Multimedia Broadcast and Multicast Service

This chapter provides information on Multimedia Broadcast and Multicast Service (MBMS) functionality on GGSN. The product Administration Guides provide examples and procedures for configuration of basic services on the system. It is recommended that you select the configuration example that best meets your service model, and configure the required elements for that model, as described in the respective product Administration Guide, before using the procedures in this chapter.

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Important   The features described in this chapter are only available if you have purchased and installed MBMS feature support license on your chassis.

Introduction

MBMS is an IP datacast type of service in GSM and UMTS cellular network. It eliminates unnecessary replication of data on UMTS wireless networks by transmitting a single stream of data to multiple users. By delivering a single, unidirectional data stream to many subscribers, MBMS makes more efficient use of wireless network resources than traditional point to point connections.

MBMS is a solution for transferring light video and audio clips with a suitable method for mass communications.

MBMS functionality on the system is provided by an existing GGSN service and is enabled by a valid services license.

The main features supported by the Multimedia Broadcast & Multicast Services are:

- Individual user network control functions and provide forward MBMS user data to SGSN

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Important   The Cisco chassis supports 225 downlink SGSNs per MBMS Bearer Service through NPU assisted data flow processing. NPU assisted data processing is available on the systems with release 8.1 or later only.

• Support for intra-GGSN and inter-GGSN mobility procedures

• Generate charging data per multicast service for each user for both prepaid and post paid subscribers.

• Multicast proxy-host functionality

• Support for MBMS-specific Gmb messages

• Authentication of MBMS flow-ids using a MBMS controller

• Establishment and tear-down of MBMS bearer paths using the multicast framework

• Support for framing HDLC-like and segment based framing

• Accounting for the MBMS flows to charge the originator of the content

This service provides two mode of operations:

• MBMS Broadcast Mode

• MBMS Multicast Mode

A broadcast mode is a unidirectional point-to-multipoint service in which data is transmitted from a single source to multiple terminals (UE/MS) in the associated broadcast service area/cell area. The transmitted data can be text to light multimedia services (Audio, Video etc). On the other hand multicast mode is a unidirectional point-to-multipoint service in which data is transmitted from a single source to a pre-defined multicast group of users that are subscribed to the specific multicast service and have joined the multicast group in the associated multicast service area.

The following figure shows the reference architecture of MBMS service in UMTS network.

Figure 1: MBMS Reference Architecture in UMTS network
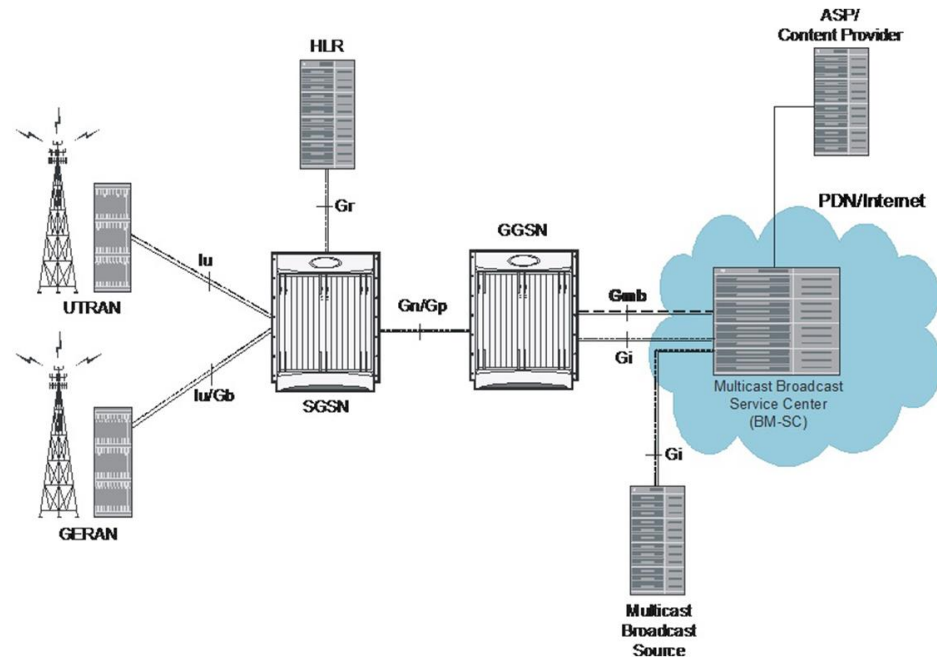
The GGSN provides the following functionality to perform MBMS services:

- serves as an entry point for IP multicast traffic as MBMS data. It provides establishment of bearer plan and tear-down of the established bearer plan upon notification from the BM-SC.

