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Technical Specification

3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Broadcast and Multicast Services; (Release 5)



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Foreword

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

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- x the first digit:
 - 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.

Introduction

Broadcast and Multicast are methods for transmitting data-grams from a single source to several destinations (point-to-multipoint). To date, release-4 and release-99 define two services in this respect:

1. A cell broadcast service allowing for low bit-rate data to be transmitted to all subscribers in a set of given cells over a shared broadcast channel. [3,4]
2. An IP-Multicast service allowing for mobile subscribers to receive multicast traffic. This service does not allow for multiple subscribers to share radio or core network resources and as such does not offer any advantages as far as resource utilization within the PLMN and over the radio access network. [1,2]

It is envisaged that for some application, multiple users can receive the same data at the same time. The benefit of multicast in the network is that the data is sent once on each link. For example, an SGSN will send data once to an RNC regardless of the number Node Bs and UEs that wish to receive it. The benefit of multicast on the air interface is that many users can receive the same data on a common channel, thus not clogging up the air interface with multiple transmissions of the same data.

With increasing use of high bandwidth applications in third generation mobile systems, especially with a large number of users receiving the same high data rate services, efficient information distribution is essential. Thus, broadcast and multicast are techniques to decrease the amount of data within the network and use resources more efficiently

1 Scope

This Technical Report defines the stage one description of the Broadcast and Multicast Services. Stage one is the set of requirements which shall be supported for the provision of Broadcast and Multicast services, seen primarily from the subscriber's and service providers' points of view.

This TR includes information applicable to network operators, content providers, and terminal and network manufacturers.

This TR contains the core requirements for Multicast Services, which are sufficient to provide a complete service.

Additional functionalities not documented in this TR may implement requirements, which are considered outside the scope of this TR.

This TR defines the requirements for Multicast and broadcast services regarding:

- General description of Broadcast and Multicast
- Definition of broadcast and multicast service capabilities
- Service areas
- QoS on broadcast and multicast services
- Multimedia support, Codecs
- Charging aspects
- Security aspects
- Roaming, Service availability and continuity
- Administration and Control
- Connectivity to external networks
- Optimized routing

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] 3G TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".
- [2] 3G TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [3] 3G TS 25.324: "Broadcast/Multicast Control BMC"
- [4] 3G TS 23.041: "Technical Realization of Cell Broadcast Service (CBS)"

3 Definitions, symbols and abbreviations

3.1 Definitions

Broadcast: A unidirectional point-to-multipoint service in which data is transmitted from a single source entity to all users in a certain geographical area or areas. When using broadcast transmission, all subscribers in a cell, receive the same data over a shared radio channel.

Multicast: a unidirectional point-to-multipoint service in which data is transmitted from a single source entity to a subgroup of users in a certain geographical area or areas. When using multicast transmission all multicast group members within a given cell receive the same data over a shared radio channel.

Multicast group: the set of all subscribers that have joined and are currently registered to an available multicast service. A subscriber may be a member of several multicast groups.

Multicast session: defined by the set of multicast transmissions made available to the user during the time for which he/she is registered as multicast group member. A session may consist of a single unbounded transmission (e.g. a multimedia stream) or may be comprised of a set of intermittent transmissions (e.g. rich media messages).

3.2 Abbreviations

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

MC	Multicast
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4 General description

4.1 Broadcast

Broadcast is the unidirectional point-to-multipoint service in which data is transmitted from a single source point to all users in a certain geographical area or areas.

Broadcast transmissions are unacknowledged. Acknowledgement of broadcast transmissions may be employed by specific applications and is not within the scope of this service.

4.2 Multicast

Multicast allows the unidirectional point-to-multipoint transmission of data from a single source point to a subgroup of users in a certain geographical area or areas.

The user should be able to select and/or join different multicast services. The operator should have admission control for each service in order to be able to provide a particular service for closed groups only (e.g. companies)

It shall also be possible for the operator/service provider to terminate the multicast session.

Users which are subscribed to a certain Multicast service may be alerted to up coming Multicast transmissions within a service area.

For the efficient use of bandwidth there should be one transmission per cell on the Uu interface. Multicast transmissions are unacknowledged. Acknowledgement of multicast transmissions may be employed by specific applications and is not within the scope of this service.

