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1 Scope

This document is part of the RAN WI "**Introduction of the Multimedia Broadcast Multicast Service (MBMS) in RAN**" and it is linked to 3GPP TS 22.146 "Multimedia Broadcast Multicast Service; Stage-1" [2] and the SA2 WI "Multimedia Broadcast/Multicast Service Architecture", the work of which is reflected in 3GPP TS 23.246 [3].

The purpose of the present document is to address the UTRAN and GERAN MBMS requirements in order to help the TSG RAN and TSG GERAN working groups address the changes needed to existing specifications and also identify new specifications, that are required for the introduction of the WI "**Introduction of the Multimedia Broadcast Multicast Service (MBMS) in RAN**".

2 References

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- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.146: "Multimedia Broadcast/Multicast Service; Stage-1".
- [3] 3GPP TS 23.246: "Multimedia Broadcast Multicast Service; Architecture and Functional Description".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions given in [1] and the following apply..

Broadcast mode: The part of MBMS that supports broadcast services.

Counting: This is the function that UTRAN performs when it wishes to identify the number of multicast subscribers (all joined subscribers, or just above a "threshold") in a particular cell, that wish to receive a multicast session for a particular service.

MBMS (Broadcast/Multicast) Session: A continuous and time-bounded reception of a broadcast/multicast service by the UE. A single broadcast/multicast service can only have one broadcast/multicast session at any time. A broadcast/multicast service may consist of multiple successive broadcast/multicast sessions.

Multicast mode: The part of MBMS that supports multicast services.

MBMS broadcast activation: The process which enables the data reception from a specific broadcast mode MBMS on a UE. Thereby the user enables the reception locally on the UE.

MBMS multicast activation (Joining): The explicit point-to-point UE to network signalling, which enables a UE to become a member of a multicast group and thus start receiving data from a specific MBMS multicast service (when data become available).

MBMS Notification: The mechanism, which informs the UEs about the availability or coming availability of a specific MBMS RAB data in one given cell.

Service Announcements/Discovery: The mechanisms should allow users to request or be informed about the range of MBMS services available. Operators/service providers may consider several service discovery mechanisms. This could include standard mechanisms such as SMS, or depending on the capability of the terminal, applications that encourage user interrogation. Users who have not already subscribed to a MBMS service should also be able to discover MBMS services.

NOTE: Some of the above definitions have been taken from TS 22.146 [2].

Tracking: This is a function that allows UTRAN to follow the mobility of multicast subscribers. Inherently it can be used as a means of counting multicast subscribers.

UE: Unless otherwise stated, 'UE' is used to refer to both the UE and the MS.

3.2 Symbols

(void)

3.1 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TS 21.905 [1] and the following apply:

MBMS	Multimedia Broadcast Multicast Service
p-t-p	Point-to-point
p-t-m	Point-to-multipoint

4 Background and introduction

Following TSG RAN/SA#15, it was concluded that the service requirements [2] of MBMS are considered stable enough and the work on the architectural aspects have progressed to the extent that the work in the RAN groups could be initiated.

5 RAN MBMS requirements

Following the clarifications provided during the 3GPP MBMS workshop on stage 1 [2] and stage 2 [3], the following RAN requirements have been identified and are currently agreed within RAN WG2:

1. MBMS data transfer shall be downlink only.
2. QoS attributes shall be the same for MBMS Multicast and Broadcast modes.
3. During MBMS data transmission it shall be possible to receive paging messages, which also should contain some additional information, such as CLI.
4. Simultaneous reception of MBMS and non-MBMS services shall depend upon UE capabilities.
5. Simultaneous reception of more than one MBMS services shall depend upon UE capabilities.
6. A notification procedure shall be used to indicate the start of MBMS data transmission. This procedure shall contain MBMS RB information. The MBMS notification requirements are listed in subclause 5.1.
7. A mechanism to enable the Network to move MBMS subscribers between cells is required.
8. MBMS UE multicast activation (Joining) shall be transparent to UTRAN.
9. A mechanism is required that enables the non-transmission of MBMS multicast mode in a cell which does not contain any MBMS UEs joined to the multicast group.
10. Reception of MBMS shall not be guaranteed at RAN level. MBMS does not support individual retransmissions at the radio link layer, nor does it support retransmissions based on feedback from individual subscribers at the

radio level. This does not preclude the periodic repetitions of the MBMS content based on operator or content provider scheduling or retransmissions based on feedback at the application level.