- provides functionality to receive MBMS specific IP multicast traffic and to route this data to the proper GTP tunnels set-up as part of the MBMS bearer service.

- provides features, that are not exclusive to MBMS, for the MBMS bearer service, like charging data collection, flow-based charging, optional message screening etc.

MBMS is able to use NPU assisted MBMS data flow processing on chassis so that system can relieve the Session Manager to provide better performance and processing. Currently with NPU assisted data processing, the Cisco chassis can support 225 SGSNs per MBMS Bearer Service for downlink of MBMS data.

Supported Standards

Support for the following standards and requests for comments (Rafts) have been added with the MBMS functionality:

- 3GPP TS 22.146: Multimedia Broadcast/Multicast Service; Stage 1 (Release 6)

- 3GPP TS 22.246: MBMS user services; Stage 1 (Release 6)

- 3GPP TS 23.246: MBMS; Architecture and functional description (Release 6)

- 3GPP TS 26.346: MBMS; Protocols and codecs (Release 6)

- 3GPP TS 33.246: Security of Multimedia Broadcast/Multicast Service

- 3GPP TS 32.251: Telecommunication management; Charging management; Packet Switched (PS) domain charging

- 3GPP TS 32.273: Telecommunication management; Charging management; Multimedia Broadcast and Multicast Service (MBMS) charging

- RFC 3588, Diameter Base Protocol

Supported Networks and Platforms

This feature supports all Cisco chassis running StarOS Release 8.0 or later with GGSN service for the core network services.

License Information

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Important Use of MBMS feature requires that a valid license key be installed. Contact your local Sales or Support representative for information on how to obtain a license

Services and Application in MBMS

MBMS service can be used as an enabler for various data streaming services. Compared to traditional broadcast services like cell broadcast, MBMS provides multimedia capabilities with relatively high data rates and considerably greater multimedia capabilities.

Some of the applications for MBMS are:

- News clips

- Audio streams

- Combined audio and picture/video clips

- Video distribution services, either via streaming, carousel, or download methods

- Localized services like tourist information, weather alerts etc.

- Content distribution

- Game delivery

The charging of the MBMS bearer service can be done based on events, content, or flows.

MBMS provides the authentication, key distribution, and data protection for the multicast service users.

MBMS References and Entities

Following are the major components and entities required for MBMS service.

Gmb Reference

The Gmb reference point handles the broadcast multicast service center (BM-SC) related signaling, which includes the user specific and bearer service messages.

MBMS bearer service specific Gmb signaling includes:

- MBMS bearer context establishment by GGSN and registering of GGSN at BM-SC.

- Release of MBMS bearer context at GGSN and de-registration of GGSN from the BM-SC.

- Session start/stop indication from BM-SC to GGSN including session attributes like QoS or MBMS service area.

User specific Gmb signaling includes:

- BM-SC authorization of user specific MBMS multicast service activation at the GGSN.

- Reporting of successful user specific MBMS multicast service activation by GGSN to BM-SC to synchronize the BM-SC UE MBMS context and charging with the MBMS UE contexts in GGSN.

- Reporting of release or deactivation of user specific MBMS multicast service activation by GGSN to BM-SC to synchronize the BM-SC UE MBMS context and charging with the MBMS UE contexts in GGSN.

- BM-SC initiated deactivation of user specific MBMS bearer service when the MBMS user service is terminated.

MBMS UE Context

A MBMS UE context is defined per UE. Session Manager assign a separate context structure for a MBMS UE Context.

Session Manager maintains the following information as part of MBMS UE Context:

- IP multicast address: IP multicast address identifying an MBMS bearer that the UE has joined.

- APN: Access Point Name on which this IP multicast address is defined.

- SGSN address: The IP address of SGSN

- IMSI: IMSI identifying the user.

- TEID for Control Plane: The Tunnel Endpoint Identifier for the control plane between SGSN and GGSN.

- MBMS NSAPI: Network layer Service Access Point Identifier which identifies an MBMS UE Context.