The means by which the set of available multicast services are relayed and presented to the subscriber are application specific and are beyond the scope of this service.

5 Broadcast/Multicast service capabilities A UE capability set may include the following:

- The terminals ability to receive broadcast transmissions including associated QoS parameters.
- The terminals ability to join multicast groups.
- The terminals ability to receive multicast transmissions including associated QoS parameters.

6 Service Areas

Multicast services offered by an operator may be available in the whole PLMN. However, since there may be Multicast services which are only of local interest, it should be possible to restrict the service area to a number of cells.

Within the designated service areas, resources should be allocated based on actual need. That is, if it is known that no multicast group members are present in a given cell then multicast session data should not be transmitted to and within that cell.

7 Quality of Service Aspects

It should be possible to configure the whole value range of QoS parameters provided in the radio access network (UTRAN, BSS) and core-network. The QoS for each Multicast session should be individually configurable.

8 Multimedia Support and Codecs

Broadcast and Multicast functionality will support all data types e.g Data (text, software updates), Audio (music), Video (sports clips)

9 Charging Aspects

Operators should be able to charge users for Multicast Services. It should be possible to set charging characteristics individually for each Multicast Service.

E.g. the following charging information could be applied:

- Radio interface usage
- Usage duration, time of membership
- Volume of contents
- Flat fee.
- Message or content based. (e.g. charge a fee per sports clip).

Additionally, it should also be possible to charge the provider of a Multicast service, e.g. for advertising.

Billing issues when roaming need to be studied in more detail.

10 Security aspects

In order to ensure that multicast data may be transmitted confidentially only to those users that are entitled to receive it, a mechanism, complementing multicast user admission, should be defined. This mechanism will allow for secure/encrypted transmission to all multicast group members. Secure and encrypted multicast transmission may be used to enforce service charges and prevent unauthorized access to multicast services. It may also be used to provide for private encrypted multicast transmissions (e.g. corporate information).

With regards to security aspects the following requirements hold:

- It shall be possible to secure a multicast service by encrypting all or parts of the transmissions for this multicast service. The UE, upon being admitted to the service will receive a key enabling it to decrypt the multicast traffic.
- If a multicast service is secured, it should be possible to send parts of the data unencrypted. The UE should be notified whether a particular transmission is being encrypted and if decryption is necessary.

11 Roaming, Service Availability and Continuity

Multicast services should in general be available for all users that are registered in an operators network. This should include UEs in idle and connected. However the availability of Multicast services in different mode may be service specific.

In case of handover and presuming that a certain Multicast service is offered in the target cell, it should be possible for the user to continue the multicast session in the target cell.

In case of roaming, a user should also be able to subscribe to Multicast Services that are provided locally in the visited network.

12 Administration and Control

The operator should have the ability to control the set of multicast and broadcast services offered within its network. Further, the operator should be able to designate the area in which a multicast or broadcast service is to be offered.

The operator should also be able to limit a certain multicast service at pre-determined time frames. This information should be relayed to the terminal.

For each multicast and broadcast service, the operator should be able to determine the level of QoS with which the service is to be offered.

An operator should be able to limit certain multicast services to a group of subscribers. These subscribers are authorized to join the multicast group and receive the multicast service.

13 Connectivity to external networks

An operator probably doesn't want to provide all content for all Multicast services himself. Assuming that a third party, not located in the PLMN of the operator, provides the content, it seems sensible to provide an interface to external networks for Multicast Content.

Basically there are two possibilities:

1. proprietary solution, similar to CBS
2. standardised interface towards the external network

However, whether it is necessary to specify an open interface is for further study.

14 Core-Network Routing

In order to conserve core network resources, multicast and broadcast transmissions should be routed so as to minimize network resource utilization. Multicast and broadcast traffic should be routed within the core network so that it is received by core-network entities only once. Since the multicast and broadcast are point-to-multipoint services it is suggested that source-specific multicast routing technologies be considered.

Annex A (informative): Change history

V. 0.0.1	May 2001	First Draft (Presented at TSG-SA-WG1 #12, 7th – 11th May 2001)
V1.0.0	June 2001	Presented to SA #12 for information.

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	Work Item