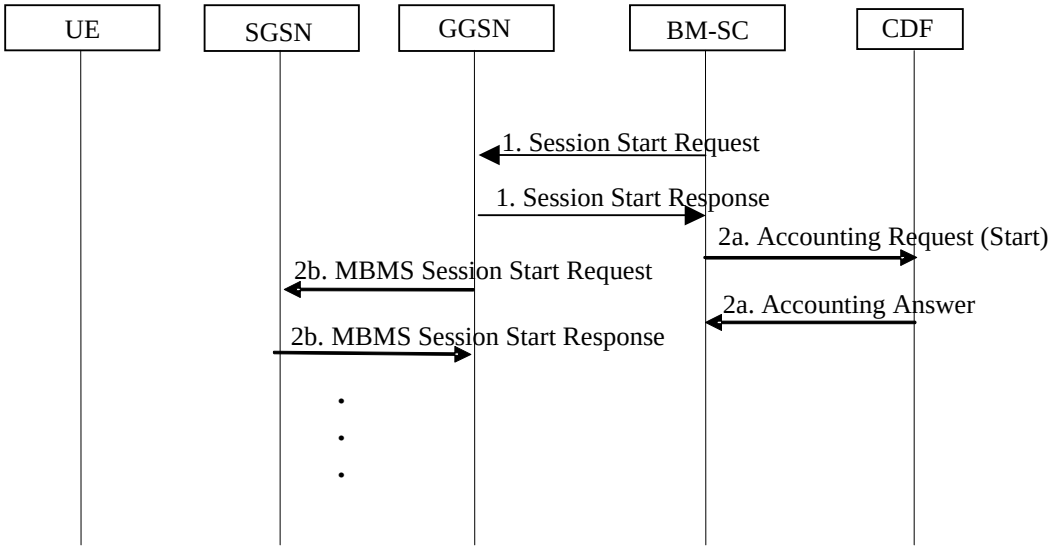

Figure 5.2.2.1.2: Rf interaction during Broadcast Session Start Procedure for a broadcast bearer

1) The BM-SC performs the MBMS Session Start procedure as described in 3GPP TS 23.246 [200].

2a) On receiving the first MBMS Session Start Response from any GGSN, the BM-SC sends an Accounting Request.

2b) The remainder of the MBMS Session Start procedure may occur in parallel with the Accounting Request procedure in 2a.

The full details of the MBMS Session Start procedure for the broadcast bearer are described in 3GPP TS 23.246 [200].

5.2.2.1.3 Session Stop

The following procedure in figure 5.2.2.1.3 shows the charging interaction during the MBMS Session Stop procedure for a broadcast bearer.

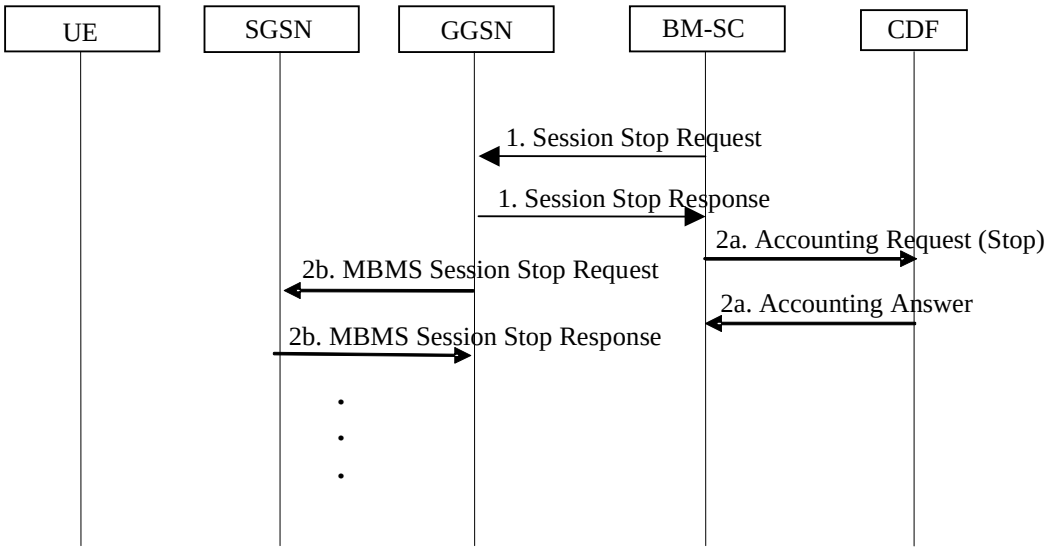

Figure 5.2.2.1.3: Rf interaction during MBMS Session Stop procedure for a broadcast bearer

1) The BM-SC performs the MBMS Session Stop procedure as described in 3GPP TS 23.246 [200].

2a) On receiving a Session Stop Response from any GGSN, the BM-SC sends a Accounting Request.

2b) The remainder of the MBMS Session Stop procedure occurs in parallel with the Accounting Request procedure in 2a.

The full details of the MBMS Session Stop procedure for the broadcast bearer are described in 3GPP TS 23.246 [200].

5.2.2.1.4 BM-SC initiated Registration and De-Registration

BM-SC initiated Registration and De-Registration are handled through O&M towards the GGSNs (and subsequent nodes) and therefore Rf interactions (Accounting Request (Start) and Accounting Request (Stop) respectively) may be triggered when the Registration and De-Registration is triggered through O&M. These Rf interactions should only occur for sessions that have already started.

5.2.2.2 Multicast Service

5.2.2.2.1 Session Start

The following procedure in figure 5.2.2.2.1 shows the charging interaction during the MBMS Session Start procedure for a multicast bearer.

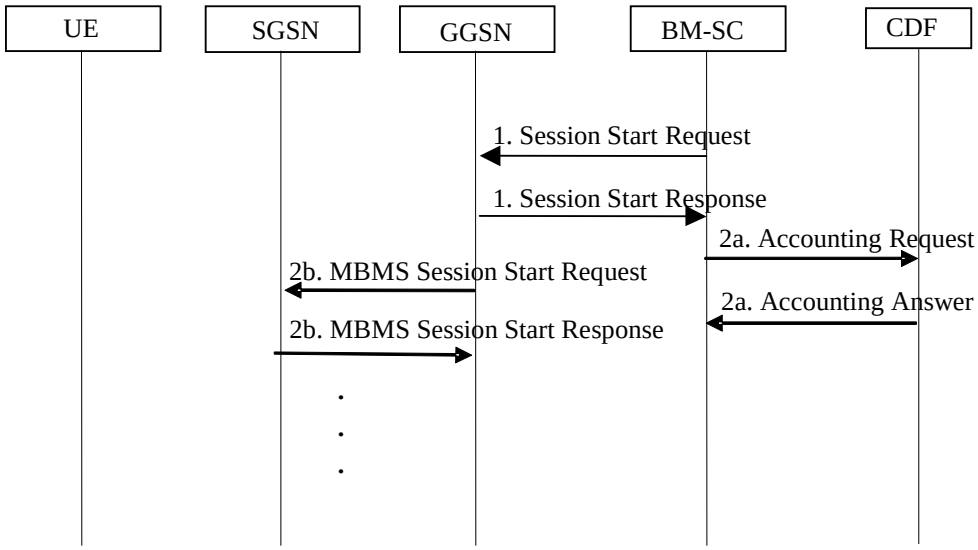

Figure 5.2.2.2.1: Rf interaction during MBMS Session Start procedure for a multicast bearer

1) The BM-SC performs the MBMS Session Start procedure as described in 3GPP TS 23.246 [200].

2a) On receiving the first Session Start Response from any GGSN, the BM-SC sends an Accounting Request. The accounting request may be for subscriber and/or content provider charging. For subscriber charging, the Accounting Request shall be "Interim". For content provider charging, the Accounting Request shall be "Start". It shall be possible to send one Accounting Request message for multiple subscribers of the same multicast service, but the procedure in the BM-SC to group subscribers is implementation dependent.