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Important For capacity and resource purpose one MBMS UE context is equal to one PDP context.

MBMS Bearer Context

The MBMS bearer context is created in the SGSN and GGSN for each provisioned MBMS service. This is created when the first MS requests for this service or when a downstream node requests it. Once created, an MBMS context can be in two states:

- Active - is the state in which network resources are required for the transfer of MBMS data.

- Standby - is the state in which no network resources are required.

The MBMS Bearer Context contains all information describing a particular MBMS bearer service and is created in each node involved in the delivery of the MBMS data.

Broadcast Multicast Service Center (BM-SC)

The BM-SC includes functions for MBMS user service provisioning and delivery. It serves as an entry point for content provider MBMS transmissions, used to authorize and initiate MBMS Bearer Services within the PLMN. It can also be used to schedule and deliver MBMS transmissions.

The BM-SC consists of five sub-functions:

- Membership function

- Session and Transmission function

- Proxy and Transport function

- Service Announcement function

- Security function.

BM-SC is a functional entity and must exist for each MBMS User Service.

How MBMS Works

The Multimedia Broadcast Multicast System provides two types of service provisioning; broadcast and multicast modes. This section describes the procedure of these modes.

MBMS Broadcast Mode

The broadcast mode provides unidirectional point-to-multipoint type transmission of multimedia data from a single source to all users that found in a defined broadcast service area. This mode uses radio resources efficiently, since the data is transmitted over a common channel.

MBMS data transmission adapts to the suitable RAN capabilities, depending on the availability of radio resources too. If needed, the bit rate of MBMS data may be varied in order to optimized radio resources.

The following figure shows the basic outline of broadcast mode procedure of an MBMS service in order to broadcast MBMS data within the defined broadcast service area via a packet switched core network.

The broadcast service may include one or more successive broadcast sessions. The user can control the enabling or disabling of the MBMS broadcast mode service.

MBMS Broadcast Mode Procedure

The MBMS performs following steps for broadcast mode user service:

Step 1   Service Announcement: Through the service announcement mechanisms, like SMS, WAP, users informed about the available MBMS services.

Step 2   Session Start: This is the phase where BM-SC has data to send and this triggers establishment of network resources for data transfer irrespective of whether a given user has activated the service or not.

Step 3   MBMS Notification: Notifies the MS of a impending MBMS data transfer.

Step 4   Data Transfer: It is the phase when MBMS data are transferred to the UEs.

Step 5   Session Stop: In this phase, the BM-SC determines that it has no more data to send for a time period and so the network resources can be released.
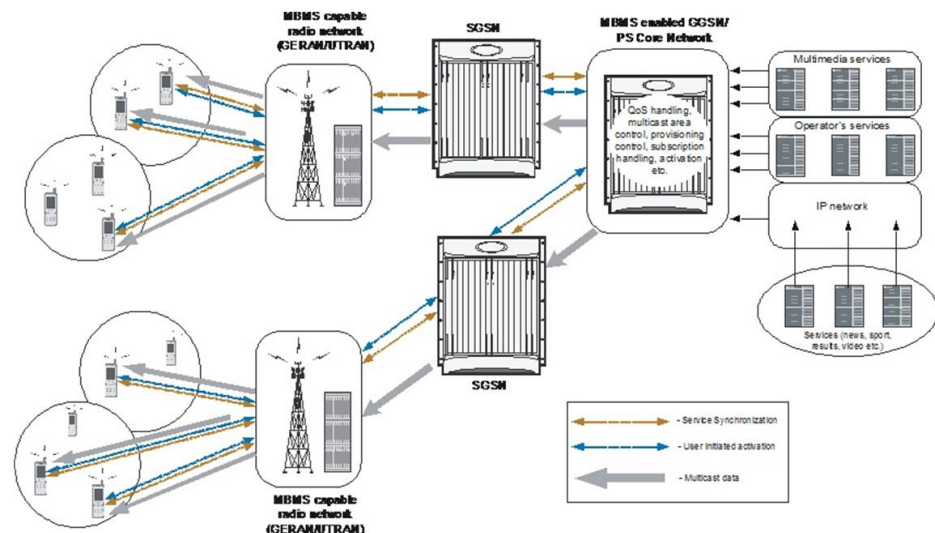
MBMS Multicast Mode

The multicast mode provides unidirectional point-to-multipoint type transmission of multimedia data from a single content source to a group of subscribers that subscribed to specific multicast service separately. The basic difference between broadcast and multicast modes is that the user does not need to subscribe in each broadcast service separately, whereas in multicast mode the services cab be order separately. The subscription and group joining for the multicast mode service can be done by the operator, user, or a separate service provider.

