

Source: Editor

Title: TR 25.925 « Radio Interface for Broadcast/Multicast Services »,
Version 0.1.0

Document for: For information

Agenda Item: 6.2

**3rd Generation Partnership Project (3GPP);
Technical Specification Group (TSG) RAN;
Working Group 2 (WG2);**

Radio Interface for Broadcast/Multicast Services



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Reference

<Workitem> (<Shortfilename>.PDF)

Keywords

Digital cellular telecommunications system,
Universal Mobile Telecommunication System
(UMTS), UTRA, IMT-2000

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Foreword

This Technical Report has been produced by the 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 this TR, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

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

1 Scope

The present document shall provide a general overview on radio interface related aspects of broadcast/multicast services. Also in the scope of this report is the functional split between UTRAN nodes and the analysis of the potential impact on UTRAN related interfaces regarding broadcast/multicast services. This report covers stage 2 and stage 3 aspects.

This report is organized as follows: Chapter 4 gives an overview on the broadcast/multicast services and their requirements. Chapter 5 provides a common model and describes aspects common to all point-to-multipoint services. Chapters 6 - 10 are devoted to the different broadcast/multicast service categories. Each service specific chapter describes the requirements on the interfaces. In these subchapters the impacts on the interface functions and the protocol aspects are described. This TR covers only those items which are in the scope of 3GPP TSG RAN. Information from Technical Specifications or other documents are provided when it is necessary to understand the requirements described.

Table 1: Schedule of the broadcast/multicast services onto the UMTS phases and annual releases

Phase	(Annual) Release	Broadcast/multicast service
1	1999	SMS Cell Broadcast Service (GSM)
	2000	
	2001	

Note: A decision to map the services to phases/releases is required for all other broadcast/multicast services.

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.
- A non-specific reference to a TS shall also be taken to refer to later versions published as an EN with the same number.

- [1] 3GPP TS 22.100 "UMTS Phase 1"
- [2] 3GPP TS 22.101 "UMTS Service Principle"
- [3] 3GPP TS 22.105 "Services and Service Capabilities"
- [4] 3GPP TS 25.301 "Radio Interface Protocol Architecture"
- [5] 3GPP TS 25.302 "Services provided by the Physical Layer"
- [6] 3GPP TS 25.303 "UE Functions and Interlayer Procedures in Connected Mode"
- [7] 3GPP TS 25.304 "UE Procedures in Idle Mode"
- [8] 3GPP TS 25.321 "MAC Protocol Specification"
- [9] 3GPP TS 25.322 "RLC Protocol Specification"
- [8] 3GPP TS 25.331 "RRC Protocol Specification"
- [9] GSM 02.03: "Digital cellular telecommunications system (Phase 2+); Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".
- [10] GSM 02.60: "GPRS Service description"
- [11] GSM 03.41: "Digital cellular telecommunications system (Phase 2+); Man-Machine Interface (MMI) of the Mobile Station (MS)"
- [12] GSM 03.61: "Digital cellular telecommunications system (Phase 2+); Support of Mobile Number Portability (MNP); Service description; Stage 1"

3 Definitions and Abbreviations

3.1 Definitions

3.2 Abbreviations

CB	Cell Broadcast
IP	Internet Protocol
IP-M	IP Multicast
MDS	Multimedia Distribution Service
PTM	Point-to-Multipoint
PTM-G	PTM Group Call
PTM-M	PTM Multicast
SMS	Short Message Service
SMS-CB	SMS Cell Broadcast
UE	User Equipment
UMTS	Universal Mobile Telecommunication System
UTRAN	UMTS Terrestrial Radio Access Network

4 Overview of Point-to-multipoint Services and Requirements

It is agreed to have service continuity for GSM/GPRS point-to-multipoint services in UMTS ([1] and [2]). This means that the user gets the same service behaviour as he knows it from GSM or GPRS. The services are SMS Cell Broadcast [101] and Point-to-multipoint Multicast, Point-to-multipoint Group Call and IP Multicast [102].