2b) The remainder of the MBMS Session Start procedure occurs in parallel with the Accounting Request procedure in 2a.

The full details of the MBMS Session Start procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.2.2.2.2 Session Stop

The following procedure in figure 5.2.2.2.2 shows the charging interaction during the MBMS Session Stop procedure for a multicast bearer.

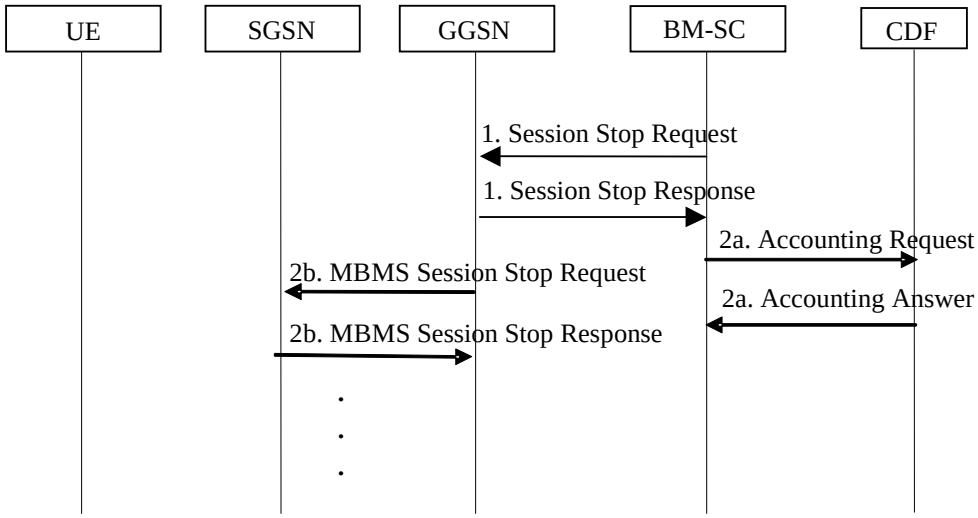

Figure 5.2.2.2.2: Rf interaction during MBMS Session Stop procedure for a multicast bearer

1) The BM-SC performs the MBMS Session Stop procedure as described in 3GPP TS 23.246 [200].

2a) On receiving the first Session Stop Response from any GGSN, the BM-SC sends a Accounting Request. For subscriber charging, the Accounting Request shall be "Interim" and it shall be possible to send one Accounting Request message for multiple or all subscribers of the same multicast service, that are still active, and is implementation and service dependent. For content provider charging, the Accounting Request shall be "Stop".

2b) The remainder of the MBMS Session Stop procedure occurs in parallel with the Accounting Request procedure in 2a.

The full details of the Session Stop procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.2.2.2.3 BM-SC initiated MBMS De-registration

The following procedure in figure 5.5 shows the charging interaction during the BM-SC initiated MBMS De-registration procedure for a multicast bearer for an already started session.

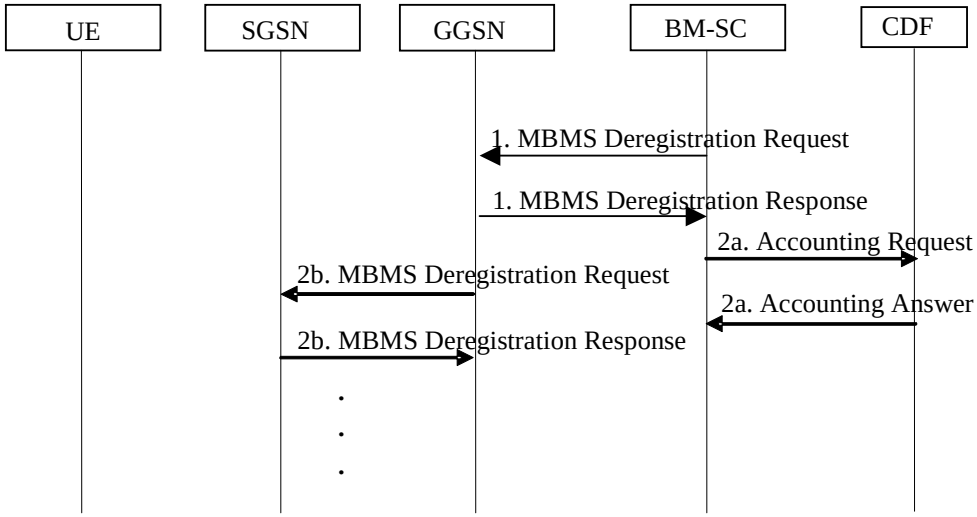

Figure 5.2.2.2.3: Rf interaction during BM-SC initiated MBMS Deregistration procedure for a multicast bearer

1) The BM-SC performs the MBMS Deregistration procedure as described in 3GPP TS 23.246 [200].

2a) On receiving an MBMS Deregistration Response from the GGSN, the BM-SC sends a Accounting Request. If the Deregistration is to all GGSNs previously receiving the session, the Accounting Request shall be a "Stop", otherwise, the Accounting Request shall be "Interim".

2b) The remainder of the MBMS Deregistration procedure occurs in parallel with the Accounting Request procedure in 2a.

The full details of the MBMS Deregistration procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.2.2.2.4 UE Activation

The following procedure in figure 5.6 should apply to subscriber's that activate the multicast service.

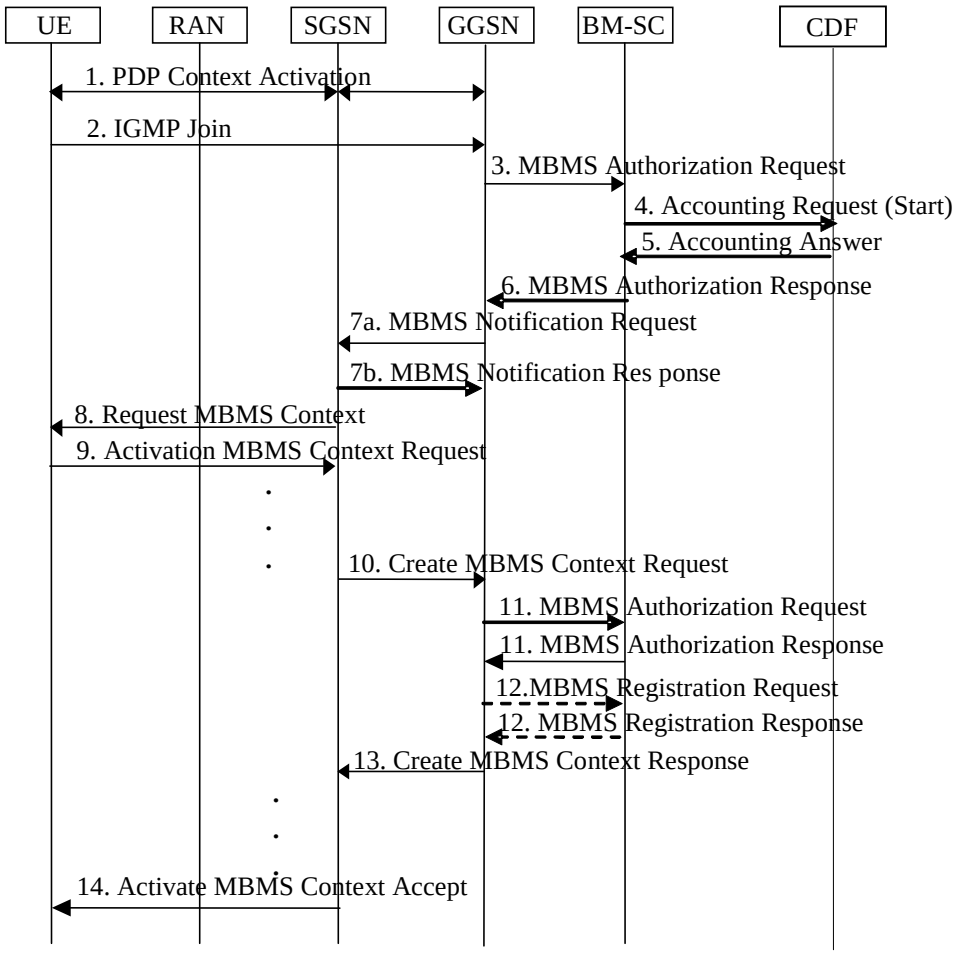

Figure 5.2.2.2.4: Rf interaction during MBMS Multicast Service Activation procedure for a multicast bearer

Full details of the activation procedure are described in the MBMS Multicast Service Activation procedure in 3GPP TS 23.246 [200].

