TSG-RAN Meeting #26 **RP-040492**
Athen, Greece, 08-10 December 2004 **Agenda item 8.4**

Source: TSG-RAN WG2.

Title: Introduction of the MBMS in RAN. CRs to 25.346.

The following CRs are in RP-040492:

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.346	006	1	Rel-6	Actions due to MBMS session repetition and MBMS service prioritisation	F	6.2.0	6.3.0	R2-042700	MBMS-RAN
25.346	007	1	Rel-6	Introduction of MSCH and soft combining and other general corrections	F	6.2.0	6.3.0	R2-042701	MBMS-RAN
25.346	008	-	Rel-6	Corrections to UE Linking, Session Start and addition of URA Linking and Information Exchange procedure	F	6.2.0	6.3.0	R2-042702	MBMS-RAN
25.346	009	-	Rel-6	Update of Annex B	F	6.2.0	6.3.0	R2-042703	MBMS-RAN

3GPP TSG-RAN WG2 Meeting #45
Shin-Yokohama, Japan, 15th-19th of November

Tdoc ⌘R2-042700

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.346** **CR** **006** ⌘ **rev** **1** ⌘ Current version: **6.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Actions due to MBMS session repetition and MBMS service prioritisation
Source:	⌘	RAN WG2
Work item code:	⌘	MBMS-RAN
Date:	⌘	19/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	RAN2 found out agreements to define UE actions regarding the session repetition and MBMS service prioritisation inside UE.
Summary of change:	⌘	1) It is clarified that UTRAN should include the MBMS session Id together with MBMS service ID on the MCCH. In addition the UE may ignore MBMS session repetitions if it has received the session completely from previous transmission moment. The UE in Idle or URA_PCH state ignores the counting and FLC rules in this case. 2) It is clarified that allocation and retention priority assigned for MBMS bearer is used to prioritise MBMS bearers and non MBMS bearers in the network. The UE may have different priorities defined internally, which are used to priorities MBMS services if UE is not able to receive all MBMS services which it has activated and are transmitted simultaneously. It is defined that if UE desires to prioritise the MBMS service over non MBMS service and desires to stop the reception of non MBMS service the UE shall initiate NAS level signalling towards CN. In case, that UE may stop or reject lower priority MBMS p-t-p service due to higher priority MBMS p-t-m service reception the UE may request release of the p-t-p MBMS RB or reject the p-t-p MBMS RB setup.
Consequences if not approved:	⌘	Agreements on MBMS session repetition and MBMS service prioritisation are not captured in Stage-2 specifications

Clauses affected:	⌘	New subclause: 5.2.7, 5.2.8 and 8.3.9 and modifications to 7.3. 8.1. 8.3.2

[Y] [N]

Other specs affected:	⌘		Other core specifications Test specifications O&M Specifications	⌘	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

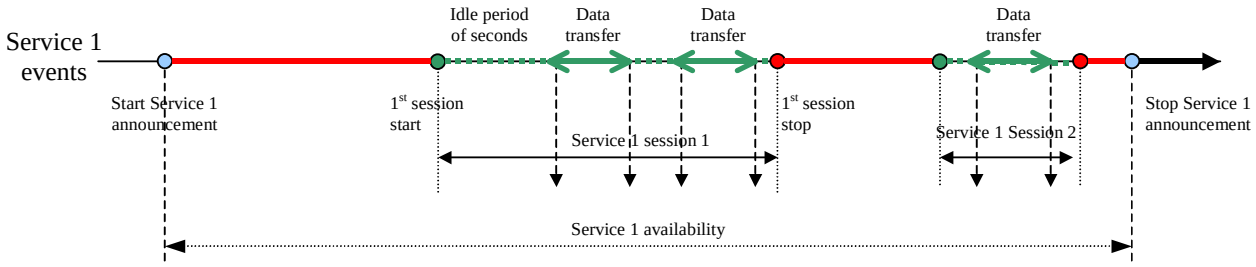

Figure 3.1: MBMS Timeline, based on [4].

MBMS session start is the point at which the BM-SC is ready to send data.

MBMS notification informs the UEs about forthcoming and about ongoing MBMS data transfer.

MBMS Cell Group is a group of multiple cells belonging to one RNS and sharing one PDCP and RLC entity to utilize p-t-m transmission of the MBMS Service

MBMS session stop is the point at which the BM-SC determines that there will be no more data to send for some period of time.

Data transfer is the phase when MBMS data are transferred to the UEs.

MBMS service availability is the phase between start of service announcement and the end of the last session or stop of service announcement.

MBMS Iu data bearer denotes the data bearer established between SGSN and RNC to transport MBMS data

MBMS radio bearer denotes the data bearer established between RNC and UE(s) to transport MBMS data

MBMS RAB denotes both, the MBMS Iu data bearer and the MBMS radio bearer

MBMS Service Context contains the necessary information for the UTRAN to control the MBMS Service in UTRAN.

MBMS Iu signalling connection denotes the signalling connection established between the RNC and the CN node to serve one MBMS Service Context.

MBMS Service Announcement: Mechanism to allow users to be informed about the MBMS services available [4]

Pool area: see definition in ref.[6]

MBMS Multicast Service Activation: see description in ref.[4]

Critical Information: MBMS Neighbouring Cell Information, MBMS Radio Bearer Information and MBMS Service Information sent on MCCH.

Non-critical information: MBMS Access Information sent on MCCH.

MBMS Service Area: The area in which a specific MBMS Bearer Service is available. It is defined individually per MBMS Bearer Service. [4]

3.2 Symbols

(void)

3.3 Abbreviations

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

CELL_DCH	
CELL_FACH	
CG-Id	Cell Group Identifier
CRNC-Id	CRNC Identifier
FFS	For Further Study
FLC	Frequency Layer Convergence
LCI	Layer Convergence Information
MBMS	Multimedia Broadcast Multicast Service
MBMS service ID	Multimedia Broadcast Multicast Service service Identity
MBMS Session ID	Multimedia Broadcast Multicast Service session identity
MBMS CG-Id	MBMS Cell Group Identifier
MBMS UCG-Id	MBMS UTRAN Cell Group Identifier
MCCH	MBMS point-to-multipoint Control Channel
MICH	MBMS notification Indicator Channel
MTCH	MBMS point-to-multipoint Traffic Channel
NI	Notification Indicator
PL	Preferred Layer
p-t-p	Point-to-Point
p-t-m	Point-to-Multipoint
PF	Probability Factor

Next modified sections*

5.2 MBMS Uu Principles

5.2.1 MBMS Service States in UE

The MBMS bearer service has following service states in the UE:

1. Not active, UE has not joined any MBMS multicast service or not activated the broadcast mode of the MBMS
2. Not active, UE has joined at least one MBMS multicast service and/or activated the broadcast mode of the MBMS, but MBMS SYSTEM INFORMATION is not broadcasted on BCCH.
3. Active, UE has joined at least one MBMS multicast service and/or activated the broadcast mode of the MBMS, but any of the services that UE has joined (interested in broadcast mode) is not being transmitted. UE monitors MICH to find modifications in the MCCH as defined in 5.1.6
4. Active; at least one MBMS multicast service which the UE has joined (interested in broadcast mode) is transmitted on p-t-m
   - UE is receiving MBMS transmission on MTCH
   - UE is using DRX based on scheduling information informing that coming MTCH transmission is not in the interest of the UE.
5. Active; at least one MBMS multicast service which UE has joined is transmitted on p-t-p

6. Active; at least one MBMS multicast service which UE has joined is transmitted on p-t-p and at least one MBMS multicast service which UE has joined (interested in broadcast mode) is transmitted on p-t-m. (only valid if UE has capability to support this combination)

When MBMS transmission is started in cell the UE moves from state 3 to either state 4 or state 5 (6), depending on p-t-p transmission mode and after MBMS transmission ends in the cell, the UE moves from state 4 or state 5 (6) to state 3.

5.2.2 One PDCP and RLC entity shared among multiple cells within one RNS

For each MBMS service, a group of multiple cells belonging to one RNS shares one PDCP entity and RLC entity over p-t-m transmission. The group of multiple cells is called 'MBMS Cell Group'.

1. There are one or more MBMS Cell Groups per MBMS service per RNS. The MBMS Cell Groups are managed by the CRNC.

2. There are one or more cells pertaining to the same RNS for one MBMS Cell Group.

3. For each MBMS service, the MBMS Cell Group Identifier (MBMS CG-Id) is used to uniquely identify a group of multiple cells sharing the same PDCP entity and RLC entity within an RNS.

4. For each MBMS service, the MBMS CG-Id together with the identifier of the controlling RNC (CRNC-Id) constitutes the MBMS UTRAN Cell Group Identifier (MBMS UCG-Id).

5. Each cell sends the MBMS UCG-Id to UEs for each MBMS service. The MBMS UCG-Id is used to uniquely identify an MBMS Cell Group in the UTRAN and UE.

5.2.3 MCCH Information Scheduling

The MCCH information will be transmitted based on a fixed schedule. This schedule will identify the TTI containing the beginning of the MCCH information. The transmission of this information may take a variable number of TTIs and the UE will keep receiving the S-CCPCH until:

- It receives all of the MCCH information, or

- It receives a TTI that does not include any MCCH data, or

- The information contents indicate that further reception is not required (e.g. no modification to the desired service information).

Based on this behaviour, the UTRAN may repeat the MCCH information following a scheduled transmission in order to improve reliability. The MCCH schedule will be common for all services.

The entire MCCH information will be transmitted periodically based on a "repetition period". The "modification period" will be defined as an integer multiple of the repetition period. The MBMS ACCESS INFORMATION may be transmitted periodically based on an "access info period". This period will be an integer divider of the "repetition period".

MCCH information is split into critical and non-critical information. The critical information is made up of the MBMS NEIGHBOURING CELL INFORMATION, MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION. The non-critical information corresponds to the MBMS ACCESS INFORMATION. Changes to critical information will only be applied at the first MCCH transmission of a modification period and in the beginning of each modification period UTRAN transmits the MBMS CHANGE INFORMATION including MBMS services ids whose MCCH information is modified at that modification period. MBMS CHANGE INFORMATION is repeated at least once in each repetition period of that modification period. Changes to non-critical information could take place at any time.

The Figure 1 below illustrates the schedule with which the MBMS SERVICE INFORMATION and RADIO BEARER INFORMATION would be transmitted. Different colours indicate potentially different MCCH content.

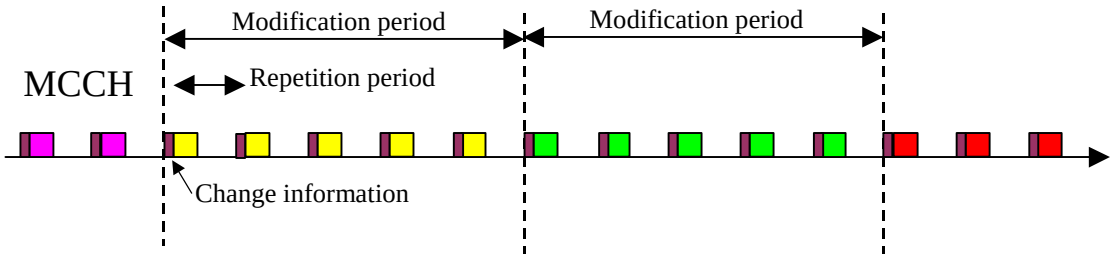

Figure 5.2.3: MCCH Information Schedule

5.2.4 MBMS Notification

The MBMS notification mechanism is used to inform UEs of an upcoming change in critical MCCH information. Notifications are based on service groups. The mapping between service IDs and service groups will be based on a hashing mechanism. The exact details of this mechanism will be defined in the Stage 3 specifications.

The MBMS notification indicators will be sent on an MBMS specific PICH, called the MICH. A single MICH frame will be able to carry indications for every service-group.

Critical MCCH information can only be changed at the beginning of a modification period as described in Section 5.2.3. The MBMS notification indicator corresponding to the service group of every affected service shall be set continuously during the entire modification period preceding the first change in MCCH information related to a given service. Subsequent changes in the MCCH information in the next modification period related to the same service can be signalled on the MCCH.

UEs which are not any receiving MBMS service on MTCH or p-t-p channel are free to read the MBMS notification at any time; however the modification interval shall be long enough so that UEs are able to reliably detect it even if they only receive the MICH during their regular Release 9 paging occasions. The need to limit particularly long DRX cycles (e.g. 5 sec) due to MBMS reception is defined in Stage 3.