- 11 MBMS shall not prevent the capability for SRNS/SBSS relocation.
- 12 A mechanism to provide UTRAN the received QoS per UE is not required as part of MBMS.
- 13 UE controlled "service based" cell selection/reselection shall not be permitted.
- 14 Handover and SGSN relocation shall not be affected by an active MBMS session.
- 15 In the case of UTRAN only, guaranteed 'QoS' linked to a certain initial downlink power setting is not required; however, the purpose and possibility of some reporting mechanism could be identified to measure the delivered QoS.

NOTE: The above requirement is not applicable in GERAN, as a p-t-m type connection will use a similar power control mechanism to a broadcast channel.

- 16 MBMS Multicast mode transmissions should use dedicated resources (p-t-p) or common resources (p-t-m). The selection of the connection type (p-t-p or p-t-m) is operator dependent, typically based on downlink radio resource environment such as radio resource efficiency. A "threshold" related to the number of users may be utilised, resulting in the need for a mechanism to identify the number of subscribers in a given "area".
- 17 MBMS solutions to be adopted should minimise the impact on the RAN physical layer and maximise reuse of existing physical layer and other RAN functionality.
- 18 MBMS charging should be transparent to the RAN.
- 19 MBMS should allow for low UE power consumption.
- 20 Header compression should be used.
- 21 MBMS should not prevent support for SGSN in pool.
- 22 Data loss during cell change should be minimal.

5.1 MBMS Notification Requirements

The following requirements for MBMS notification mechanism(s) have been identified and currently agreed:

- 1 MBMS notification shall be transmitted within the MBMS service area.

NOTE: If MBMS notification is transmitted in all cells of a corresponding MBMS service area or only in those cells where MBMS subscribers are actually located, is FFS.

- 2 MBMS notification shall be sent so it could be received by all UEs with an activated MBMS service, regardless of their RRC state or the lack of an RRC connection.
- 3 MBMS notification should maximise the reuse of existing channels.
- 4 MBMS notification should allow terminals to minimise their power consumption, meaning that UEs with an activated MBMS service should not listen permanently, but at regular intervals to MBMS notification.
- 5 Reception of MBMS notification cannot be guaranteed.
- 6 UEs may receive MBMS notification and simultaneously monitor other occasions, e.g. UE dedicated paging and CBS messages. The avoidance of collisions cannot be guaranteed. If collisions occur, the UE dedicated Paging has higher priority (UE requirement).

6 RAN MBMS functions

6.1 Functions list

The RAN functions identified for MBMS are:

- 1 Functions relating to service establishment and radio resource management and control for MBMS services:
 - 1.1 Admission control for MBMS services (see subclause 6.2.1).
 - 1.2 Identification of the number of UEs (counting) with activated MBMS service(s) within a cell (see subclause 6.2.2).
 - 1.3 Selection between the use of p-t-p and p-t-m radio bearers (see subclause 6.2.3).
 - 1.4 Assignment of resources and the selection of parameters for MBMS radio bearers (see subclause 6.2.3).
 - 1.5 Establishment and release of radio bearers for MBMS services (see subclause 6.2.3).
 - 1.6 Identifying to UEs the physical, transport and logical channel parameters with which particular MBMS services are transmitted in each cell (see subclause 6.2.4).
 - 1.7 Alerting UEs that MBMS data is to be transmitted (see subclause 6.2.5).
 - 1.8 Power Control (see subclause 6.2.6).
- 2 Functions relating to mobility:
 - 2.1 Support of cell change and minimisation of data loss (see subclause 6.2.7).
 - 2.2 Maintenance of the MBMS context (see subclause 6.2.8).
- 3 Functions relating to transmission of MBMS data:
 - 3.1 Replication of MBMS data streams to the cells of a multicast or broadcast area (see subclause 6.2.9).
 - 3.2 Transfer of MBMS data (see subclause 6.2.10).

6.2 Function descriptions

This subclause contains a brief description of the RAN MBMS function identified in subclause 6.1.

6.2.1 Admission control

The RAN shall contain functionality that enables it to determine how to respond to requests to provide radio bearers for individual MBMS services (data streams) made by the SGSN. This admission procedure may take into account the capacity required, quality of service and priority of the requested service and the resources that are available for MBMS services within the cell.

6.2.2 Identification of the number of UEs with activated MBMS service(s) in a cell

Some architectural solutions for MBMS require that the RAN can identify the number of UEs (or at least whether a minimum number of UES) that have activated particular MBMS services are present in a cell. This function may be used, in conjunction with discontinuous MBMS services, to identify whether the service should be established in the cell and whether p-t-p or p-t-m radio access bearers should be used.