5.2.2.2.5 UE Deactivation

The following procedure in figure 5.7 should only apply to subscriber's that deactivate the multi-cast service before the session has stopped, i.e. before the MBMS Session Stop procedure is invoked.

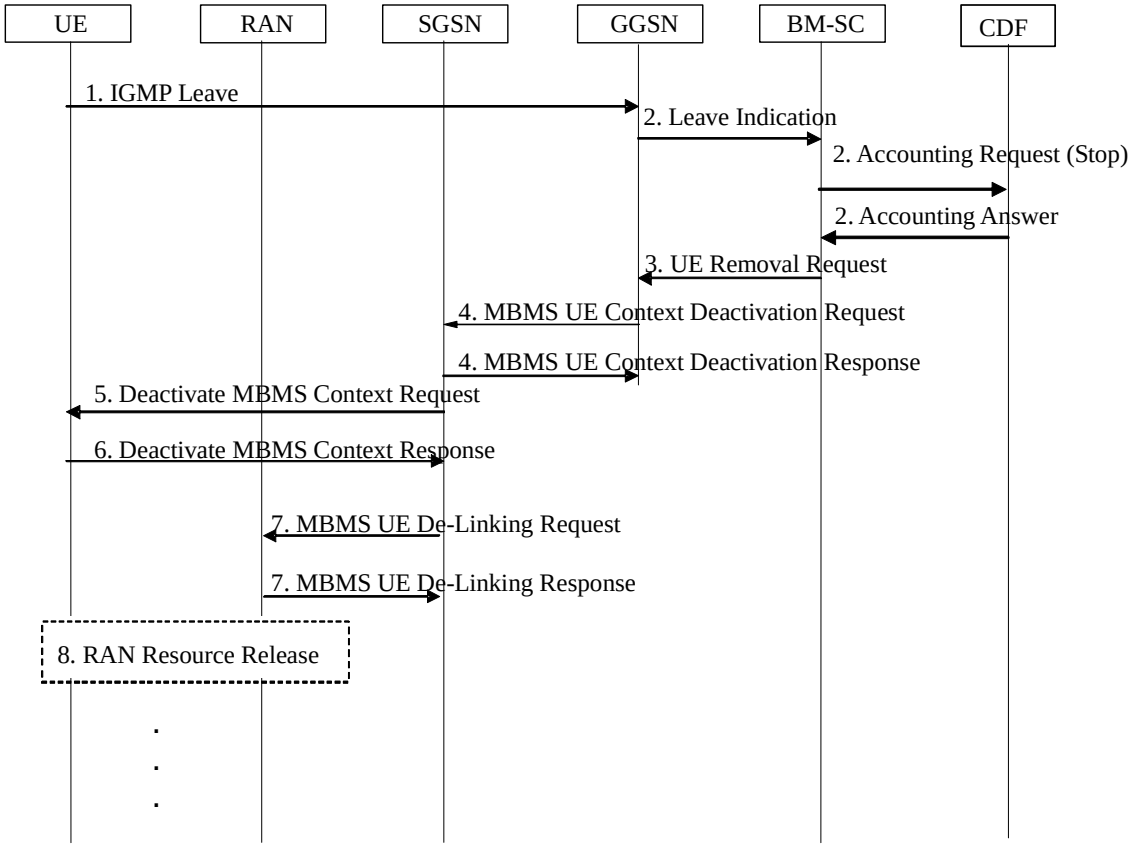

Figure 5.2.2.2.5: Rf interaction during MBMS Multicast Service Deactivation procedure for a multicast bearer

Full details of the deactivation procedure are described in the MBMS Multicast Service Deactivation procedure in 3GPP TS 23.246 [200].

5.2.3 CDR generation

5.2.3.1 CDRs related to MBMS subscribers

5.2.3.1.1 Triggers for S-BMSC-CDR charging information collection

A S-BMSC-CDR is used to collect charging information related to the MBMS Bearer Service information for a UE/MS in the BM-SC. A CDR is generated for each MBMS bearer service used and for each subscriber using the MBMS Bearer Service.

A S-BMSC-CDR shall be opened at UE activation as triggered by an ACR (Start). The volume for the MBMS bearer context is counted, separately in uplink and downlink direction.

The subsequent clauses identify in detail the conditions for adding information to, and closing the BMSC-CDR for generation towards the CGF.

5.2.3.1.2 Triggers for S-BMSC-CDR Charging Information Addition

Editor's Note: This is FFS.

5.2.3.1.3 Triggers for S-BMSC-CDR closure

The S-BMSC-CDR shall be closed on encountering some trigger conditions. Table 5.2.3.1 identifies which conditions are supported to permit closure of the S-BMSC-CDR.

Table 5.2.3.1: Triggers for S-BMSC-CDR closure

Closure Conditions	Description/Behaviour
Service Deactivation	Deactivation of the MBMS service in the BM-SC shall result in the CDR being closed. The trigger condition covers: - UE initiated deactivation; - any abnormal release.
ACR (Stop)	On reception of ACR (Stop), a CDR is closed.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers: - data volume limit; - time (duration) limit; - maximum number of charging condition changes; - management intervention.

The Partial Record generation trigger thresholds are those associated with the Charging Characteristics. The Partial Record generation trigger thresholds are configuration parameters defined per charging characteristics profile by the operator through O&M means.

5.2.3.2 CDRs related to content provider

5.2.3.2.1 Triggers for BMSC-CDR charging information collection

A C-BMSC-CDR is used to collect charging information related to the MBMS Bearer Service information for a content provider to the BM-SC. A C-BMSC-CDR is generated for each MBMS Bearer Service.

A C-BMSC-CDR shall be opened at MBMS Session Start as triggered by an ACR (Start). The volume for the MBMS bearer context is counted, separately in uplink and downlink direction. Not all of the charging information to be collected is static, and may be dependent on dynamic (de-)registration of packet-switched nodes to the MBMS bearer context.

The subsequent clauses identify in detail the conditions for adding information to, and closing the C-BMSC-CDR for passing towards the CGF.

5.2.3.2.2 Triggers for BMSC-CDR Charging Information Addition

Editor's Note: This is FFS.

5.2.3.2.3 Triggers for C-BMSC-CDR closure

The BMSC-CDR shall be closed on encountering some trigger conditions. Table 5.2.3.2 identifies which conditions are supported to permit closure of the C-BMSC-CDR.

Table 5.2.3.2: Triggers for C-BMSC-CDR closure

Closure Conditions	Description/Behaviour
Service Deactivation	Deactivation of the MBMS service in the BM-SC shall result in the CDR being closed. The trigger condition covers: - MBMS Session Stop; - termination of the MBMS User Service - any abnormal release.
ACR (Stop)	On reception of an ACR (Stop), the CDR shall be closed.
Partial Record Reason	O&M reasons permit the closure of the CDR for internal reasons. The trigger condition covers: - data volume limit; - time (duration) limit; - management intervention.

The Partial Record generation trigger thresholds are configuration parameters defined per charging characteristics profile by the operator through O&M means.

5.2.4 Ga record transfer flows

For further details on the Ga protocol application refer to 3GPP TS 32.295 [54].

5.2.5 B_{mb} CDR file transfer

The CGF transfers the CDR files to the BD as described in 3GPP TS 32.297 [52]. For further details on the Bmb protocol application refer to 3GPP TS 32.297 [52].

5.3 MBMS online charging scenarios

5.3.1 Basic principles

MBMS online charging uses the credit control application as specified in 3GPP TS 32.299 [50] and the present document.