Upon detecting the MBMS notification indication for a service group, UEs interested in a service corresponding to this group shall start reading the MCCH at the beginning of the next modification period. The UE shall read at least MBMS CHANGE INFORMATION.

The Figure 2 below illustrates the timing relation between the setting of the MICH and the first MCCH critical information change. The green colour for the MICH indicates when the NI is set for the service. For the MCCH, different colours indicate MCCH content related to the notification of different services.

UEs, which are receiving MBMS service(s) on MTCH in idle mode or URA_PCH, CELL_PCH, or CELL_FACH state shall read the MCCH at the beginning of the each modification period to receive the MBMS CHANGE INFORMATION, which will indicate MBMS service Ids and optionally MBMS Session ID whose MCCH information is modified at that modification period. If MBMS service Id and optionally MBMS Session ID, which UE has activated, is indicated in MBMS CHANGE INFORMATION the UE shall read the rest of the MCCH information.

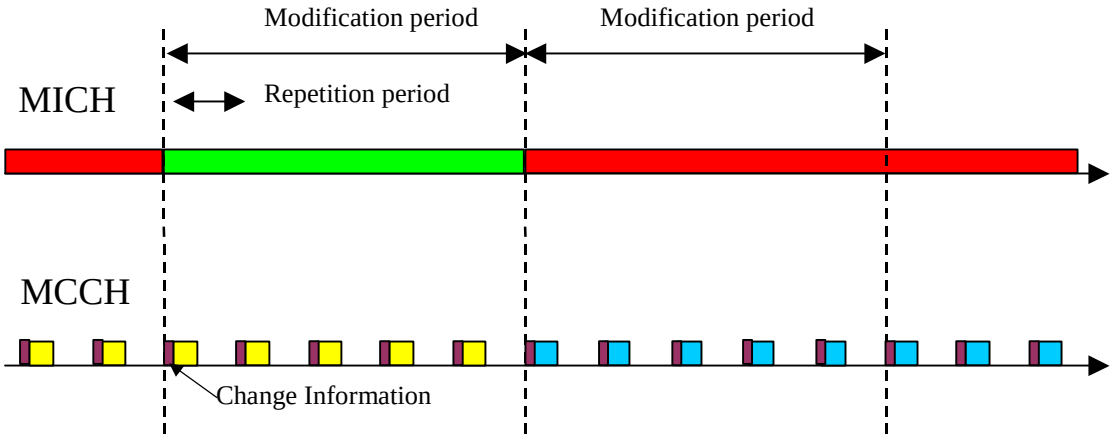

Figure 5.2.4: Illustration of MICH timing relative to Modification period

5.2.5 MBMS Counting

MBMS Counting is used to determine the optimum transmission mechanism for a given service.

1. The need for counting is indicated in the notification, and achieved by requesting UEs, belonging to the same MBMS service group, to establish an RRC connection.
2. The exact number of UEs that need to be brought to RRC connected mode is an RRM issue.
3. Since it is desirable in a specific cell, to avoid bringing a large number of UEs for counting purposes to RRC connected mode at the same time (RACH load, etc), RRM may control the load due to the RRC connection establishment requests, by setting an access "probability factor".
4. Following counting, the number of subscribers that need to be maintained in RRC connected mode or for which the RNC releases their connection, is also an RRM issue.
5. For a given MBMS service, the counting indication in the notification may be switched on and off, on per-cell basis.
6. The RNC may use notification to indicate counting during an ongoing MBMS session (term used is re-counting).
7. The RNC receives via Iu from CN information (MBMS service ID) about UEs who are in RRC Connected mode, and have joined the MBMS service. This information may be used for counting purposes.

The MBMS counting function includes a mechanism by which the UTRAN can prompt users interested in a given service to become RRC connected. This procedure is only applicable for UEs in idle mode and relies on the MBMS ACCESS INFORMATION transmitted on the MCCH. The probability factor indicates the probability with which UEs need to attempt an RRC connection procedure.

In order to trigger counting for a given service, the UTRAN may use the regular MBMS notification mechanism outlined in section 5.2.4 to force UEs interested in the service to read the MCCH information.

Once a UE detects that the counting procedure is on-going for the specific service it wants to receive, it will attempt to set up an RRC connection based on the probability factor included in the MCCH. [The details of this mechanism will be defined in the Stage 3 specifications].

A UE in URA_PCH state which is notified on the MCCH shall initiate a cell update procedure with a specific cause based upon the information provided in the MBMS ACCESS INFORMATION.

Also, the UE will keep receiving the MBMS ACCESS INFORMATION at every access info period until UE becomes RRC connected or counting is no longer required. Whenever it receives new MBMS ACCESS INFORMATION the UE will update its probability factor with the new value.

The Figure 3 below illustrates this mechanism. The green colour for the MICH indicates when the NI is set for the service. The green colour for the MBMS ACCESS INFORMATION indicates that the counting procedure is on-going

and that UEs need to establish an RRC connection based on the included probability factor (PF). For the critical MCCH info, different colours indicate potentially different content.

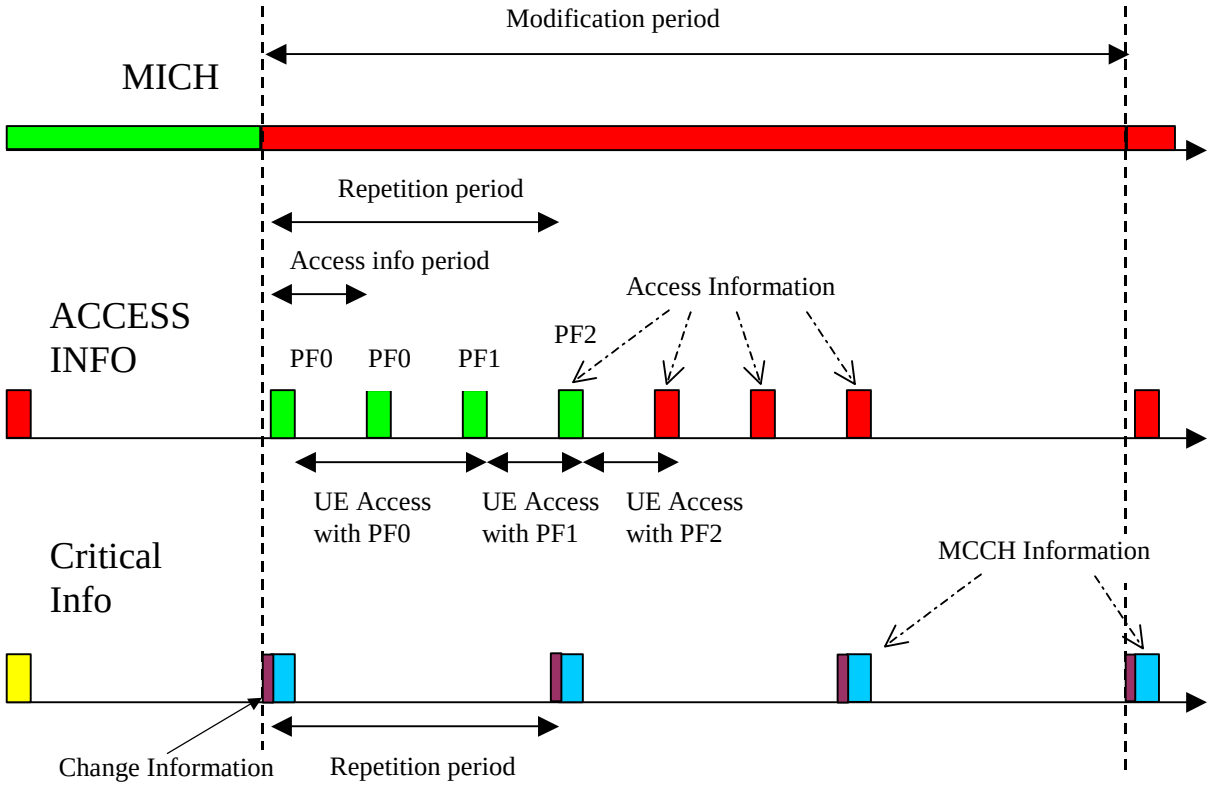

Figure 5.2.5: Illustration of Access Info period during MBMS counting

For every UE brought to RRC connected state for the purpose of counting, UTRAN will initiate the PMM Connection establishment procedure and will obtain from CN the set of MBMS services these users have joined.

Counting for on-going services (re-counting) will rely on the same scheduling of the MCCH information.

5.2.6 MBMS Radio Bearer Release in the UE

The UE releases the MBMS RB by using one of the following mechanisms:

- Explicit MBMS RB Release
- Implicit MBMS RB Release

The Explicit MBMS RB Release mechanism allows UTRAN to explicitly indicate to MBMS UEs that an MBMS Radio Bearer should be released. The Explicit MBMS RB Release indication is included in a new MBMS RADIO BEARER RELEASE information, the existing MBMS SERVICE INFORMATION, MBMS RADIO BEARER INFORMATION or the existing RADIO BEARER RELEASE message. If the Explicit MBMS RB Release indication is received, the UE releases the MBMS RB.

The Implicit MBMS RB Release mechanism allows is only used for p-t-m transmission and a UE to release the MBMS Radio Bearer without receiving the MBMS RB release message given from UTRAN as follows:

A UE uses a timer to implicit release of the MBMS RB. The timer value is given from UTRAN.

5.2.7 MBMS Session Repetition

In the case that the BM-SC repeats MBMS sessions (send multiple time identical content), the MBMS service Id and MBMS session Id is used to identify specific MBMS service and session. If UTRAN receives the MBMS session ID in session start, the UTRAN should:

- include MBMS session Id in critical and non critical information send on MCCH
  Note: The non-critical information may contain index referring to critical information, avoiding repetition of MBMS service and session Id in non-critical information.

If UE has already received correctly the data of the MBMS session, which is being indicated on MCCH, the UE may:

- ignore FLC by not applying the Layer Convergence Information
- ignore counting procedure in Idle and URA_PCH state
- ignore p-t-m MBMS RB setup signalled on MCCH
- reject the p-t-p RB setup for MBMS service, signalled on DCCH

In the case that UTRAN receives reject from the UE to the p-t-p RB setup for MBMS service on DCCH, the UTRAN should not try to re-establish p-t-p RB setup for that MBMS service and session.

In the case, UE has accepted the p-t-p RB for repeated MBMS session the UE shall receive the complete session.

5.2.8 MBMS Service Prioritisation

CN may assign the Allocation and Retention Priority for the MBMS bearer service. The Allocation and Retention Priority allows for prioritisation between MBMS bearer services and between MBMS bearer services and non MBMS bearer services in the UTRAN.

The UE may assign internally different priorities for different MBMS services to prioritise MBMS and non MBMS service reception. In case that UE has no capability to receive simultaneously, the dedicated non MBMS service and the MBMS service and the MBMS service has priority over the non MBMS service the UE may:

- initialise signalling with CN on NAS layer to stop reception of dedicated non MBMS service

If UE has no capacity on receiving all MBMS services, which it has activated and which are transmitted simultaneously on p-t-m RBs, the UE may

- stop autonomously ongoing reception of lower priority MBMS service
- act on MCCH message assigned to the highest priority MBMS service
- start autonomously the reception p-t-m RB of the highest priority MBMS service

If the reception p-t-p RB of the lower priority MBMS service is blocking the reception of p-t-m RB of the higher priority MBMS service the UE may:

If p-t-p RB is being established

- reject the setup of p-t-p MBMS RB

If UTRAN receives reject message UTRAN should not try to re-establish p-t-p RB setup for that MBMS service and session.

If p-t-p RB is already existing

- request the release of p-t-p MBMS RB from the UTRAN or only indicate frequency of higher priority MBMS service

If UTRAN receives release request message UTRAN may release the p-t-p MBMS RB.

Next modified sections*

7.3 MBMS Reception

The following descriptions add MBMS specific processes to be considered for each RRC State/Mode.

The BCCH contains information regarding the MCCH, while the latter contains information on the MTCH.

In the sub-sections below, how and when the UE reads the MCCH is not described as periodic MCCH transmission is described in 5.2.3. .

NOTE: The reception of multiple MBMS services simultaneously is subject to UE capability; selection principles between these MBMS services are when needed is [FFS] defined in section 5.2.8. The specific actions related to MBMS session repetition are specified in 5.2.7.