Combined with the UMTS service classification given in [2] the service classification shown in Figure 1 could be used as a starting point. The figure contains the view in terms of Radio Access Bearer services and should not be applied for higher layers where other categories of services may exist. Future work may result in changes of Figure 1.

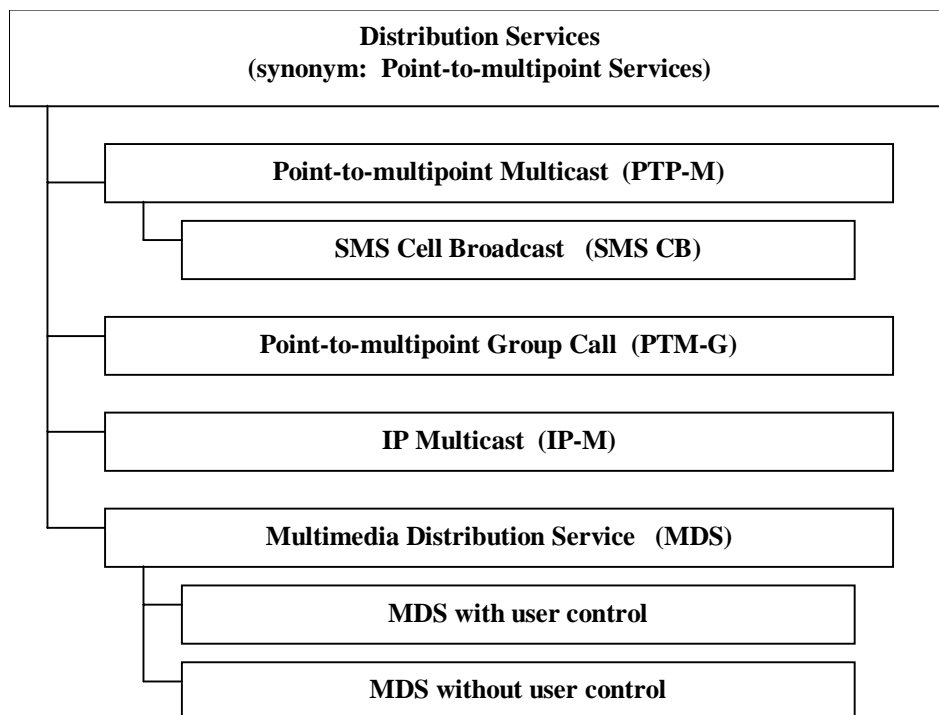


Figure 1: Structure of point-to-multipoint services

Tables 1 and 2 below summarize the service attributes defining the broadcast/multicast services. Table 3 allocates attributes of the Uu radio interface to the services. Table entries which are left empty, require further study.

Table 1: Bearer Service attributes ([3])

Attributes		Values
Information transfer attributes	1. Connection mode attribute	Connection oriented: CO (Circuit Switched base)
		Connectionless: CL (Packet Switched)
	2. Transfer type attribute	Constant bit rate
		Variable bit rate
		Available bit rate
		Unspecified bit rate
	3. Symmetry attribute	Unidirectional
		Bi-directional symmetric
		Bi-directional asymmetric
	4. Communication configuration attribute	Point-to-point
		Point-to-multipoint
	5. Information transfer rate attributes	(Continuous range of values is possible)
		High bit rate
		Medium bit rate
Low bit rate		
Information quality attributes	1. Maximum transfer delay attribute	(Continuous range of values is possible)
		Delay sensitive
		Delay insensitive
	2. Delay variation attribute	(Continuous range of values is possible)
		Constant
		Variable
	3. Bit error ratio attribute	(Continuous range of values is possible)
		Loss sensitive
		Loss insensitive
	4. Error characteristics attribute	Uniform
Bursty		

Table 2: Overview of Broadcast/Multicast Services (Part 1)