Online charging of content providers is not supported in this release of the present document.

The type of online interaction used is dependent on the user service type, bearer type and whether delivery notification is required. Table 5.3.1 shows this dependency

Table 5.3.1: Online interaction dependency on MBMS service parameters

User Service Type	Bearer Service Type	Delivery Notification	Online Interaction
Key Management	N/A	N/A	IEC
Streaming	Broadcast	N/A	Operator Configurable
Streaming	Multicast	N/A	SCUR
Download	Broadcast	Required	Operator Configurable
Download	Multicast	Required	Operator Configurable
Download	Broadcast	Not required	Operator Configurable
Download	Multicast	Not required	Operator Configurable
NOTE: Operator configurable options imply that IEC, SCUR and ECUR should be supported			

It is not possible to perform charging transactions in a load efficient manner as in offline charging (see clause 5.2). Therefore, one online charging interaction is necessary for each user.

5.3.2 Ro message flows

5.3.2.1 Broadcast Service

5.3.2.1.1 User service charging

A MBMS user service that is delivered using a broadcast bearer may be Event charged or Session charged. As there is no 3GPP specified signalling for a UE to activate or deactivate the broadcast service, it is MBMS user service dependent (e.g. key management) when the Accounting Request is triggered. The Event based or Session based online charging flows are as defined in 3GPP TS 32.299 [50].

5.3.2.1.2 Session Start

As online charging does not apply to content provider, this scenario is not applicable.

5.3.2.1.3 Session Stop

As online charging does not apply to content provider, this scenario is not applicable.

5.3.2.1.4 BM-SC initiated Registration and De-Registration

As online charging does not apply to content provider, this scenario is not applicable.

5.3.2.2 Multicast Service

5.3.2.2.1 Session Start

The following procedure in figure 5.3.2.2.1 shows the charging interaction during the MBMS Session Start procedure for a multicast bearer.

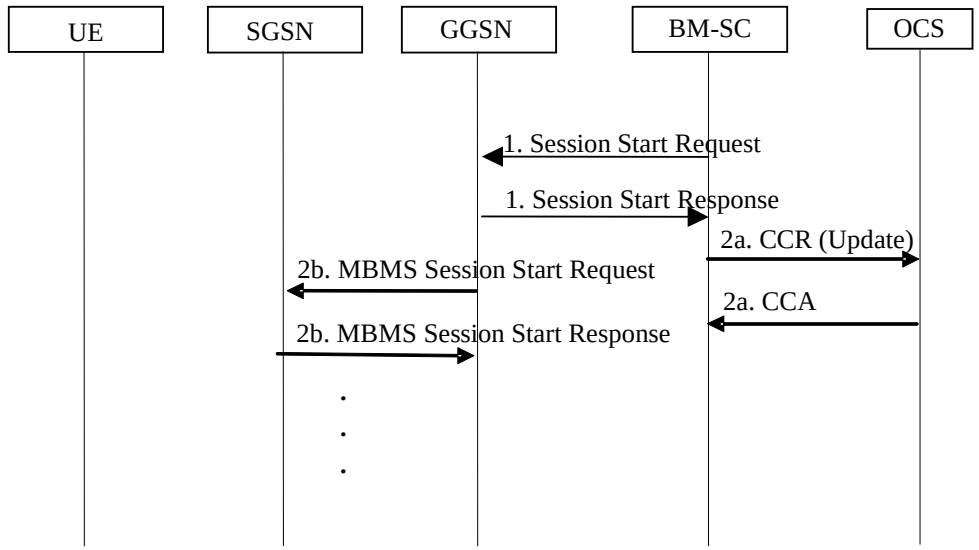

Figure 5.3.2.2.1: Ro interaction during MBMS Session Start procedure for a multicast bearer

1) The BM-SC performs the MBMS Session Start procedure as described in 3GPP TS 23.246 [200]

2a) On receiving the first Session Start Response from any GGSN, the BM-SC sends a Credit Control Request for each subscriber that has joined the service.

2b) The remainder of the MBMS Session Start procedure occurs in parallel with the Credit Control Request procedure in 2a.

The full details of the MBMS Session Start procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.3.2.2.2 Session Stop

The following procedure in figure 5.3.2.2.2 shows the charging interaction during the MBMS Session Stop procedure for a multicast bearer.

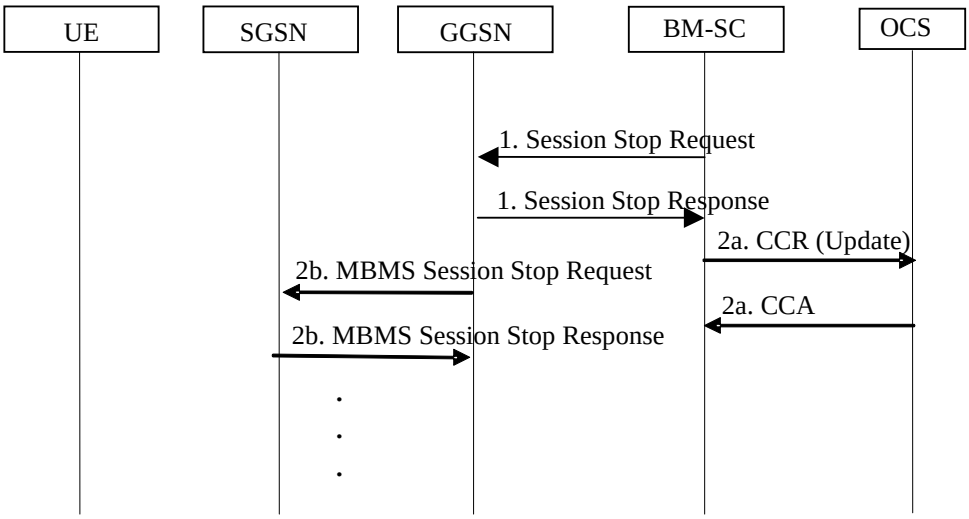

Figure 5.3.2.2.2: Ro interaction during MBMS Session Stop procedure for a multicast bearer

1) The BM-SC performs the MBMS Session Stop procedure as described in 3GPP TS 23.246 [200]

2a) On receiving the first Session Stop Response from any GGSN, the BM-SC sends a Credit Control Request for each subscriber that is still joined to the service.

2b) The remainder of the MBMS Session Stop procedure occurs in parallel with the Credit Control Request procedure in 2a.

The full details of the Session Stop procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.3.2.2.3 BM-SC initiated MBMS De-registration

The following procedure in figure 5.3.2.2.3 shows the charging interaction during the BM-SC initiated MBMS De-registration procedure for a multicast bearer for an already started session.

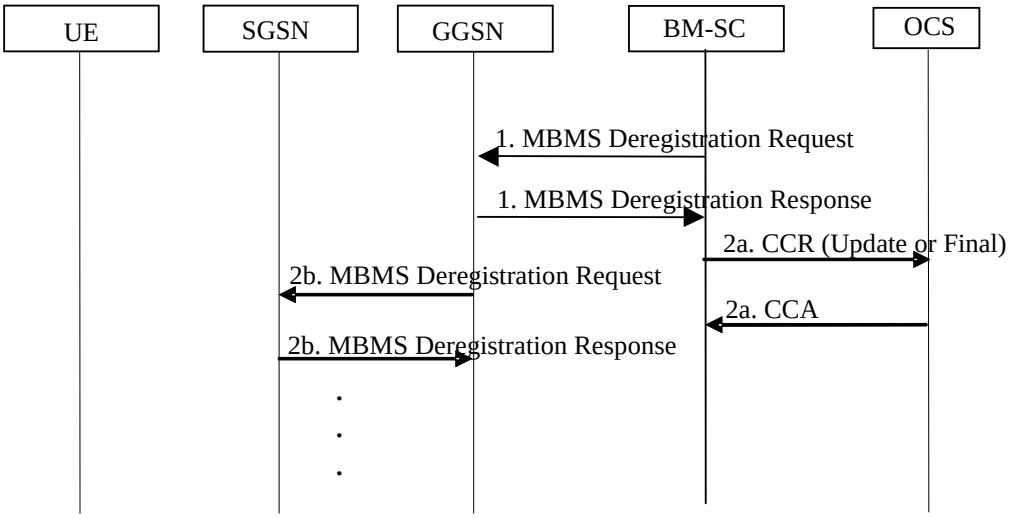

Figure 5.3.2.2.3: Ro interaction during BM-SC initiated MBMS Deregistration procedure for a multicast bearer

1) The BM-SC performs the MBMS Deregistration procedure as described in 3GPP TS 23.246 [200].