7.3.1 MBMS Reception in RRC Idle Mode

In idle mode, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH and:

  - if the MBMS service requires the establishment of an RRC Connection

    - inform upper layers that the MBMS Service requires the establishment of an RRC Connection,

  - if the MBMS service does not require the establishment of an RRC Connection :

    - listen to the common transport channel on which the MTCH is mapped.

  - if the UE determines that a neighbouring cell is suitable for selective combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell:

    - performs selective combining of MTCH between the selected cell and the neighbouring cell.

7.3.2 MBMS Reception in RRC Connected Mode: URA_PCH state

In URA_PCH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the URA where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH,

    - if on the MCCH is indicated that the MBMS service in the cell requires a cell update:

      - initiate a cell update procedure. The cause to be used in the cell update procedure is defined in Stage 3.

  - for each MBMS service that the UE has activated and where transmission on a MTCH is indicated in the MCCH, listen to the common transport channel on which the MTCH is mapped,

  - if the UE determines that a neighbouring cell is suitable for selective combining the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

    - performs selective combining of MTCH between the selected cell and the neighbouring cell.

7.3.3 MBMS Reception in RRC Connected Mode: CELL_PCH state

In CELL_PCH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH

  - listen to the common transport channel on which the MTCH is mapped,

  - if the UE determines that a neighbouring cell is suitable for selective combining the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

    - performs selective combining of MTCH between the selected cell and the neighbouring cell.

7.3.4 MBMS Reception in RRC Connected Mode: CELL_FACH state

In CELL_FACH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH

  - listen to the common transport channel on which the MTCH is mapped

  - if the UE determines that a neighbouring cell is suitable for selective combining the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

    - performs selective combining of MTCH between the selected cell and the neighbouring cell.

NOTE: For UEs in CELL_FACH, UTRAN may decide to send MBMS data over DTCH.

7.3.5 MBMS Reception in RRC Connected Mode: CELL_DCH state

In CELL_DCH, the UE shall,

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available and

- if the UE has the capabilities:

  - act on RRC messages received on MCCH

  - listen to the common transport channel on which the MTCH is mapped.

  - if the UE determines that a neighbouring cell is suitable for selective combining the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell and UE has capability

    - performs selective combining of MTCH between the selected cell and the neighbouring cell.

NOTE: For UEs in CELL_DCH, UTRAN may decide to send MBMS data over DTCH

8 UTRAN Signalling Flows for MBMS

8.1 MBMS High Level Signalling Scenarios

8.1.1 Session start

Upon receiving a session start indication from CN, UTRAN initiates the session start sequence to allocate radio resources to UEs for receiving the MBMS content. As part of this sequence, UTRAN may apply the counting procedure (counting the number of idle mode UEs) to decide whether to use the p-t-m or p-t-p transfer mode.

The Figure 8.1.1 shows an example of a possible session start sequence.

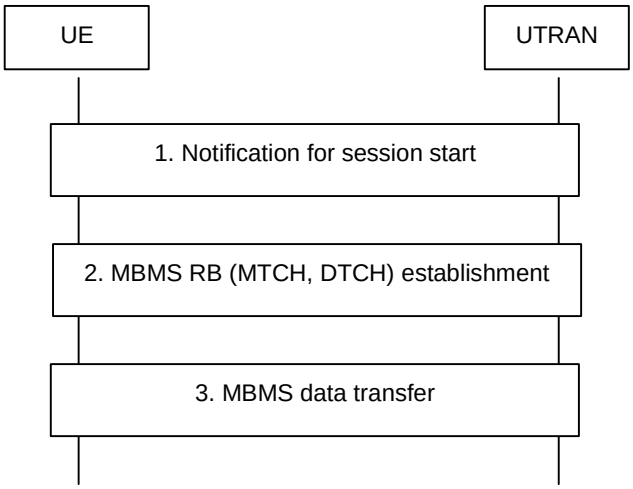

Figure 8.1.1: Session start

In general, the session start sequence involves the following steps:

- In case UTRAN applies counting to determine the most optimal transfer mode the following steps are performed:
    - UTRAN sets the correct MBMS Notification Indicator (NI) and sends the MBMS CHANGE INFORMATION and the MBMS ACCESS INFORMATION including service ID, the session ID if received from the CN, and access probability on MCCH.
    - Upon DRX wakeup, UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH not receiving an MBMS service provided in p-t-m transfer mode evaluate the MBMS NI and if set, read the MBMS CHANGE INFORMATION from MCCH at beginning of the modification period. UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH receiving an MBMS service provided in p-t-m transfer mode read the MBMS CHANGE INFORMATION directly. If service Id of activated MBMS service and session ID that UE has not received is indicated in MBMS CHANGE INFORMATION UEs continue reading the rest of MCCH information. Upon receiving the MBMS ACCESS INFORMATION including access probability, UEs in idle mode or URA_PCH state for which the probability check passes, initiate RRC connection establishment to move to PMM CONNECTED or perform cell update procedure respectively. UEs in CELL_PCH or CELL_FACH state ignore the MBMS ACCESS INFORMATION. UTRAN counts the UEs interested in the MBMS service using UE linking from CN
    - ~~RRC Connected mode.~~ In the case that no UE is counted as present in the cell then UTRAN may decide not to provide any RB for the service in the cell.
    - In case a pre- defined threshold is reached, UTRAN applies the p-t-m RB establishment procedure specified below. Otherwise, UTRAN may repeat the MBMS ACCESS INFORMATION a number of times, using different probability values. If the threshold is not reached, UTRAN applies the p-t-p RB establishment procedure
- In case UTRAN selects the p-t-m RB establishment procedure:

- UTRAN configures MTCH and updates MCCH (MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION) by including the service ID, the session ID if received from the CN, and p-t-m RB information for the concerned MBMS service
- In case p-t-m RB establishment is not preceded by counting, UTRAN sets the correct MBMS Notification Indicator (NI) and sends MBMS CHANGE INFORMATION.
- UTRAN sends the MBMS dedicated notification message including the service ID and cause= session start on DCCH to inform UEs in CELL_DCH that are not receiving an MBMS service provided using p-t-m transfer mode
- In case p-t-m RB establishment is preceded by counting, UEs read MCCH at the pre- defined time(s) to acquire the MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION
- In case p-t-m RB establishment is not preceded by counting, Upon DRX wakeup, UEs not receiving MTCH evaluate the MBMS NI and if set, read MCCH at beginning of modification period to acquire MBMS CHANGE INFORMATION. UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH receiving an MBMS service provided in p-t-m transfer mode read the MBMS CHANGE INFORMATION directly. If service Id of activated MBMS service and session ID that UE has not received is indicated in MBMS CHANGE INFORMATION UEs continue reading the rest of MCCH information to acquire the MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION
- UEs that are incapable of receiving the MTCH for the session that is started in parallel to the existing activity notify the user. This enables the user to choose between the ongoing activity and the new MBMS service
- Upon receiving MBMS dedicated notification with cause= session start, UEs in CELL_DCH that are incapable of receiving the MCCH and the corresponding MTCH in parallel to the existing activity notify the user. This enables the user to choose between the ongoing activity and the new MBMS service. If the user decides to receive the new MBMS service, the UE shall read MCCH to acquire the MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION.
- Upon receiving the MBMS SERVICE INFORMATION and the MBMS RB INFORMATION including the p-t-m RB information for the concerned MBMS service, the UE starts receiving the p-t-m radio bearers

- In case UTRAN selects the p-t-p RB establishment procedure:
  - UTRAN applies conventional paging to trigger UEs in CELL_PCH to perform cell update. Furthermore, UTRAN establishes the p-t-p RB by means of appropriate RRC procedures eg. the RB setup procedure
  - UEs establish the p-t-p radio bearers by means of the RRC procedure selected by UTRAN eg. the RB setup procedure
  - UTRAN updates MCCH (MBMS SERVICE INFO) to inform UEs joining or entering the cell at a later point in time.

8.1.2 Joining (during a session)

In case the user wants to join an MBMS service (before or during a session), the UE initiates NAS procedures (e.g. MBMS service activation).

If no session is ongoing upon completion of the joining procedure, the joining procedure is transparent to the AS.

In case a session using p-t-m transfer mode is ongoing upon completion of the joining procedure, the UE may initiate reception of the p-t-m radio bearers. In case the ongoing session applies p-t-p transfer mode, UTRAN may establish the p-t-p radio bearers. UTRAN would do this upon receiving a UE linking indication from CN, which normally follows the joining. As a result of the UE linking, UTRAN may decide to change the transfer mode from p-t-p to p-t-m. This change of transfer mode is out of the scope of this sequence (to be covered by a separate sequence).

The Figure 8.1.2 shows an example of a possible joining sequence.

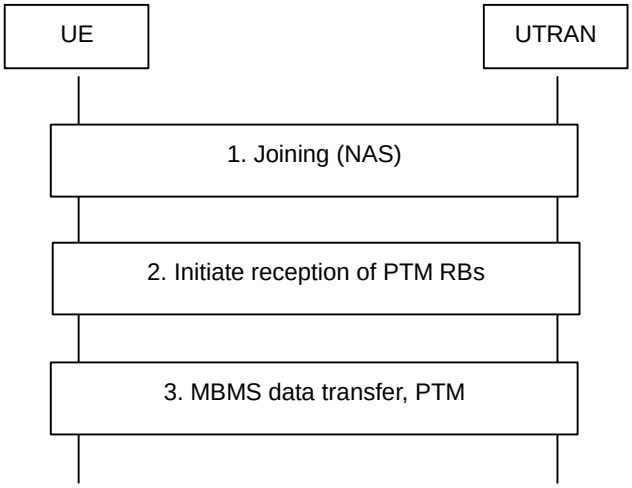

Figure 8.1.2: Joining with continuation of p-t-m

In general, the joining sequence involves the following steps:

- UEs in idle mode first perform RRC connection establishment, while UEs in CELL_PCH and URA_PCH first perform cell update
- UEs initiate the joining procedure (NAS)
- In case UTRAN continues to use the p-t-m transfer mode:
    - UTRAN sends the MBMS dedicated notification message on DCCH including the service ID and cause= session ongoing to inform UEs in CELL_DCH
    - Upon receiving MBMS dedicated notification with cause= session ongoing, UEs in CELL_DCH that are incapable of receiving the MCCH and the corresponding MTCH in parallel to the existing activity notify the upper layer. This enables the user to choose between the ongoing activity and the new MBMS service. If the user chooses to receive the new MBMS service or if the UE in Cell_DCH is capable of receiving MCCH and MTCH in parallel to the existing activity, the UE shall read MCCH to acquire the MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION from MCCH.
    - Upon acquiring the MBMS SERVICE INFORMATION and the MBMS RADIO BEARER INFORMATION including the p-t-m RB information for the concerned MBMS service, the UE starts receiving the p-t-m radio bearers
- In case UTRAN continues using the p-t-p transfer mode:
    - UTRAN establishes the p-t-p RB by means of appropriate RRC procedures eg. the RB setup procedure
    - UEs establish the p-t-p radio bearers by means of the RRC procedure selected by UTRAN eg. the RB setup procedure.

8.1.3 Recounting

During a p-t-m MBMS session, UTRAN may perform re- counting to verify if p-t-m is still the optimal transfer mode. The purpose of the re- counting procedure is to count the number of idle mode UEs that have joined a specific service. As a result of this procedure, UTRAN may decide to change the transfer mode from p-t-m to p-t-p. This change of transfer mode is outside the scope of this sequence (to be covered by a separate sequence).

The Figure 8.1.3 shows an example of a possible recounting sequence.