Attributes	SMS-CB	PTM Multicast (medium rate)	PTM Multicast (high rate)	PTM Group call	IP-multicast (Medium rate)	IP-multicast (Low rate)
Information transfer attributes						
1. Connection mode attribute	CL	CL	CL	CO	CL	CL
2. Transfer type attribute	Constant	Variable	Variable	Variable	Available	Available
3. Symmetry attribute	UNI	UNI	UNI	UNI BI ASYM MULTI	MULTI (UNI)	MULTI (UNI)
4. Communication configuration attribute	PTM	PTM	PTM	PTM	PTM	PTM
5. Information transfer rate attributes	Low	Medium	High	Low	Medium	Low
Information quality attributes						
1. Maximum transfer delay attribute	Delay insensitive	Delay insensitive	Delay sensitive	Delay sensitive	Delay insensitive	Delay insensitive
2. Delay variation attribute						
3. Bit error ratio attribute	Loss insensitive	Loss insensitive	Loss insensitive	Loss insensitive	Loss sensitive	Loss sensitive
4. Error characteristics attribute						
Defined in	GSM	GPRS	GPRS	GPRS	GPRS	GPRS

(Editor's note: Value MULTI is not defined in [3] yet. It is specified in [10])

Table 2: Overview of Broadcast/Multicast Services (Part 2)

Attributes	MDS without user control (high rate)	MDS without user control (medium rate)	MDS with user control (high rate)	MDS with user control (medium rate)	Messaging service (high rate)	Messaging service (medium rate)
Information transfer attributes						
1. Connection mode attribute						
2. Transfer type attribute						
3. Symmetry attribute						
4. Communication configuration attribute	PTM	PTM	PTM	PTM	PTM	PTM
5. Information transfer rate attributes	High	Medium	High	Medium	High	Medium
Information quality attributes						
1. Maximum transfer delay attribute						
2. Delay variation attribute						
3. Bit error ratio attribute						
4. Error characteristics attribute						
Defined in	UMTS	UMTS	UMTS	UMTS	UMTS	UMTS

Table 3: Radio Interface related attributes of broadcast/multicast services (part 1) [10]

Attributes	SMS-CB	PTM Multicast (medium rate)	PTM Multicast (high rate)	PTM Group call	IP-multicast (Medium rate)	IP-multicast (Low rate)
UE modes (ffs.)	(ffs.)					
Logical Channels	CTCH	CTCH	CTCH	CTCH	CTCH	CTCH
Necessity of separate control channel	No					
Transport Channels	FACH					
Physical Channels	Secondary CCPCH					
DRX Mode	Yes	Yes	Yes	No	Yes	Yes
Primary addressing	GEO area	Subscriber group	Subscriber group	Subscriber group	Subscriber group	Subscriber group
Secondary addressing	---	GEO area	GEO area	GEO area	---	---
Present subscribers known	No	No	No	Yes	Yes	Yes
Ciphering	No	No	No	Yes	Yes	Yes
Reliable delivery	No	No	No	Optional	Yes	Yes

Table 3: Radio Interface related attributes of broadcast/multicast services (part 2)

Attributes	MDS without user control (high rate)	MDS without user control (medium rate)	MDS with user control (high rate)	MDS with user control (medium rate)	Messaging service (high rate)	Messaging service (medium rate)
UE modes (ffs.)						
Logical Channels						
Necessity of separate control channel						
Transport Channels						
Physical Channels						
DRX Mode						
Primary addressing						
Secondary addressing						
Present subscribers known						
Ciphering						
Reliable delivery						

5 Common Model

The common Traffic Channel (CTCH) [4] is provided by the MAC sublayer for support of broadcast/multicast services. It is presently assumed that the CTCH can be used for all categories of broadcast/multicast services.

The present assumption (ffs.) for SMS-CB service is that the CTCH is mapped to a FACH transport channel. The FACH is also a candidate to be used for other multicast services. This possibility will be further investigated in this report.