2a) On receiving an MBMS Deregistration Response from the GGSN, the BM-SC sends a Credit Control Request for each subscriber that has joined the service. If the Deregistration is to all GGSNs previously receiving the session, this implies an error in the service and therefore the CCR shall be a "Final", otherwise, the CCR shall be "Update".

2b) The remainder of the MBMS Deregistration procedure occurs in parallel with the Accounting Request procedure in 2a.

The full details of the MBMS Deregistration procedure for the multicast bearer are described in 3GPP TS 23.246 [200].

5.3.2.2.4 UE Activation

The following procedure in figure 5.3.2.2.4 applies to subscribers that activate the multicast service.

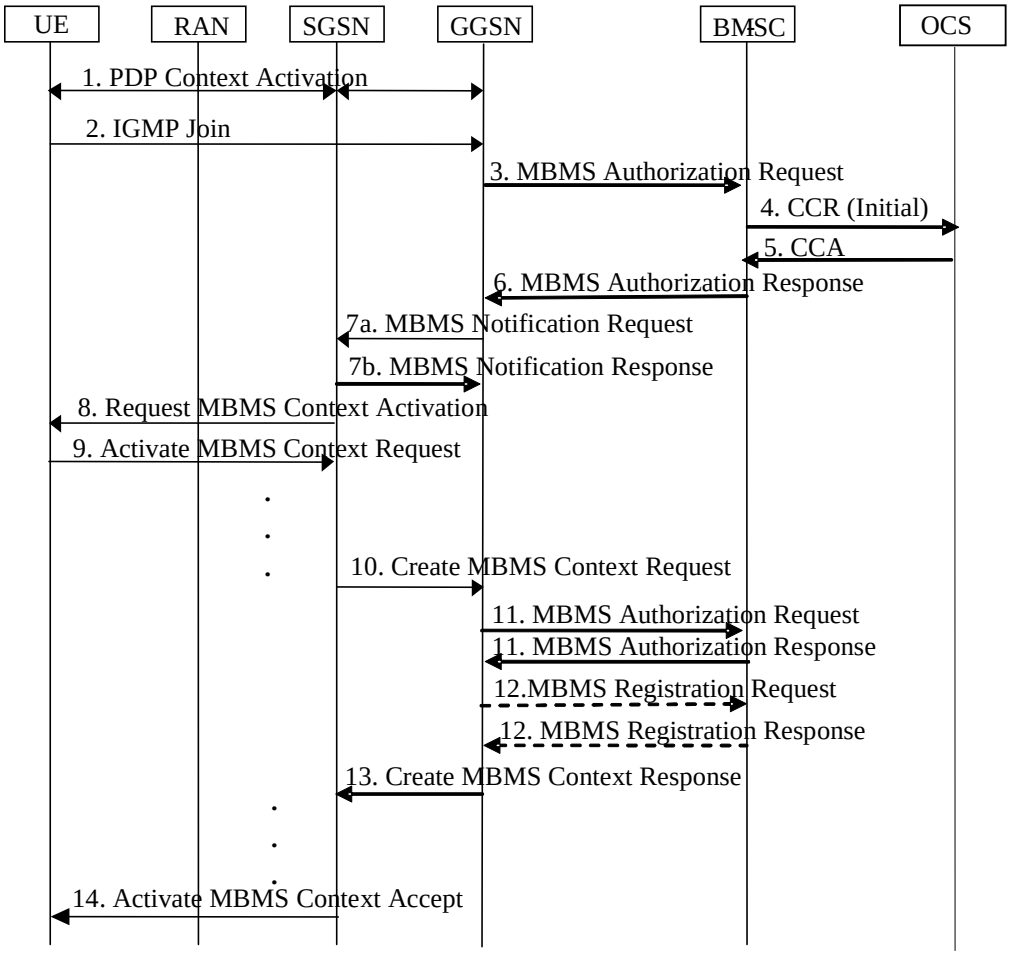

Figure 5.3.2.2.4: Ro interaction during MBMS Multicast Service Activation procedure for a multicast bearer

Full details of the activation procedure are described in the MBMS Multicast Service Activation procedure in 3GPP TS 23.246 [200].

5.3.2.2.5 UE Deactivation

The following procedure in figure 5.3.2.2.5 applies to subscribers that deregisters from the multi-cast service before the session has stopped, i.e. before the MBMS Session Stop procedure is invoked. The following procedure is optionally applied, if the deactivation occurs after the MBMS Session Stop procedure, depending on the charging model applied.

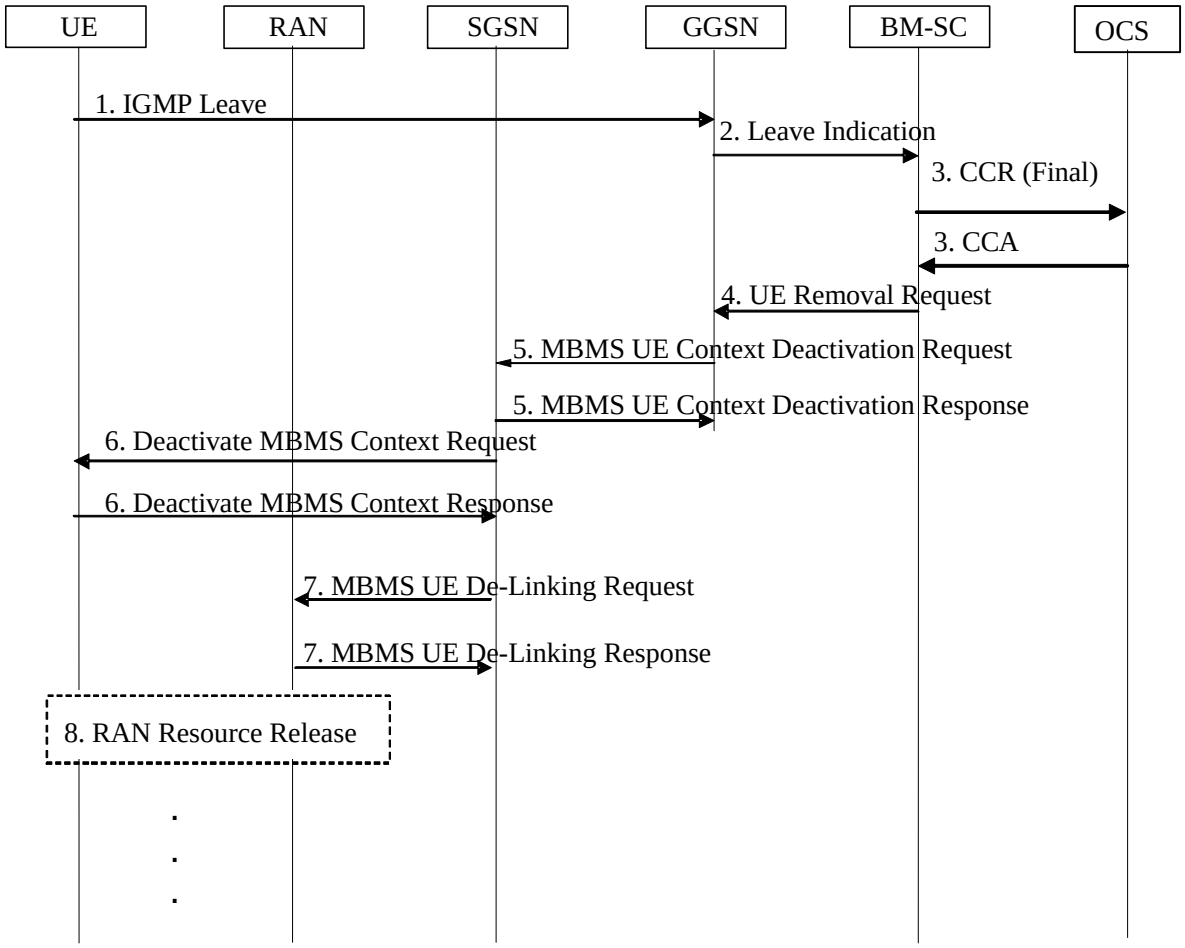

Figure 5.3.2.2.5: Ro interaction during MBMS Multicast Service Deactivation procedure for a multicast bearer

Full details of the deactivation procedure are described in the MBMS Multicast Service Deactivation procedure in 3GPP TS 23.246 [200].