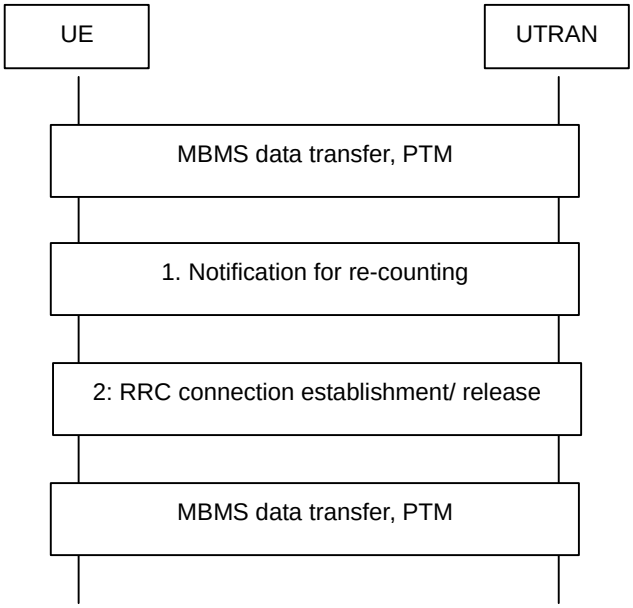

Figure 8.1.3: Recounting with continuation of p-t-m

In case UTRAN applies re- counting to determine the most optimal transfer mode, the following steps are performed:

- UTRAN sends the MBMS CHANGE INFORMATION and the MBMS ACCESS INFORMATION including service ID, and access probability on MCCH
- UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH receiving an MBMS service provided in p-t-m transfer mode read the MBMS CHANGE INFORMATION at the beginning of each modification period. If service Id of activated MBMS service is indicated in MBMS CHANGE INFORMATION UEs continue reading the rest of MCCH information.
- Upon receiving the MBMS ACCESS INFORMATION including access probability, UEs in idle mode or URA_PCH state for which the probability check passes, initiate RRC connection establishment or cell update procedure respectively. UEs in CELL_PCH or CELL_FACH state ignore the MBMS ACCESS INFORMATION.
- UTRAN counts the UEs interested in the MBMS service using UE linking from CN
- In the case that no UE is counted as present in the cell then UTRAN may decide not to provide any RB for the service in the cell.
- In case a pre- defined threshold is reached, UTRAN continues using the p-t-m transfer mode. Otherwise, UTRAN may repeat the MBMS ACCESS INFORMATION a number of times, using different probability values. If the threshold is not reached, UTRAN switches transfer mode from p-t-m to p-t-p
- In case UTRAN continues using the p-t-m transfer mode, it may return UEs that responded to counting back to idle mode by releasing the RRC connection.

8.1.4 Session stop

UTRAN may apply the session stop procedure to inform UEs that the end of MTCH transmission concerns the end of a session rather than just an idle period. The purpose of the procedure is to reduce the UE power consumption.

The Figure 8.1.4 shows an example of a possible session stop sequence.

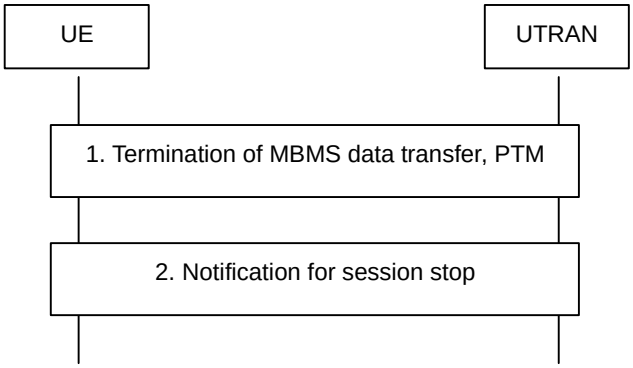

Figure 8.1.4: Session stop

In case UTRAN provides the service p-t-m, the session stop sequence involves the following steps:

- UTRAN sends the MBMS CHANGE INFORMATION and the MBMS RADIO BEARER INFORMATION including service ID and radio bearer release indicator. UTRAN updates MCCH (MBMS SERVICE INFORMATION) to inform UEs joining or entering the cell in a later point of time.
- UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH receiving an MBMS service provided in p-t-m transfer mode read the MBMS CHANGE INFORMATION at the beginning of the each modification period. If service Id of activated MBMS service is indicated in MBMS CHANGE INFORMATION UEs continue reading the rest of MCCH information.
- Upon receiving this information the UE stops receiving the MTCH

In case UTRAN provides the service p-t-p, the session stop sequence involves the following steps:

- UTRAN releases the p-t-p radio bearers and updates MCCH (MBMS SERVICE INFO) to inform UEs joining or entering the cell at a later point in time.

8.2 MBMS RNC Signalling Flows

8.2.1 MBMS Session Start procedure

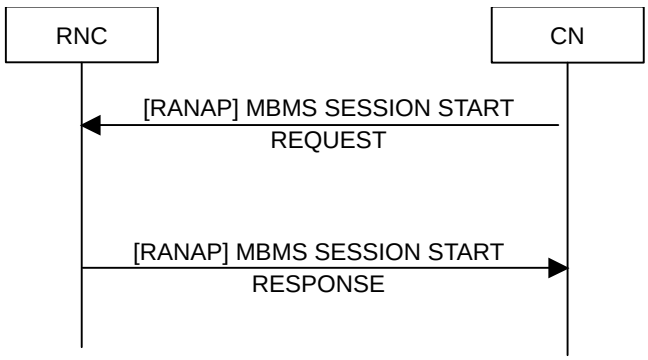

Figure 8.2.1: MBMS Session Start procedure. Successful operation.

The MBMS Session Start procedure is initiated by the CN when an MBMS Session is started. The MBMS SESSION START REQUEST is sent to each RNC that is connected to the CN (in case of Iu-flex the RNC may receive more than one MBMS SESSION START REQUEST message).

The MBMS SESSION START REQUEST contains the MBMS Service Id, and optionally the MBMS Session ID, MBMS Bearer Service Type and the MBMS Session Attributes (MBMS Service Area Information, QoS parameters…) It may also include a list of RAs which lists each RA that contains at least one PMM-IDLE UE that has activated the service.

MBMS Session Start procedure also provides the MBMS Iu Data Bearer Establishment functionality. If the RNC cannot provide resources at all the RNC shall inform the CN accordingly. In case of Iu-flex the RNC shall not establish more than one MBMS Iu bearer for a certain service towards a pool area and shall inform the respective CN nodes accordingly.

8.2.2 MBMS Session Update procedure

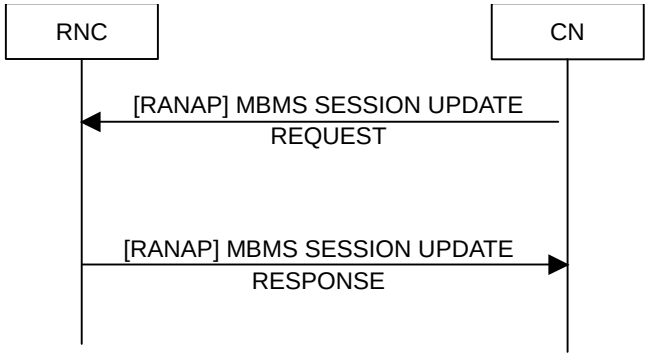

Figure 8.2.2: MBMS Session Update procedure. Successful operation.

The MBMS Session Update procedure is initiated by the CN when an MBMS Session is ongoing and SGSN notices that there is a need to update the list of RAs. The MBMS SESSION UPDATE REQUEST contains the MBMS Service Id, and e.g. List of RAs with PMM Idle UEs,~~…~~).

8.2.3 MBMS Session Stop procedure

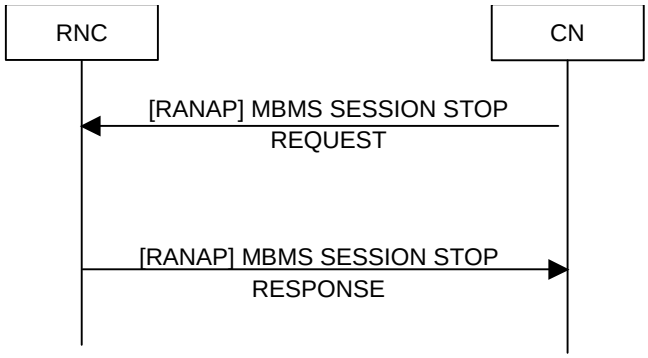

Figure 8.2.3: MBMS Session Stop procedure.

This signalling flow depicts the MBMS Session Stop procedure.

This procedure is initiated by the CN to the RNCs with an ongoing MBMS session, when no more data will be sent for that MBMS service for some period of time.

The MBMS Session Stop procedure also provides the MBMS Iu Data Bearer Release functionality.

8.2.4 RNC Registration procedure

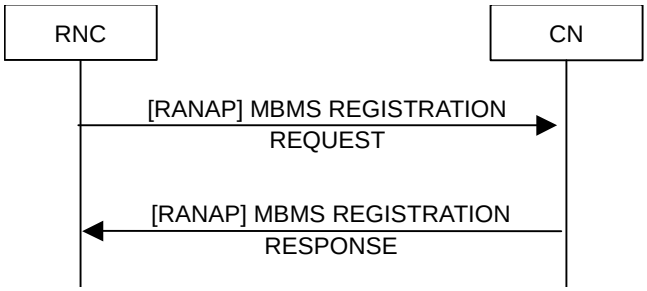

Figure 8.2.4: MBMS Registration procedure.

This signalling flow depicts the MBMS Registration procedure.

This procedure is initiated by the RNC in the case that the RNC is not SRNC for any UE that has joined the MBMS Service, but this RNC is DRNC for PMM-CONNECTED UEs that have joined the MBMS Service and there is no MBMS Service Context for the MBMS Service in this RNC.

This procedure shall be initiated by the DRNC, as soon as a UE link is received over the Iur and there exists no MBMS Service Context for the MBMS service for which the UE link is received.

8.2.5 RNC De-Registration procedure

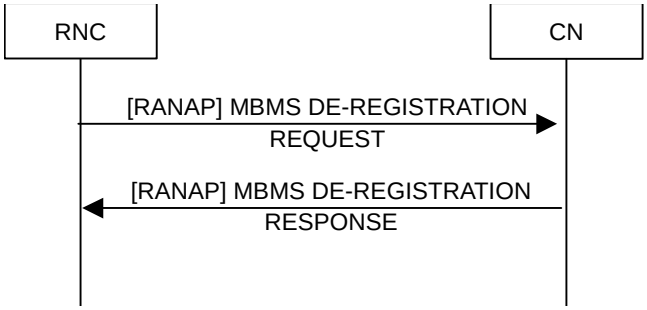

Figure 8.2.5: RNC MBMS De-Registration procedure.

This signalling flow depicts the RNC De-Registration procedure. This procedure is initiated by the RNC towards the CN node it was registered to in case the RNC is not acting as a Serving RNC for any UE that has activated the MBMS Service and has ceased to act as a Drift RNC for UEs which has activated an MBMS service.

8.2.6 CN De-Registration procedure

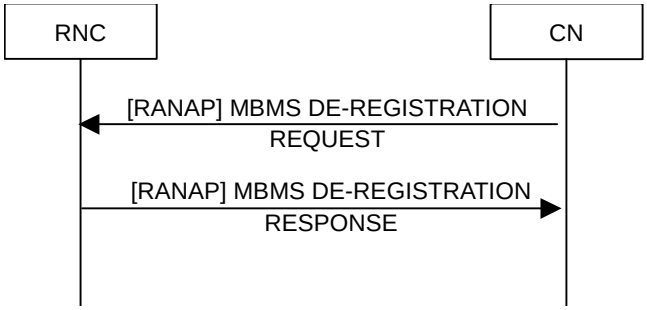

Figure 8.2.6: CN MBMS De-Registration procedure.

This signalling flow depicts the CN De-Registration procedure.

This procedure is initiated by the CN in order to inform the RNC that a certain MBMS Service is no longer available.

8.2.7 MBMS Channel Type Switching over Uu

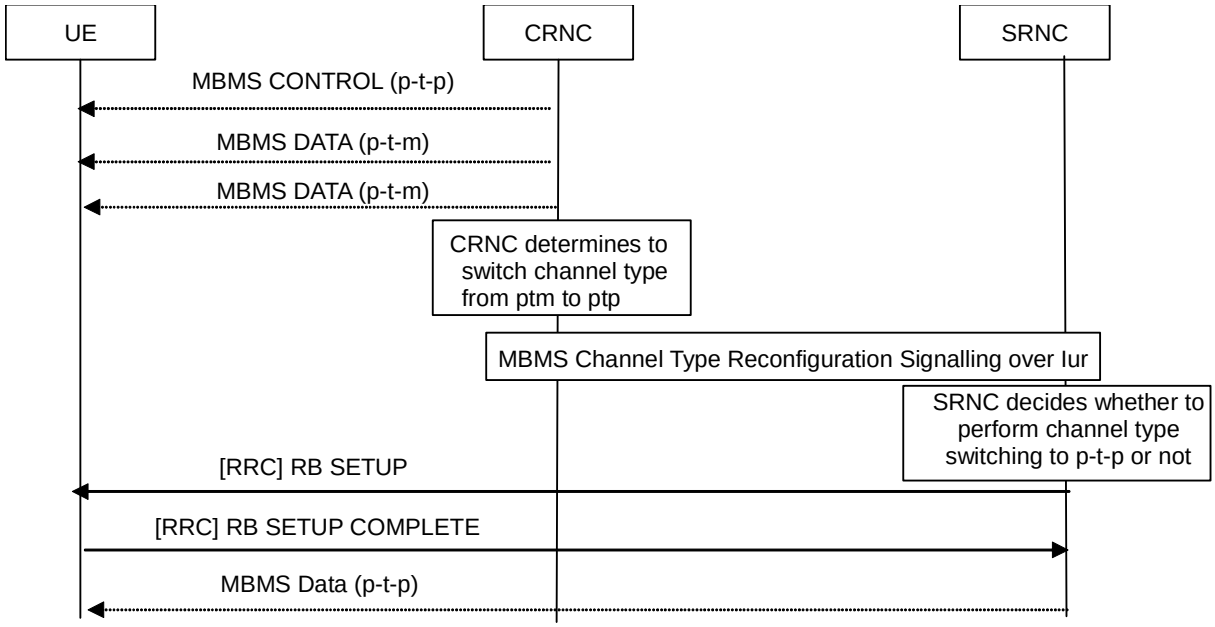

Figure 8.2.7: Channel type switching signalling flow from p-t-m to p-t-p.