Like broadcast mode the multicast mode allows the unidirectional point-to-multipoint transmission of multimedia data within the multicast service area. The multicast mode uses radio resources in efficient way by using common radio channel as in broadcast mode. Data is transmitted over the multicast service area as defined by the network operator.

The multicast mode provides the flexibility for the network to selectively transmit to those cells within the multicast service area that contains members of a multicast group.

The following figure shows the basic outline of multicast mode procedure of an MBMS service in order to multicast MBMS data within the defined multicast service area via a packet switched core network.

Figure 2: Basic Procedure of MBMS Multicast Mode

A multicast service might consist of a single on-going session or may include several simultaneous multicast sessions over and extended period of time.

Following are some of the examples of multicast mode service:

- transmission of sports video clips to subscribers on charging basis

- transmission of news, movie, song, and audio clips to subscribed users on charging basis

MBMS Multicast Mode Procedure

The MBMS performs following steps for multicast mode user service:

Step 1 Subscription: Establishes the relationship between the user and the service provider, which allows the user to receive the related MBMS multicast service.

Step 2 Service Announcement: Through the service announcement mechanisms like, SMS, WAP, users shall be informed about the available MBMS services.

Step 3 Joining: This is the process by which a subscriber joins a multicast group, i.e. the user indicates to the network that he/she wants to receive Multicast mode data of a specific MBMS bearer service.

Step 4 Session Start: This is the phase where BM-SC is ready to send data and this triggers establishment of network resources for data transfer irrespective of whether a given user has activated the service or not.

Step 5 MBMS Notification: Notifies the MS of a impending MBMS data transfer.

Step 6 Data Transfer: It is the phase when MBMS data are transferred to the UEs.

Step 7 Session Stop: In this phase, the BM-SC determines that it has no more data to send for a time period and so the network resources can be released.

Step 8 Leaving: In this phase, the user leaves a MBMS group through an Internet Group Management Protocol (IGMP) Leave message.

MBMS Configuration

This section provides a high-level series of steps and the associated configuration examples for configuring the system with MBMS user service in GGSN services.

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Important These instructions assume that you have already configured the GGSN/SGSN system level configuration as described in network function *Administration Guide*.

To configure the system to perform Multimedia Broadcast and Multicast service:

Step 1 Configure the BM-SC profile in a context by applying the example configurations presented in the *BMSC Profile Configuration* section.

Step 2 Configure the MBMS charging parameters in GTPP Server Group Configuration mode by applying the example configurations presented in the *MBMS GTPP Configuration* section.

Step 3 Configure the MBMS accounting, supported contexts, timeout parameters, and BMSC profile association with APN in APN configuration mode by applying the example configurations presented in the *MBMS APN Configuration* section.

Step 4 Enable the MBMS user service provisioning mode in GGSN and configure the number of MBMS UE and MBMS bearer context in GGSN configuration mode by applying the example configurations presented in the *MBMS Provisioning* section.

Step 5 Save the changes to system configuration by applying the example configuration found in *Verifying and Saving Your Configuration* chapter.

Step 6 Verify configuration of MBMS service related parameters by applying the commands provided in the *Managing Your Configuration* section of this chapter.

BMSC Profile Configuration

This section provides the configuration example to configure the BM-SC profile in a context:

```
configure
 context <vpn_context_name> [ -noconfirm ]
 bmsc-profile name <profile_name> [ -noconfirm ]
 default gmb diameter dictionary
 gmb diameter endpoint <endpoint_name>
 gmb diameter peer-select peer < peer_name> [ realm <realm_name> ] [
secondary-peer <sec_peer_name> [ realm <sec_realm_name> ]]
 default gmb user-data mode-preference
 end
```