6 Definition of charging information

6.1 Data description for MBMS offline charging

6.1.1 Rf message contents

6.1.1.1 Summary of Offline Charging Message Formats

The BM-SC generates accounting information that can be transferred to the CDF. For this purpose, the MBMS Accounting application employs the *Accounting-Request* (ACR) and *Accounting-Answer* (ACA) messages from the Diameter base protocol. The request can be of type start, stop, interim and event. The accounting request message includes all charging information and the answer is just an acknowledgement of the request message. Detailed information about the Diameter offline charging application is described in 3GPP TS 32.299 [50].

The following clauses describe the different fields used in the accounting messages.

Table 6.1.1.1 describes the use of these messages for offline charging.

Table 6.1.1.1: Offline Charging Messages Reference Table

Command-Name	Source	Destination	Abbreviation
Accounting-Request	BM-SC	CDF	ACR
Accounting-Answer	CDF	BM-SC	ACA

6.1.1.2 Structure for the Accounting Message Formats

6.1.1.2.1 Accounting-Request Message

Table 6.1.1.2.1 illustrates the basic structure of a Diameter ACR message as used for MBMS offline charging.

Table 6.1.1.2.1: Accounting-Request (ACR) Message Contents for Offline Charging

Field	Category	Description
Session-Id	M	Used as described in 3GPP TS 32.299 [50].
Origin-Host	M	Used as described in 3GPP TS 32.299 [50].
Origin-Realm	M	Used as described in 3GPP TS 32.299 [50].
Destination-Realm	M	Used as described in 3GPP TS 32.299 [50].
Accounting-Record-Type	M	Used as described in 3GPP TS 32.299 [50].
Accounting-Record-Number	M	Used as described in 3GPP TS 32.299 [50].
Acct-Application-Id	-	Not used in 3GPP.
Vendor-Specific-Application-Id	O_C	Used as described in 3GPP TS 32.299 [50].
User-Name	O_C	Used as described in 3GPP TS 32.299 [50].
Accounting-Sub-Session-Id	-	Not used in 3GPP.
Acct-Session-Id	-	Not used in 3GPP.
Acct-Multi-Session-Id	-	Not used in 3GPP.
Acct-Interim-Interval	O_C	Used as described in 3GPP TS 32.299 [50].
Accounting-Realtime-Required	-	Not used in 3GPP.
Origin-State-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Event-Timestamp	O_C	Used as described in 3GPP TS 32.299 [50].
Proxy-Info	-	Not used in 3GPP.
Route-Record	-	Not used in 3GPP.
Extension	-	Not used in 3GPP.
Service-Information	O_M	Described in 3GPP TS 32.299 [50]
PS-Information	O_C	Described in 3GPP TS 32.251 [11]
IMS-Information	O_C	Described in 3GPP TS 32.260 [20]
MBMS-Information	O_M	Described in clause 6.3
NOTE: For structured fields only the "field" is listed in this table. Detailed description of the fields are provided according to "Description" column.		

6.1.1.2.2 Accounting-Answer Message

Table 6.1.1.2.2 illustrates the basic structure of a Diameter ACA message as used for MBMS charging. This message is always used by the CDF as specified below, regardless of the BM-SC it is received from and the ACR record type that is being replied to.

Table 6.1.1.2.2: Accounting-Answer (ACA) Message Contents for Offline Charging

Field	Category	Description
Session-Id	M	Used as described in 3GPP TS 32.299 [50].
Result-Code	M	Used as described in 3GPP TS 32.299 [50].
Origin-Host	M	Used as described in 3GPP TS 32.299 [50].
Origin-Realm	M	Used as described in 3GPP TS 32.299 [50].
Accounting-Record-Type	M	Used as described in 3GPP TS 32.299 [50].
Accounting-Record-Number	M	Used as described in 3GPP TS 32.299 [50].
Acct-Application-Id	-	Not used in 3GPP.
Vendor-Specific-Application-Id	O_C	Used as described in 3GPP TS 32.299 [50].
User-Name	O_C	Used as described in 3GPP TS 32.299 [50].
Accounting-Sub-Session-Id	-	Not used in 3GPP.
Acct-Session-Id	-	Not used in 3GPP.
Acct-Multi-Session-Id	-	Not used in 3GPP.
Error-Reporting-Host	-	Not used in 3GPP.
Acct-Interim-Interval	O_C	Used as described in 3GPP TS 32.299 [50].
Accounting-Realtime-Required	-	Not used in 3GPP.
Origin-State-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Event-Timestamp	O_C	Used as described in 3GPP TS 32.299 [50].
Proxy-Info	-	Not used in 3GPP.
Extension	-	Not used in 3GPP.

6.1.2 Ga message contents

6.1.3 CDR description on the B_{mb} interface

6.1.3.1 CDR description for subscriber charging

Editor's Note: Still need to describe which service specific information is used to trigger CDR generation. It may be necessary to define separate triggers for Multicast and for Broadcast.

Table 6.1.3.1: Subscriber BM-SC data (S-BMSC-CDR)

Field	Category	Description
Record Type	M	S-BM-SC record.
Served IMSI	M	IMSI of the served party.
GGSN Address used	C	The control plane IP address of the GGSN used for UE activation. Present only for multicast.
Access Point Name Network Identifier	O_C	The logical name of the connected access point to the external packet data network (network identifier part of APN). Present only for multicast
Served PDP Address	O_M	Represents the IP Multicast address associated with the MBMS bearer context.
List of Service Data Volumes	O_M	It is FFS whether this field is a list.
Record Opening Time	M	Time stamp when UE activation occurs or record opening time on subsequent partial records.
Duration	M	Duration of this record.
Cause for Record Closing	M	The reason for the release of record.
Diagnostics	O_M	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	O_M	Name of the recording entity.
Record Extensions	O_C	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	O_M	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Served MSISDN	O_M	The primary MSISDN of the subscriber.
SDP Session Description	O_C	Holds the Session portion of the SDP data exchanged between the User Agents if available in the SIP transaction. This parameter corresponds to SDP-Session-Description.
List of SDP Media Components	O_C	This is a grouped field comprising several sub-fields associated with one media component. It may occur several times in one CDR. The field is present only in a SIP session related case
SDP Media Components	O_C	This is a grouped field (and is a sub-field of List of SDP Media Components) comprising several sub-fields associated with one media component. Since several media components may exist for a session in parallel these sub-fields may occur several times. This parameter corresponds to SDP-Media-Component.
SDP Media Name	O_C	This sub-field of SDP Media Component holds the name of the media as available in the SDP data. This parameter corresponds to SDP-Media-Name.
SDP Media Description	O_C	This sub-field of SDP Media Component holds the attributes of the media as available in the SDP data. This parameter corresponds to SDP-Media-Description.
TMGI	M	This field contains the Temporary Mobile Group Identity allocated to the MBMS Bearer Service. This parameter corresponds to the TMGI.
MBMS Service Type	M	This field contains explicit information about the type of MBMS bearer service used. This parameter corresponds to the MBMS-Service-Type.
MBMS User Service Type	M	This field holds the type of MBMS User Service that is delivered. This parameter corresponds to the MBMS-User-Service-Type.
File Repair Supported	O_C	This field holds information about whether point-to-point file repair is supported for the MBMS User Service that is delivered. This parameter corresponds to the File-Repair-Supported.
Required MBMS Bearer Capabilities	O_C	This field contains the minimum bearer capabilities the UE needs to support. This parameter corresponds to the Required-MBMS-Bearer-Capabilities.
MBMS 2G-3G Indicator	O_C	This field holds information about the delivery of the MBMS Bearer Service over GERAN and/or UTRAN access.
RAI	O_C	Holds information about the routeing area identity used at service activation. This parameter corresponds to the RAI.
MBMS Service Area	O_C	List of MBMS service areas configured to receive the bearer service. This parameter corresponds to the MBMS-Service-Area.
MBMS Session Identity	O_C	This field holds information about the transmission of a session together with TMGI. This parameter corresponds to the MBMS-Session-Identity.