The CRNC is responsible for the decision regarding having p-t-m transmission or no p-t-m transmission in a cell for a specific MBMS service. The CRNC informs all the SRNCs having UEs in that cell about its decision. The SRNC is the RNC controlling the RRC connection and RBs to a specific UE. In the example shown, the CRNC decided to no longer use p-t-m, then the SRNC decided to perform channel type switching to deliver the MBMS service over DTCH mapped on a dedicated channel. The RB SETUP message contains the MBMS Service Id. It is FFS whether the SRNC always follows the CRNC's request or not.

NOTE: the channel type switching in this case includes a change of both transport and logical channels.

8.2.8 MBMS UE Linking

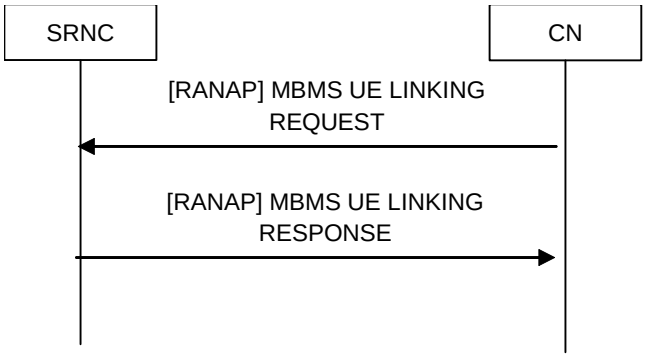

Figure 8.2.8: MBMS UE linking signalling flow

This signalling flow is only applicable for handling UEs in PMM-CONNECTED mode with activated MBMS Services.

The signalling flow is used to link a specific UE to one or several MBMS service contexts in the SRNC. The MBMS UE LINKING REQUEST message contains the whole list of MBMS Service Ids activated by the UE. If there has not been a MBMS service context related to an MBMS Service Id then SRNC creates a MBMS service context as a result of this procedure.

8.2.9 MBMS UE De-Linking

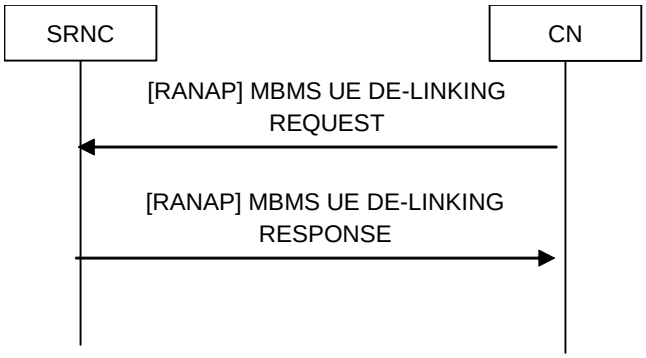

Figure 8.2.9: MBMS UE De-linking signalling flow

This signalling flow is only applicable for handling UEs in PMM-CONNECTED mode with activated MBMS Services.

The signalling flow is used to remove a specific UE from one or several MBMS service context in the SRNC. The MBMS UE DE-LINKING REQUEST message contains the list of MBMS Service Ids de-activated by the UE.

8.2.10 MBMS Service Id Request

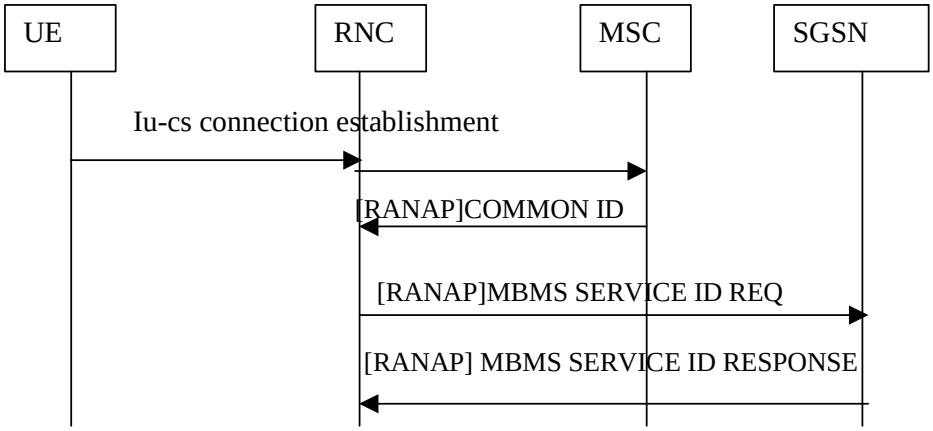

Figure 8.2.10: MBMS Service Id list over Iu signalling flow

This signalling flow is applicable for handling MBMS to UEs in RRC-Connected, PMM-IDLE state. The list of MBMS services the user has joined is sent over Iu.

The purpose of this signalling flow is to perform UE linking for a RRC connected, PMM idle user. The UE provides an indication that the user has joined at least one MBMS service and the PS Domain specific IDNNS (the message that would carry this information is FFS) whenever an Iu-cs connection is established and the UE is PMM idle (that is there is no Iu-ps connection), The RNC requests the MBMS services the UE has joined from the SGSN (or the SGSN the UE is attached to in case of Iu-flex) using a connectionless procedure. The MBMS SERVICE ID REQ contains the IMSI of the UE. The SGSN response contains the full list of MBMS services the user has joined.

The MBMS service list is then stored in the RNC. The list is deleted when the UE moves to RRC idle and the RRC context is removed in the RNC.

8.2.11 MBMS Attach/Detach over Iur

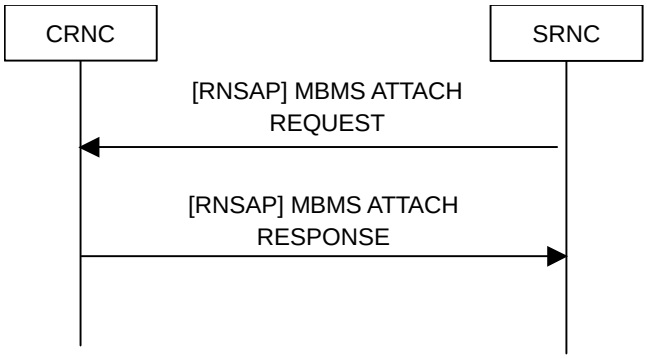

Figure 8.2.11-1: MBMS attach request signalling flow: Successful Operation.

This signalling flow is only applicable for handling UEs in RRC connected mode with activated MBMS Services.

The purpose of this signalling flow is

- to either allow the CRNC to add one or several new UEs to the total number of UEs in a given cell using one or several MBMS services. The MBMS ATTACH REQUEST then contains the Cell Id of the new cell (may contain the URA Id of the new URA for UEs in URA_PCH state), the whole list of affected MBMS Service Ids and a UTRAN specific UE Identification if necessary.
- or to allow the SRNC to inform the DRNC in which URA notifications for MBMS Services have to be sent. The MBMS ATTACH REQUEST then contains a list of URAs and the corresponding MBMS Services.

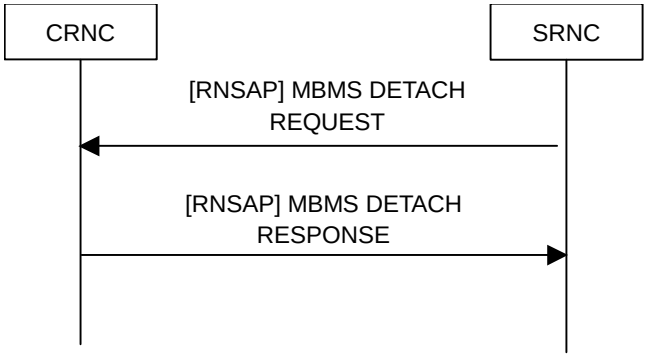

Figure 8.2.11-2: MBMS detach request signalling flow: Successful Operation.

This signalling flow is only applicable for handling UEs in RRC connected mode with activated MBMS Services.

The purpose of this signalling flow is

- to either allow the CRNC to decrease the total number of UEs receiving one or several MBMS service in a given cell. The MBMS DETACH REQUEST contains the Cell Id of the old cell (may contain the URA Id of the old URA for UEs in URA_PCH state), the whole list of affected MBMS Service Ids and a UTRAN specific UE Identification if necessary.
- or to allow the SRNC to inform the DRNC in which URA there is not anymore a need to send notifications for MBMS Services due to the presence of UEs in URA_PCH. The MBMS DETACH REQUEST then contains a list of URAs and the corresponding MBMS Services

8.2.12 MBMS Channel Type Reconfiguration over Iur

These signalling flows need further study.

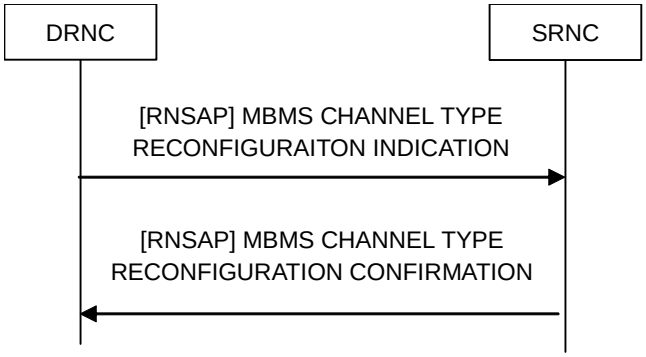

Figure 8.2.12: Channel Type Reconfiguration signalling flow: Successful Operation.

This signalling flow is only applicable for handling MBMS UEs in RRC connected mode.

The purpose of this signalling flow is that the CRNC informs the selected channel type to the SRNCs used in a cell under the CRNC. The MBMS CHANNEL TYPE RECONFIGURATION INDICATION contains a list of U-RNTI, Channel type and MBMS Service Id corresponding to the UEs connected to the SRNC.

8.3 MBMS Uu Signalling Flows

8.3.1 Broadcast of MBMS System Information

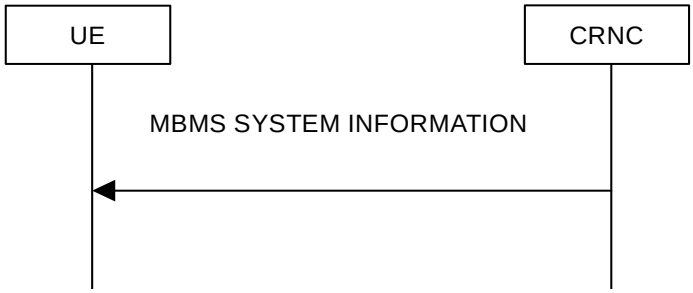

Figure 8.3.1: Broadcast of MBMS system information.

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and PMM-CONNECTED mode.

The purpose of the signalling flow is for UTRAN to broadcast MBMS system information to UEs using the BCCH. The MBMS SYSTEM INFORMATION shall be repeatedly transmitted after its first transmission. Upon receiving the first MBMS SYSTEM INFORMATION, the UE shall establish the radio bearer carrying an MCCH.

The MBMS SYSTEM INFORMATION includes:

- MCCH schedule information (access info, repetition and modification periods)
- Configuration of a radio bearer carrying an MCCH

More information may be included in the MBMS SYSTEM INFORMATION.