MBMS GTPP Configuration

This section provides the configuration example to configure the GTPP server parameters in GTPP group configuration mode for MBMS charging:

```
configure
 context <vpn_context_name> [ -noconfirm ]
 gtpp group default
 gtpp mbms buckets <cc_bucket>
 gtpp mbms interval <duration_sec>
 gtpp mbms tariff time1 <mins> <hours> [ time2 <mins> <hours> ]
 gtpp mbms volume <download_bytes>
 end
```

MBMS APN Configuration

This section provides the configuration example to enable the BM-SC profile for an APN and to configure the MBMS accounting, supported contexts, and timeout parameters in APN configuration mode:

```
configure
 context <vpn_context_name>
 apn <apn_name> [ -noconfirm ]
 mbms bmsc-profile name <profile_name>
 accounting mode gtpp
 default mbms bearer timeout { absolute | idle }
 default mbms ue timeout absolute
 end
```

MBMS Provisioning

This section provides the configuration example for provisioning of MBMS service mode for a GGSN service and associating the MBMS policy for multcast broadcast within the GGSN service in GGSN service configuration mode:

```
configure
 context <vpn_context_name>
 ggsn-service <ggsn_service_name>

 mbms policy multicast broadcast
 end
```

Save the Configuration

To save changes made to the system configuration for this service, refer *Verifying and Saving Your Configuration* chapter.

Managing Your Configuration

This section explains how to display and review the configurations after saving them in a *.cfg* file as described in *Saving Your Configuration* chapter of this guide and also to retrieve errors and warnings within an active configuration for a service.

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Important   All commands listed here are under Exec mode. Not all commands are available on all platforms.

Output descriptions for most of the commands are located in *Command Line Interface Reference*.

To do this:	Enter this command:
View Administrative Information	
Display Current Administrative User Access	
View a list of all administrative users currently logged on to the system	**show administrators**
View the context in which the administrative user is working, the IP address from which the administrative user is accessing the CLI, and a system generated ID number	**show administrators session id**
View information pertaining to local-user administrative accounts configured for the system	**show local-user verbose**
View statistics for local-user administrative accounts	**show local-user statistics verbose**
View information pertaining to your CLI session	**show cli**
Determining the System's Uptime	

To do this:	Enter this command:
View the system's uptime (time since last reboot)	**show system uptime**
View the Status of Configured NTP Servers	
View the status of the configured NTP servers	**show ntp status**
View the Statistics of Broadcast Multicast service	
View the full information of all broadcast-multicast service session	**show multicast-sessions full all**
View the status of all broadcast multicast-service session	**show session in-progress**
View all session for broadcast-multicast service	**show multicast-sessions all**
View Subscribers Currently Accessing the System	
View a listing of subscribers currently accessing the system	**show subscribers all**
View information for a specific subscriber	show subscribers full username *<user_name>*
View the MBMS Related Information	
Display Configured MBMS service	
View the configuration of a context	**show configuration context** *<vpn_ctxt_name>*
View configuration errors for GGSN service	**show configuration errors section ggsn-service [verbose] [	{grep** *<grep_options>* **| more }]**
Display BM-SC server Information	**show bmsc servers**

Gathering MBMS Statistics

The following table lists the commands that can be used to gather the statistics for MBMS.

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Important   All commands listed here are under Exec mode. For more information on these commands, refer *Executive Mode Commands* chapter in *Command Line Interface Reference*.

Multimedia Broadcast and Multicast Service

Gathering MBMS Statistics

Table 1: Gathering Statistics

Statistics Wanted	Action to Perform	Information to Look For
Gmb interface statistics for APN and BM-SC profile	At the Exec Mode prompt, enter the following command: **show gmb statistics** [**apn** *<apn_name>* | **bmsc-profile** *<bmsc_profile_name>*] [**verbose**]	The output of this command displays the statistics about the Gmb interface session for MBMS on an APN.
Detailed MBMS bearer service statistics	At the Exec Mode prompt, enter the following command: **show mbms bearer-service** [**mcast-address** *<mcast_address>*] [**apn** *<apn_name>*] [**bmsc-profile** *<bmsc_profile_name>*] [**service-type { multicast | broadcast }] [summary | full] [all]**	The output of this command displays the MBMS bearer service statistics.
Detailed statistics of MBMS multicast sessions	At the Exec Mode prompt, enter the following command: **show multicast-sessions**	The output of this command displays the detailed statistics of MBMS multicast session running on system.

Multimedia Broadcast and Multicast Service

12