Editor's Note: Further clarification of some of the fields may be needed. List of Service Data Volumes may need to distinguish between the volume conveyed during the session (MBMS service usage) and the volume during the entire subscription.

6.1.3.2 CDR description for content provider charging

Editor's Note: Still need to describe which service specific information is used to trigger CDR generation. It may be necessary to define separate triggers for Multicast and for Broadcast.

Table 6.1.3.2: Content Provider BM-SC data (C-BMSC-CDR)

Field	Category	Description
Record Type	M	C-BM-SC record.
Content Provider Id	M	Identity of the content provider.
GGSN Address used	M	A list of the control plane IP address of the GGSNs used by the MBMS Bearer Service.
Access Point Name Network Identifier	O_C	The logical name of the connected access point to the external packet data network (network identifier part of APN). Present only for multicast
Served PDP Address	O_M	Represents the IP Multicast address used to transmit the MBMS user service.
List of Service Data Volumes	O_M	It is FFS whether this field is a list
Record Opening Time	M	Time stamp when MBMS Bearer Context is activated (i.e. MBMS Session Start) or record opening time on subsequent partial records.
Duration	M	Duration of this record.
Cause for Record Closing	M	The reason for the release of record.
Diagnostics	O_M	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	O_M	Name of the recording entity.
Record Extensions	O_C	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	O_M	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Recipient Address List	O_C	The address(es) of the recipients registered to receive the bearer service.
SDP Session Description	O_C	Holds the Session portion of the SDP data used to describe the MBMS User Service. This parameter corresponds to SDP-Session-Description.
List of SDP Media Components	O_C	This is a grouped field comprising several sub-fields associated with one media component. It may occur several times in one CDR. The field is present only in a SIP session related case
SDP Media Components	O_C	This is a grouped field (and a sub-field of List of SDP Media Components) comprising several sub-fields associated with one media component. Since several media components may exist for a session in parallel these sub-fields may occur several times. This parameter corresponds to SDP-Media-Component.
SDP Media Name	O_C	This sub-field of SDP Media Components holds the name of the media as available in the SDP data. This parameter corresponds to SDP-Media-Name.
SDP Media Description	O_C	This sub-field of SDP Media Components holds the attributes of the media as available in the SDP data. This parameter corresponds to SDP-Media-Description.
TMGI	M	This field contains the Temporary Mobile Group Identity allocated to the MBMS Bearer Service. This parameter corresponds to the TMGI.
MBMS Service Type	M	This field contains explicit information about the type of MBMS bearer service used. This parameter corresponds to the MBMS-Service-Type.
MBMS User Service Type	M	This field holds the type of MBMS User Service that is delivered. This parameter corresponds to the MBMS-User-Service-Type.
File Repair Supported	O_C	This field holds information about whether point-to-point file repair is supported for the MBMS User Service that is delivered. This parameter corresponds to the File-Repair-Supported.
Required MBMS Bearer Capabilities	O_C	This field contains the minimum bearer capabilities the UE needs to support. This parameter corresponds to the Required-MBMS-Bearer-Capabilities.
MBMS 2G-3G Indicator	O_C	This field holds information about the delivery of the MBMS Bearer Service over GERAN and/or UTRAN access. This parameter corresponds to the MBMS-2G-3G-Indicator.
MBMS Service Area	O_C	List of MBMS service areas configured to receive the bearer service. This parameter corresponds to the MBMS-Service-Area.
MBMS Session Identity	O_C	This field holds information about the transmission of a session together with TMGI. This parameter corresponds to the MBMS-Session-Identity.

Editor's Note: Further clarification of some of the fields may be needed. List of Service Data Volumes may need to distinguish between the volume conveyed during the session (MBMS service usage) and the volume during the entire subscription.

6.2 Data description for MBMS online charging

6.2.1 Ro message contents

6.2.1.1 Summary of Message Formats

MBMS Online Charging use Credit-Control-Request (CCR) and Credit-Control-Answer (CCA) messages defined in 3GPP TS 32.299 [50]. The CCR triggers the rating of the MBMS service and reserves units on the user's account. The CCA is a response including any reserved units or an error code if the user is out of credit. Detailed information about the diameter online charging application is described in 3GPP TS 32.299 [50].

The CCR for the "intermediate interrogation" and "final interrogation" reports the actual number of "units" that were used, from what was previously reserved. This determines the actual amount debited from the subscriber's account.

The following clauses describes the different fields used in the credit control messages.

Table 6.2.1.1 describes the use of these messages for online charging.

Table 6.2.1.1: Online Charging Messages Reference Table

Command-Name	Source	Destination	Abbreviation
Credit-Control-Request	BM-SC	OCS	CCR
Credit-Control-Answer	OCS	BM-SC	CCA

6.2.1.2 Structure for the Credit Control Message Formats

6.2.1.2.1 Credit-Control-Request Message

Table 6.2.1.2.1 illustrates the basic structure of a Diameter CCR message from the BM-SC as used for MBMS online charging.

Table 6.2.1.2.1: Credit-Control-Request (CCR) Message Contents

Field	Category	Description
Session-Id	M	Used as described in 3GPP TS 32.299 [50].
Origin-Host	M	Used as described in 3GPP TS 32.299 [50].
Origin-Realm	M	Used as described in 3GPP TS 32.299 [50].
Destination-Realm	M	Used as described in 3GPP TS 32.299 [50].
Auth-Application-Id	M	Used as described in 3GPP TS 32.299 [50].
Service-Context-Id	M	Used as described in 3GPP TS 32.299 [50].
CC-Request-Type	M	Used as described in 3GPP TS 32.299 [50].
CC-Request-Number	M	Used as described in 3GPP TS 32.299 [50].
Destination-Host	O_C	Used as described in 3GPP TS 32.299 [50].
User-Name	O_C	Used as described in 3GPP TS 32.299 [50].
CC-Sub-Session-Id	O_M	Used as described in 3GPP TS 32.299 [50].
Acct-Multi-Session-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Origin-State-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Event-Timestamp	O_C	Used as described in 3GPP TS 32.299 [50].
Subscription-Id	O_C	Used as described in 3GPP TS 32.299 [50]. As a minimum the IMSI and the MSISDN have to be included.
Service-Identifier	O_C	Used as described in 3GPP TS 32.299 [50].
Termination-Cause	O_C	Used as described in 3GPP TS 32.299 [50].
Requested-Service-Unit	O_C	Used as described in 3GPP TS 32.299 [50].
Requested-Action	O_C	Used as described in 3GPP TS 32.299 [50].
Multiple-Services-Indicator	O_C	Used as described in 3GPP TS 32.299 [50].
Multiple-Services-Credit Control	O_C	Used as described in 3GPP TS 32.299 [50].
Service-Parameter-Info	O_C	Used as described in 3GPP TS 32.299 [50].
CC-Correlation-Id	O_C	Used as described in 3GPP TS 32.299 [50].
User–Equipment-Info	O_C	Used as described in 3GPP TS 32.299 [50].
Service-Information	O_M	Defined in 3GPP TS 32.299 [50]
PS-Information	O_C	Used as described in 3GPP TS 32.251 [11]
IMS-Information	O_c	Used as described in 3GPP TS 32.260 [20]
MBMS-Information	O_M	Described in clause 6.3

6.2.1.2.2 Credit-Control-Answer Message

Table 6.2.1.2.2 illustrates the basic structure of a Diameter CCA message as used for the BM-SC. This message is always used by the OCS as specified below, independent of the receiving BM-SC and the CCR request type that is being replied to.