8.3.2 MBMS Service Information

Figure 8.3.2: MBMS service information signalling flow

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and PMM-CONNECTED mode.

The purpose of the signalling flow is for RNC to inform UEs of all of MBMS services available in one cell. The MBMS SERVICE INFORMATION shall be transmitted periodically to support mobility in the MBMS service.

The MBMS SERVICE INFORMATION contains MBMS service ids, optionally the MBMS Session ID, and p-t-m indication. The MBMS service ids indicate the MBMS services which are being served in the cell or the MBMS services which can be served if the UE requests it. P-t-m indication indicates that the MBMS service is on p-t-m in the cell, thus it informs the UE of the need of reception of the MBMS RADIO BEARER INFORMATION. More information may be included in the MBMS SERVICE INFORMATION.

8.3.3 MBMS Radio Bearer Information

Figure 8.3.3: MBMS radio bearer information signalling flow

This signalling flow is applicable for handling MBMS to UEs in IDLE and PMM-CONNECTED mode.

The purpose of the signalling flow is for the RNC to inform UE(s) regarding the MTCH radio bearer information. MBMS RADIO BEARER INFORMATION is only available for p-t-m transmission. MBMS RADIO BEARER INFORMATION includes MBMS Service Id, MBMS UTRAN Cell Group Identifier, logical channel, transport channel and physical channel information per MBMS service. An MBMS UTRAN Cell Group Identifier is used to indicate to UEs which MBMS Cell Group the cell pertains to. More information may be included in MBMS RADIO BEARER INFORMATION.

8.3.4 MBMS Access Information

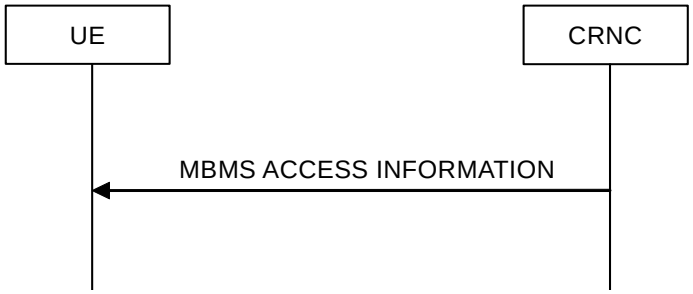

Figure 8.3.4: MBMS Access Information signalling flow

This signalling flow is applicable for handling MBMS UEs in IDLE mode.

The purpose of the signalling flow is for the RNC to inform UE(s) interested in a particular service of the potential need to establish an RRC connection. The MBMS ACCESS INFORMATION includes MBMS service id for each service for which counting is required and the associated access "probability factor". More information may be included in MBMS ACCESS INFORMATION.

8.3.5 MBMS Neighbouring Cell Information

Figure 8.3.5: MBMS Neighbouring Cell Information signalling flow

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode.

The purpose of the MBMS NEIGHBOURING CELL INFORMATION signalling flow is for the UTRAN to inform to UEs of the MTCH configuration of the neighbouring cells which are available for selective combining. With MBMS NEIGHBOURING CELL INFORMATION the UE is able to receive MTCH transmission from neighbouring cell without reception of the MCCH of that cell. The MBMS NEIGHBOURING CELL INFORMATION shall be repeatedly transmitted on MCCH when selective combining is utilized in the MBMS p-t-m transmission in the given cell group.

8.3.6 MBMS Joined Indication

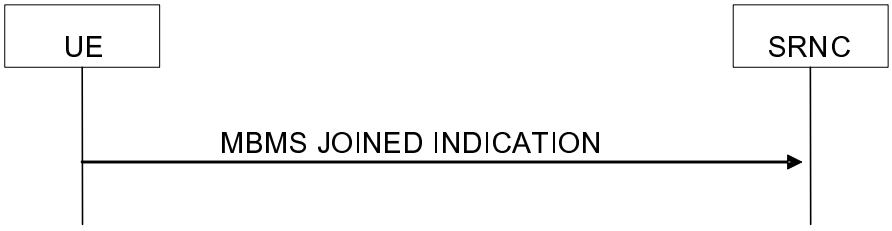

Figure 8.3.6: MBMS joined indication signalling flow

This signalling flow is applicable for handling MBMS to UEs in RRC-Connected, PMM-IDLE state. The MBMS JOINED INDICATION is sent over the DCCH.

The signalling flow is initiated by the UE after entering RRC-Connected, PMM-IDLE state. The purpose of the signalling flow is to enable the UE to inform the SRNC that the user has joined at least one MBMS service. The SRNC requests the MBMS services the UE has joined from the SGSN as defined in subclause 8.2.10.

In SRNC relocation this information is transmitted from source RNC to target RNC.

NOTE: If SRNC has valid linking information the complete service list of activated services is also transmitted from source RNC to target RNC in SRNC relocation.

8.3.7 MTCH Scheduling Information

Figure 8.3.7: MTCH scheduling information.

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode.

1. The purpose of the signalling flow is to enable UEs to perform discontinuous reception of MTCH. The UE may discontinuously receive MTCH based on scheduling information indicated by the MTCH SCHEDULING INFORMATION. This signalling is transmitted on SCCPCH carrying MTCH. The MTCH SCHEDULING INFORMATION is signalled at predetermined intervals. The scheduling information allows to cover different periods for different MBMS services.

The MTCH SCHEDULING INFORMATION includes:

- The beginning and duration for possible MBMS service transmissions on this SCCPCH.

8.3.8 MBMS Change Information

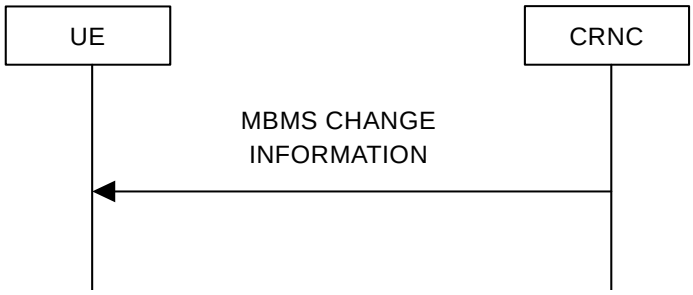

Figure 8.3.8: MBMS change information.

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode. UTRAN should transmit this signalling flow in beginning of each modification period and repeat it at least in every repetition period of that modification period. UE shall read this information flow when detecting that MICH bits set for a service that UE has activated, or periodically at the begin of each modification period when receiving MTCH.

The purpose of the signalling flow is to indicate MBMS services whose MCCH information is changed in that modification period. The content of MBMS CHANGE INFORMATIO shall be minimized, so that the MCCH reading time for the UEs, activated MBMS service whose MCCH information is not modified on that modification period, is minimized.

The MBMS CHANGE INFORMATION includes:

- The MBMS service Ids for which MCCH information is modified on that modification period.

8.3.9 MBMS P-T-P Modification Request

Figure 8.3.9: MBMS P-T-P Modification Request.

This signalling flow is applicable for handling UEs receiving MBMS p-t-p RB in CELL_DCH state. UE may transmit this signalling flow to request the release of the p-t-p MBMS RB due to higher priority MBMS service, or indicate the frequency used for transmitting the higher priority service as specified in subclause 5.2.8. This signalling flow is transmitted on DCCH.

When UTRAN receives this message from the UE, the UTRAN may release the p-t-p MBMS RB by normal RB release procedure or may perform inter-frequency HHO.

3GPP TSG-RAN WG2 meeting #45
Shin-Yokohama, Japan, 15th-19th of November

Tdoc ⌘R2-042701

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.436** **CR** **007** ⌘**rev** **1** ⌘ Current version: **6.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Introduction of MSCH and soft combining and other general corrections
Source:	⌘	RAN WG2
Work item code:	⌘	MBMS-RAN
Date:	⌘	19/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*
Rel-7 *(Release 7)*

Reason for change: ⌘ Soft combining and usage of MSCH were agreed to be used for MBMS ptm transmission. The mapping the MCCH, MSCH and MTCH to FACH were clarified based on agreements. The mobility section updated to current understanding.

Summary of change: ⌘
1) Soft combining including L1-combining schedule introduced to FDD mode
2) MSCH introduced to the specifications
3) The mapping of the MCCH, MSCH and MTCH is always to be done in specific FACH in S-CCPCH. And clarified that UTRAN should send MCCH information on consecutive TTIs in the beginning of the repetition period, based on R2-042025.
4) Section 7.MBMS Reception and UE Capability updated
5) 8.3 MBMS Uu signalling flows updated to clarify in which logical channel each signalling flow is transmitted. The usage of the MTCH scheduling information
6) Section 10. Mobility Procedures for MBMS is reviewed to reflect current understanding.
7) Clarification to channel type selection and re-counting in subclauses 5.1.5 and 8.1.3 based on R2-041982 and R2-041983
8) Correction to the FLC based on R2-041955
9) Clarified that high end UE supporting MBMS in CELL_DCH state shall be capable to acquire MCCH configuration from BCCH and in actions after handover clarified.
10) A clarification added to section 5.4.2 that in case of MBMS soft combining the combinable S-CCPCH shall have same TFC during combinable TTIs
11) UE behavior in counting is clarified based on R2-042332 so that UE will read MBMS access information until it becomes RRC connected from idle mode or performs cell update successfully in URA_PCH state.
12) The option to give ptm RB configuration in cell update confirm message after

		cell update is removed.
Consequences if not approved:	⌘	Stage-2 specification is not reflected by current agreements.

Clauses affected:	⌘	3.1, 3.3, 5.1.5, 5.2.3, 5.3.2, 5.4, 6.2, 7, 8.1.3, 8.3.2 – 8.3.5, 8.3.7, 8.3.8, 10, 11.2			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

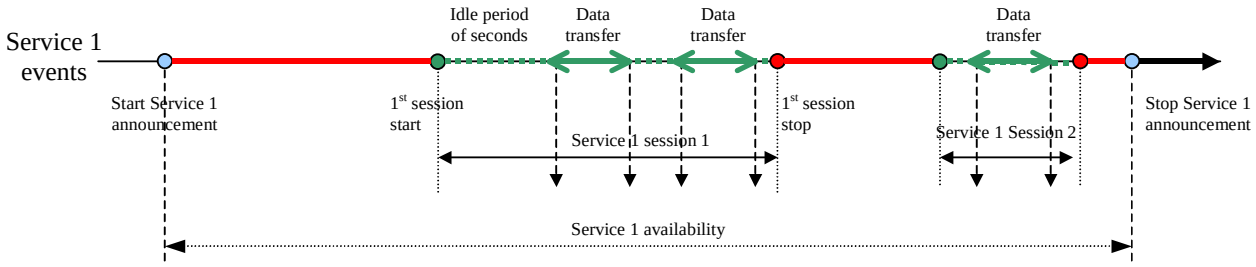

Figure 3.1: MBMS Timeline, based on [4].

MBMS session start is the point at which the BM-SC is ready to send data.

MBMS notification informs the UEs about forthcoming and about ongoing MBMS data transfer.

MBMS Cell Group is a group of multiple cells belonging to one RNS and sharing one PDCP and RLC entity to utilize p-t-m transmission of the MBMS Service

MBMS session stop is the point at which the BM-SC determines that there will be no more data to send for some period of time.

Data transfer is the phase when MBMS data are transferred to the UEs.

MBMS service availability is the phase between start of service announcement and the end of the last session or stop of service announcement.

MBMS Iu data bearer denotes the data bearer established between SGSN and RNC to transport MBMS data

MBMS radio bearer denotes the data bearer established between RNC and UE(s) to transport MBMS data

MBMS RAB denotes both, the MBMS Iu data bearer and the MBMS radio bearer

MBMS Service Context contains the necessary information for the UTRAN to control the MBMS Service in UTRAN.

MBMS Iu signalling connection denotes the signalling connection established between the RNC and the CN node to serve one MBMS Service Context.

MBMS Service Announcement: Mechanism to allow users to be informed about the MBMS services available [4]

Pool area: see definition in ref.[6]

MBMS Multicast Service Activation: see description in ref.[4]

Critical Information: MBMS Neighbouring Cell Information, MBMS Radio Bearer Information and MBMS Service Information sent on MCCH.

Non-critical information: MBMS Access Information sent on MCCH.

MBMS Service Area: The area in which a specific MBMS Bearer Service is available. It is defined individually per MBMS Bearer Service. [4]

L1-combining schedule: Indicates when the soft combining is applicable between the specific S-CCPCH of the cell and the specific S-CCPCH of the neighbouring cell.