6 SMS Cell Broadcast Service (GSM)

Functions which are not under scope of RAN are:

- Mapping of geographical area onto cells

Functions which are under scope of RAN are:

- Scheduling of SMS CB messages per cell
- Usage of transparent or unacknowledged (L2) services

6.1 Radio Interface Requirements

6.2 Impact on UTRAN functions

7 PTM-Multicast Service (GPRS)

This chapter contains the requirements derived from GPRS specifications of Point-to-multipoint Multicast service and the analysis regarding the UMTS radio interface Uu.

Note:

The specification of the PTM-Multicast service is part of the work item “GPRS – Point-To-Multipoint Services” of GSM Phase 2+ Release 1999.

7.1 Radio Interface Requirements

7.2 Impact on UTRAN Functions

8 PTM-Group Call Service (GPRS)

This chapter contains the requirements derived from GPRS specifications of Point-to-multipoint Group Call service and the analysis regarding the UMTS radio interface Uu.

Note:

The specification of the PTM-Group Call service is part of the work item “GPRS – Point-To-Multipoint Services” of GSM Phase 2+ Release 1999.

8.1 Radio Interface Requirements

8.2 Impact on UTRAN Functions

9 IP Multicast Service (GPRS)

This chapter contains the requirements derived from GPRS specifications of IP Multicast service and the analysis regarding the UMTS radio interface Uu.

Note:

The specification of the IP-Multicast service is part of the work item “GPRS – Point-To-Multipoint Services” of GSM Phase 2+ Release 1999.

9.1 Radio Interface Requirements

9.2 Impact on UTRAN Functions

10 Multimedia Distribution Service (UMTS)

This chapter contains the requirements derived from UMTS Technical Specifications and the analysis regarding the radio interface Uu.

(Editor’s Note:

RAN WG2 has sent a Liaison statement to SA WG1 and WG2 requesting stage 1 and stage 2 specification of UMTS multicast services and describing the relation to SMS services. A reply is expected. Information is needed about the questions: In which annual release the UMTS Multicast services will be part? What are the requirements for the UMTS system and the protocols?)

10.1 Radio Interface Requirements

10.2 Impact on UTRAN Functions

Annex A: Functions related to MDS (ffs.)

Previous WG2 Input documents:

R2-99075 (LGIC), R2-99076 (LGIC), R2-99218 (LGIC), R2-99219 (LGIC)

Input documents not presented yet:

R2-99077 (LGIC)

Related WG2 Output documents:

R2-99189 (TSG RAN WG2) LS to SA WG1 and SA WG2 on Multicast

(Editor's note: The following text is taken from R2-99075 and should give a first overview of functions which should be analysed for MDS. Already made decisions are incorporated.)

Functions which should be analysed are listed below:

RRC functions:

Variable Rate Support

Dynamic Code usage

Dynamic Scheduling

QoS Support (e.g. repetition time)

(LGIC, R2-99075, for information)

RLC functions:

Unacknowledged multicast data transfer

Multicast Delivery

(LGIC, R2-99075, for information)

MAC functions:

Support fo multiple CTCH

Mapping and multiplexing/demultiplexing between CTCH and transport channels

Scheduling among CTCH

Support of dynamic rate change using TFCS

(LGIC, R2-99075, for information)

New types of transport channels are not required.

L1 functions:

Transmission of messages containing multicast data to specific groups of UEs. This service includes provision of the location function necessary to deliver mulitcast messages to a mobile, which is in idle or slotted mode.

DTX (discontinious transmission)

DRX (discontinious reception)

Support of multicast data transmission with multi-code

(LGIC, R2-99075, for information)

History

Document history		
Date	Version	Comment
May 1999	0.0.1	Skeleton without scope
June 1999	0.0.2	Inclusion of scope and document structure as agreed at TSG RAN WG2 meeting #4, Berlin, 25-28 May 1999, distributed for e-mail approval
June 1999	0.1.0	RAN WG 2 approved version with editorial changes and addition of subchapter x.2 (Impact on UTRAN Functions), x service specific chapters 6 to 10
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This document is written in Microsoft Word 97.		