Table 6.2.1.2.2: Credit-Control-Answer (CCA) Message

Field	Category	Description
Session-Id	M	Used as described in 3GPP TS 32.299 [50].
Result-Code	M	Used as described in 3GPP TS 32.299 [50].
Origin-Host	M	Used as described in 3GPP TS 32.299 [50].
Origin-Realm	M	Used as described in 3GPP TS 32.299 [50].
Auth-Application-Id	M	Used as described in 3GPP TS 32.299 [50].
CC-Request-Type	M	Used as described in 3GPP TS 32.299 [50].
CC-Request-Number	M	Used as described in 3GPP TS 32.299 [50].
User-Name	O_C	Used as described in 3GPP TS 32.299 [50].
CC-Session-Failover	O_C	Used as described in 3GPP TS 32.299 [50].
CC-Sub-Session-Id	O_M	Used as described in 3GPP TS 32.299 [50].
Acct-Multi-Session-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Origin-State-Id	O_C	Used as described in 3GPP TS 32.299 [50].
Event-Timestamp	O_C	Used as described in 3GPP TS 32.299 [50].
Granted-Service-Unit	O_C	Used as described in 3GPP TS 32.299 [50].
Multiple-Services-Credit-Control	O_C	Used as described in 3GPP TS 32.299 [50].
Final-Unit-Indication	O_C	Used as described in 3GPP TS 32.299 [50].
Check-Balance-Result	O_C	Used as described in 3GPP TS 32.299 [50].
Credit-Control-Failure-Handling	O_C	Used as described in 3GPP TS 32.299 [50].
Direct-Debiting-Failure-Handling	O_C	Used as described in 3GPP TS 32.299 [50].
Validity-Time	O_C	Used as described in 3GPP TS 32.299 [50].
Redirect-Host	O_C	Used as described in 3GPP TS 32.299 [50].
Redirect-Host-Usage	O_C	Used as described in 3GPP TS 32.299 [50].
Redirect-Max-Cache-Time	O_C	Used as described in 3GPP TS 32.299 [50].
Proxy-Info	O_C	Used as described in 3GPP TS 32.299 [50].
Route-Record	O_C	Used as described in 3GPP TS 32.299 [50].
Failed-AVP	O_C	Used as described in 3GPP TS 32.299 [50].
Extension	O_C	Used as described in 3GPP TS 32.299 [50].

6.3 MBMS charging specific parameters

6.3.1 Definition of the MBMS charging information

The MBMS-Information parameter used for MBMS charging is provided in the Service-Information parameter.

6.3.1.1 MBMS charging information assignment for Service-Information

The components that are used for MBMS charging are provided in the Service-Information as described in table 6.3.1.1.

Table 6.3.1.1: Components of the Service-Information used for MBMS Charging

Field	Category	Description
Service-Information	O_M	A set of fields hold the 3GPP specific parameter as defined in 3GPP TS 32.299 [50]. For MBMS Charging the PS-Information, IMS-Information and PoC-Information are used.
PS-Information	O_C	A set of fields hold the PS specific parameters. The details are defined in 3GPP TS 32.251 [11].
PDP Type	O_C	Used as defined in 3GPP TS 32.251 [11]. See Note
PDP-Address	O_C	Used as defined in 3GPP TS 32.251 [11]. See Note
GPRS-Negotiated-QoS-Profile	O_C	Used as defined in 3GPP TS 32.251 [11].
GGSN-Address	O_C	Used as defined in 3GPP TS 32.251 [11].
GGSN-IPv6-Address	O_C	Used as defined in 3GPP TS 32.251 [11].
IMS-Information	O_C	A set of fields hold the IMS specific parameters. The details are defined in 3GPP TS 32.260 [20].
SDP-Session-Description	O_C	Used as defined in 3GPP TS 32.260 [20].
SDP-Media-Components	O_C	Used as defined in 3GPP TS 32.260 [20].
MBMS-Information	O_M	A set of fields hold the MBMS specific parameters. The details are defined in clause 6.3.1.2.
NOTE: The PDP-Type and PDP-Address represent the MBMS Bearer service, i.e. IP multicast address.		

6.3.1.2 Definition of the MBMS-Information

MBMS specific charging information is provided within the MBMS-Information. The detailed structure of the MBMS-Information can be found in table 6.3.1.2.

Table 6.3.1.2: Structure of the MBMS-Information

Field	Category	Description
TMGI	O_M	Used as defined in 3GPP TS 29.061 [204].
MBMS-Service-Type	O_M	Used as defined in 3GPP TS 29.061 [204].
MBMS-User-Service-Type	O_M	This field indicates type of service the MBMS user service that is being delivered.
File-Repair-Supported	O_C	This field indicates whether the MBMS user service supports point-to-point file repair.
Required-MBMS-Bearer-Capabilities	O_C	Used as defined in 3GPP TS 29.061 [204].
MBMS-2G-3G-Indicator	O_C	Used as defined in 3GPP TS 29.061 [204].
RAI	O_C	Used as defined in 3GPP TS 29.061 [204].
MBMS-Service-Area	O_C	Used as defined in 3GPP TS 29.061 [204].
MBMS-Session-Identity	O_C	Used as defined in 3GPP TS 29.061 [204].

Editor's Note: The list of information required is not complete.

6.3.2 Formal parameter description

6.3.2.1 MBMS charging information for CDRs

The detailed definitions, abstract syntax and encoding of the MBMS CDR parameters are specified in 3GPP TS 32.298 [51].

Editor's note: The formal definition in TS 32.298 is still needed.

6.3.2.2 MBMS charging information for charging events

The detailed charging event parameter definitions are specified in 3GPP TS 32.299 [50].

Annex A (informative): Bibliography

a) The 3GPP charging specifications

- 3GPP TS 32.252: "Telecommunication management; Charging management; Wireless Local Area Network (WLAN) charging".
- 3GPP TS 32.271: "Telecommunication management; Charging management; Location Services (LCS) charging".
- 3GPP TS 32.272: "Telecommunication management; Charging management; Push-to-talk over Cellular (PoC) charging".
- 3GPP TS 32.296: "Telecommunication management; Charging management; Online Charging System (OCS): Applications and interfaces".
- 3GPP TS 23.125: "Overall high level functionality and architecture impacts of flow based charging; Stage 2".

b) Common 3GPP specifications

- 3GPP TS 22.101: "Service aspects; Service principles".
- 3GPP TS 22.115: "Service aspects; Charging and billing".
- 3GPP TS 23.002: "Network architecture".
- 3GPP TS 23.003: "Numbering, addressing and identification".
- 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

c) other Domain and Service specific 3GPP / ETSI specifications

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d) Relevant ITU Recommendations

- ITU-T Recommendation D.93: "Charging and accounting in the international land mobile telephone service (provided via cellular radio systems)".
- ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- ITU-T Recommendation Q.767: "Application of the ISDN user part of CCITT signalling system No.7 for international ISDN interconnections".
- ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
- ITU-T Recommendation X.121: "International numbering plan for public data networks".

e) Relevant IETF RFCs

- IETF RFC 959 (1985): "File Transfer Protocol".
- IETF RFC 3588 (2003): "Diameter Base Protocol".
- IETF draft-ietf-aaa-diameter-cc-06 (2004): "Diameter Credit Control Application".
- IETF RFC 1350: "The TFTP Protocol (Revision 2)".

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Mar 2005	S_27	SP-050034	--	--	Submitted to TSG SA#27 for Information	1.0.0	
Jun 2005	S_28	SP-050280	--	--	Submitted to TSG SA#28 for Approval	2.0.0	6.0.0

History

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