MBMS service transmission schedule: Indicates when the specific MBMS service is expected to be transmitted in the cell in specific S-CCPCH. The information is transmitted on MSCH

S-CCPCH: In case of TDD, the S-CCPCH refers to the CCTrCH carrying FACH

3.2 Symbols

(void)

3.3 Abbreviations

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

CELL_DCH	
CELL_FACH	
CG-Id	Cell Group Identifier
CRNC-Id	CRNC Identifier
FFS	For Further Study
FLC	Frequency Layer Convergence
LCI	Layer Convergence Information
MBMS	Multimedia Broadcast Multicast Service
MBMS service ID	Multimedia Broadcast Multicast Service service Identity
MBMS CG-Id	MBMS Cell Group Identifier
MBMS UCG-Id	MBMS UTRAN Cell Group Identifier
MCCH	MBMS point-to-multipoint Control Channel
MICH	MBMS notification Indicator Channel
MSCH	MBMS point-to-multipoint Scheduling Channel
MTCH	MBMS point-to-multipoint Traffic Channel
NI	Notification Indicator
PL	Preferred Layer
p-t-p	Point-to-Point
p-t-m	Point-to-Multipoint
PF	Probability Factor

Next modified sections*

5.1.5 Mapping of MBMS Iu bearer to p-t-p and p-t-m connections

The service specific MBMS RAB on Iu may be mapped to p-t-m bearers in order to provide MBMS data via common channels.

1 The MBMS control function in the CRNC may decide to establish a p-t-m connection, if the number of counted MBMS users in a cell exceeds a certain operator-defined threshold.

2 The MBMS control function in the CRNC may decide to establish a p-t-m connection depending on the congestion scenario expected for a specific cell (e.g. in hotspot areas where no bearer type switching is needed). and/or the MBMS service characteristics (e.g. session duration time) on per cell basis.

3 The MBMS control function in the CRNC may, through a configurable parameter enable/disable bearer type switching and the associated procedures on a per cell basis.

4 The MBMS control function in the CRNC establishes an MBMS RB by sending service specific signalling messages (e.g. MBMS RB Setup message) to all the UEs in the cell listening MBMS point-to-multipoint control channel (MCCH). UEs with activated service(s) may then execute the RB set-up.

5 MBMS data is transferred on a MBMS point-to-multipoint traffic channel (MTCH) to all the UEs which have executed the RB setup.

6 The MBMS control function in the CRNC releases the MBMS RB (e.g. MBMS RB Release) when the data transfer has been finished or it has been interrupted by the CRNC.

7 p-t-p transmission of MBMS data should use the DTCH as defined for other dedicated services.

8 p-t-m transmission of MBMS data applies to all RRC states and modes.

Next modified sections*

5.2.3 MCCH Information Scheduling

The MCCH information will be transmitted based on a fixed schedule. This schedule will identify the TTI containing the beginning of the MCCH information. The transmission of this information may take a variable number of TTIs and UTRAN should transmit MCCH information in consecutive TTIs. ~~and t~~The UE will keep receiving the S-CCPCH until:

- It receives all of the MCCH information, or
- It receives a TTI that does not include any MCCH data, or
- The information contents indicate that further reception is not required (e.g. no modification to the desired service information).

Based on this behaviour, the UTRAN may repeat the MCCH information following a scheduled transmission in order to improve reliability. The MCCH schedule will be common for all services.

The entire MCCH information will be transmitted periodically based on a "repetition period". The "modification period" will be defined as an integer multiple of the repetition period. The MBMS ACCESS INFORMATION may be transmitted periodically based on an "access info period". This period will be an integer divider of the "repetition period".

MCCH information is split into critical and non-critical information. The critical information is made up of the MBMS NEIGHBOURING CELL INFORMATION, MBMS SERVICE INFORMATION and MBMS RADIO BEARER INFORMATION. The non-critical information corresponds to the MBMS ACCESS INFORMATION. Changes to critical information will only be applied at the first MCCH transmission of a modification period and in the beginning of each modification period UTRAN transmits the MBMS CHANGE INFORMATION including MBMS services ids whose MCCH information is modified at that modification period. MBMS CHANGE INFORMATION is repeated at least once in each repetition period of that modification period. Changes to non-critical information could take place at any time.

The Figure 1 below illustrates the schedule with which the MBMS SERVICE INFORMATION and RADIO BEARER INFORMATION would be transmitted. Different colours indicate potentially different MCCH content.

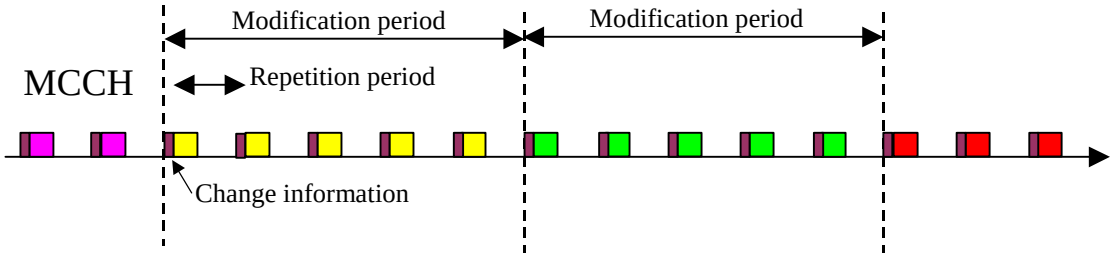

Figure 5.2.3: MCCH Information Schedule

Next modified sections*

5.2.5 MBMS Counting

MBMS Counting is used to determine the optimum transmission mechanism for a given service.

1. The need for counting is indicated in the notification, and achieved by requesting UEs, belonging to the same MBMS service group, to establish an RRC connection.

2. The exact number of UEs that need to be brought to RRC connected mode is an RRM issue.

3. Since it is desirable in a specific cell, to avoid bringing a large number of UEs for counting purposes to RRC connected mode at the same time (RACH load, etc), RRM may control the load due to the RRC connection establishment requests, by setting an access "probability factor".

4. Following counting, the number of subscribers that need to be maintained in RRC connected mode or for which the RNC releases their connection, is also an RRM issue.

5. For a given MBMS service, the counting indication in the notification may be switched on and off, on per-cell basis.

6. The RNC may use notification to indicate counting during an ongoing MBMS session (term used is re-counting).

7. The RNC receives via Iu from CN information (MBMS service ID) about UEs who are in RRC Connected mode, and have joined the MBMS service. This information may be used for counting purposes.

The MBMS counting function includes a mechanism by which the UTRAN can prompt users interested in a given service to become RRC connected. This procedure is only applicable for UEs in idle mode and relies on the MBMS ACCESS INFORMATION transmitted on the MCCH. The probability factor indicates the probability with which UEs need to attempt an RRC connection procedure.

In order to trigger counting for a given service, the UTRAN may use the regular MBMS notification mechanism outlined in section 5.2.4 to force UEs interested in the service to read the MCCH information.

Once a UE detects that the counting procedure is on-going for the specific service it wants to receive, it will attempt to set up an RRC connection based on the probability factor included in the MCCH. [The details of this mechanism will be defined in the Stage 3 specifications].

A UE in URA_PCH state which is notified on the MCCH shall initiate a cell update procedure with a specific cause based upon the information provided in the MBMS ACCESS INFORMATION.

Also, the UE will keep receiving the MBMS ACCESS INFORMATION at every access info period until UE in idle mode becomes RRC connected or UE in URA_PCH state finishes the cell update procedure successfully or counting is no longer required. Whenever it receives new MBMS ACCESS INFORMATION the UE will update its probability factor with the new value.

The Figure 2 below illustrates this mechanism. The green colour for the MICH indicates when the NI is set for the service. The green colour for the MBMS ACCESS INFORMATION indicates that the counting procedure is on-going and that UEs need to establish an RRC connection based on the included probability factor (PF). For the critical MCCH info, different colours indicate potentially different content.

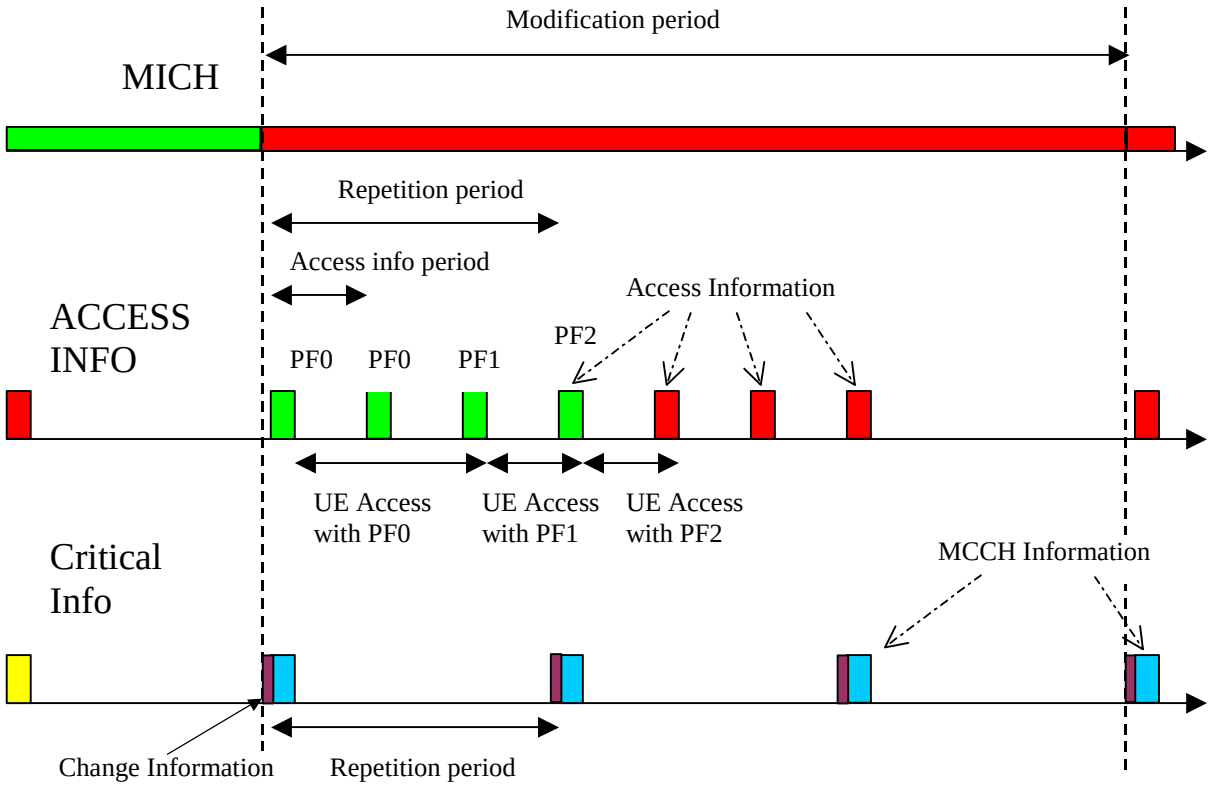

Figure 5.2.5: Illustration of Access Info period during MBMS counting

For every UE brought to RRC connected state for the purpose of counting, UTRAN will initiate the PMM Connection establishment procedure and will obtain from CN the set of MBMS services these users have joined.

Counting for on-going services (re-counting) will rely on the same scheduling of the MCCH information.

Next modified sections*

5.3 Protocol structure

5.3.1 MBMS User Plane Protocol Stack Architecture

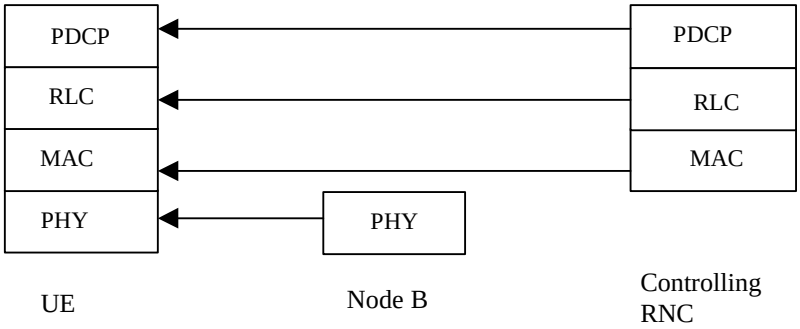

Figure 5.3.1: Protocol Stack for MTCH

Figure 5.3.1 illustrates the protocol termination for MTCH in MBMS, which is used in p-t-m transmission.

PDCP sub-layer performs header compression/decompression for the MBMS traffic.

PDCP sub-layer may operate with RFC 3095 header compression protocol. In that case, header compression should be performed under RFC 3095 U-mode.

In the UTRAN side, there is one PDCP entity per cell supporting MBMS or MBMS Cell Group for each MBMS service in each RNS. The shared PDCP entity in the UTRAN duplicates all PDCP PDUs to every RLC entity for every cell belonging to one MBMS Cell Group.

In the UTRAN, there is one RLC entity for each MBMS service in each cell or cell group in case of utilization of selective combining or maximum ratio combining in TDD, and one MAC entity for each cell.

In the UE side, there is one PDCP and RLC entity for each MBMS service in each UE. In each UE there is one MAC entity per received cell when UE is performing the selective combining between these cells.

In case of p-t-p transmission, DTCH is used for MBMS transmission and the protocol termination for DTCH mapped on DCH and RACH/FACH are presented in [8].

5.3.2 MBMS Control Plane Protocol Stack Architecture

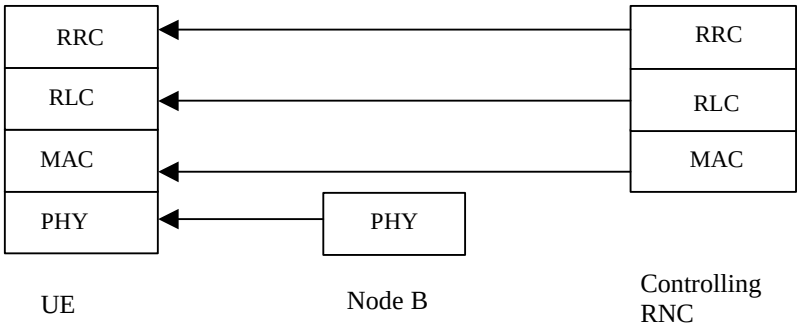

Figure 5.3.2: Protocol Stack for MCCH

Figure 5.3.2 illustrates the protocol termination for MCCH and MSCH in MBMS, which are~~is~~ MBMS p-t-m control channels.

MBMS functionalities are included in MAC and RRC.

In case of p-t-p transmission, DCCH is used for MBMS and the protocol termination for DCCH mapped on DCH and FACH are presented in [8].

5.4 MAC architecture

5.4.1 UTRAN MAC Architecture to support MBMS

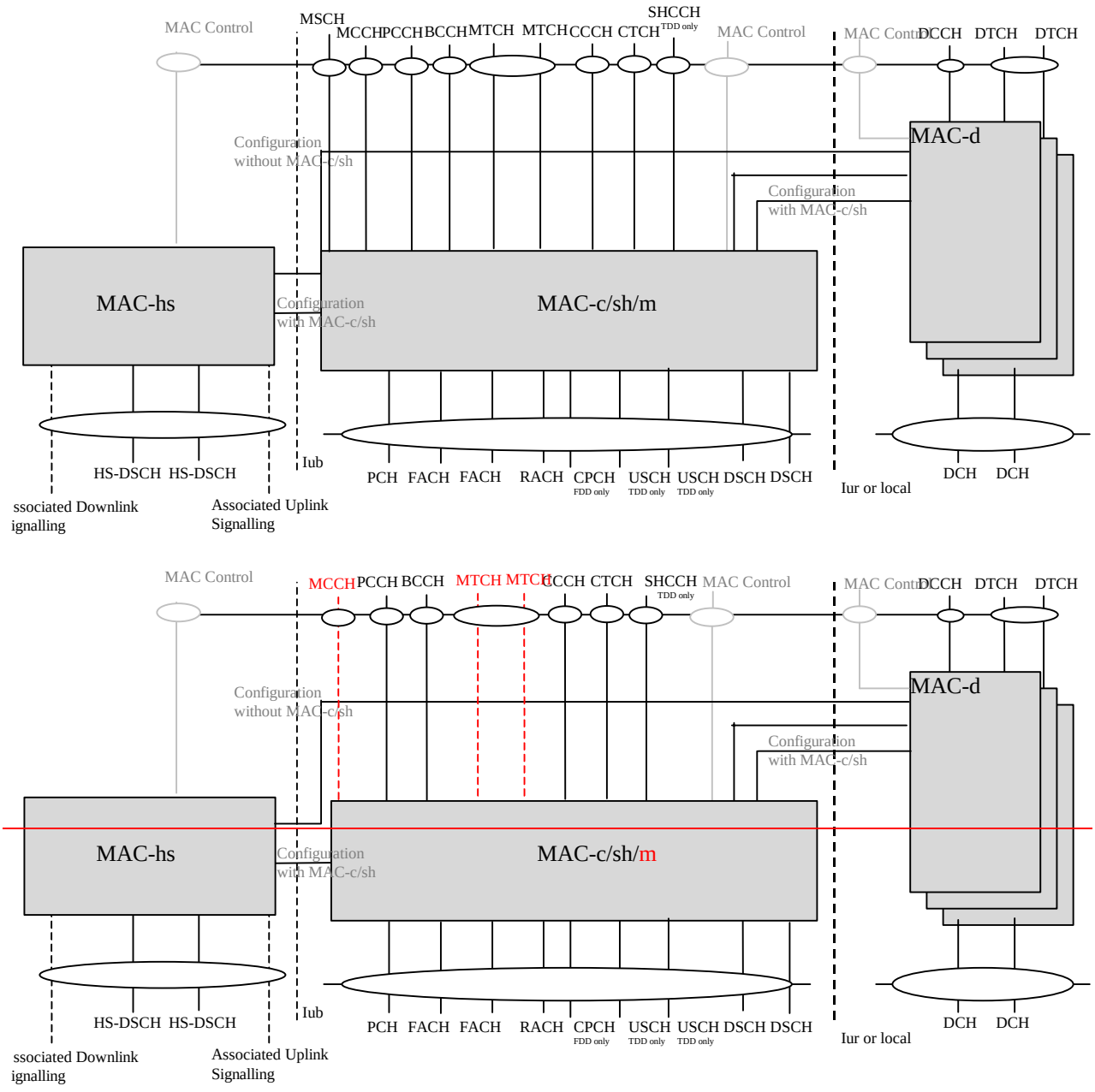

Figure 5.4.1: UTRAN MAC architecture

To support MBMS user and control plane transmission, a multicast functionality is added in the MAC c/sh, entitled "MAC m", to take care of scheduling of MBMS related transport channels as presented in Figure 5.4.1. In addition, three~~wo~~ logical channels are considered for p-t-m transmission of MBMS: MCCH, MSCH and MTCH. ~~Both~~ These logical channels are mapped on FACH. In case of p-t-p transmission DTCH and DCCH are used.

5.4.2 MAC-c/sh/m architecture: UTRAN side

Figure 4 illustrates the MAC-m additions to the MAC-c/sh architecture in the UTRAN side, needed to transmit MBMS data over a common transport channel (FACH).

MAC-c/sh/m is located in the controlling RNC. The following functionalities are covered:

- Scheduling / Buffering / Priority Handling: This function manages common transport resources between MBMS and non-MBMS data flow(s) according to their priority and delay requirements set by the higher layers.

- TCTF MUX: This function handles insertion of the TCTF field in the MAC header and also the respective mapping between logical channels (i.e. MTCH and MCCH) and transport channels. The TCTF field indicates which type of logical channel (i.e. MTCH and MCCH) is used.

- Addition of MBMS-ID: For p-t-m type of logical channels, the MBMS-ID field in the MAC header is used to distinguish between MBMS services.

- TFC selection: Transport format combination selection is done for a common transport channel (FACH) mapped to MTCH, MSCH and MCCH. In the case of MBMS soft combining, the combinable S-CCPCHs shall have the same TFC during the TTIs in which L1 combining is used.

There is one MAC-c/sh/m entity in the UTRAN for each cell.

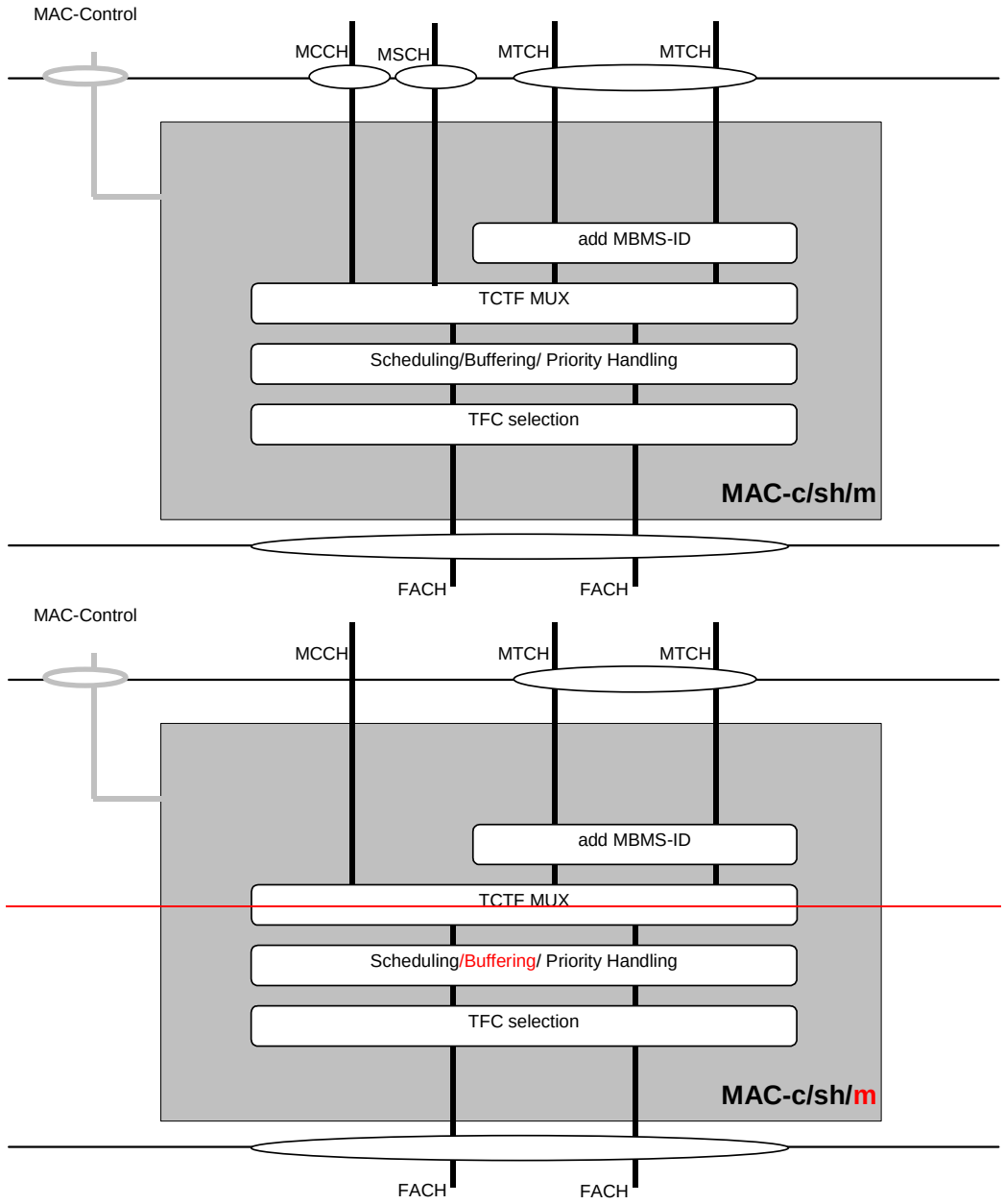

Figure 5.4.2: UTRAN side MAC-m architecture additions to MAC-c/sh

5.4.3 MAC-c/sh/m architecture: UE side

Figure 5 illustrates the MAC-m additions to the MAC-c/sh architecture in the UE side, needed to receive MBMS data over a transport channel (FACH).

The following functionalities are covered:

- TCTF DEMUX: This function handles detection and deletion of the TCTF field in the MAC header, and also the respective mapping between logical channels (i.e. MTCH and MCCH) and transport channels. The TCTF field indicates which type of logical channel (i.e. MTCH and MCCH) is used.
- Reading of MBMS-ID: The MBMS-ID identifies data to a specific MBMS service.

There is~~are~~ one MAC-m entity in the UE or ~~several (~~in case of selective combining one MAC-m entity for each selectively combined cell ~~) MAC-m entities~~ in ~~each~~ the UE.

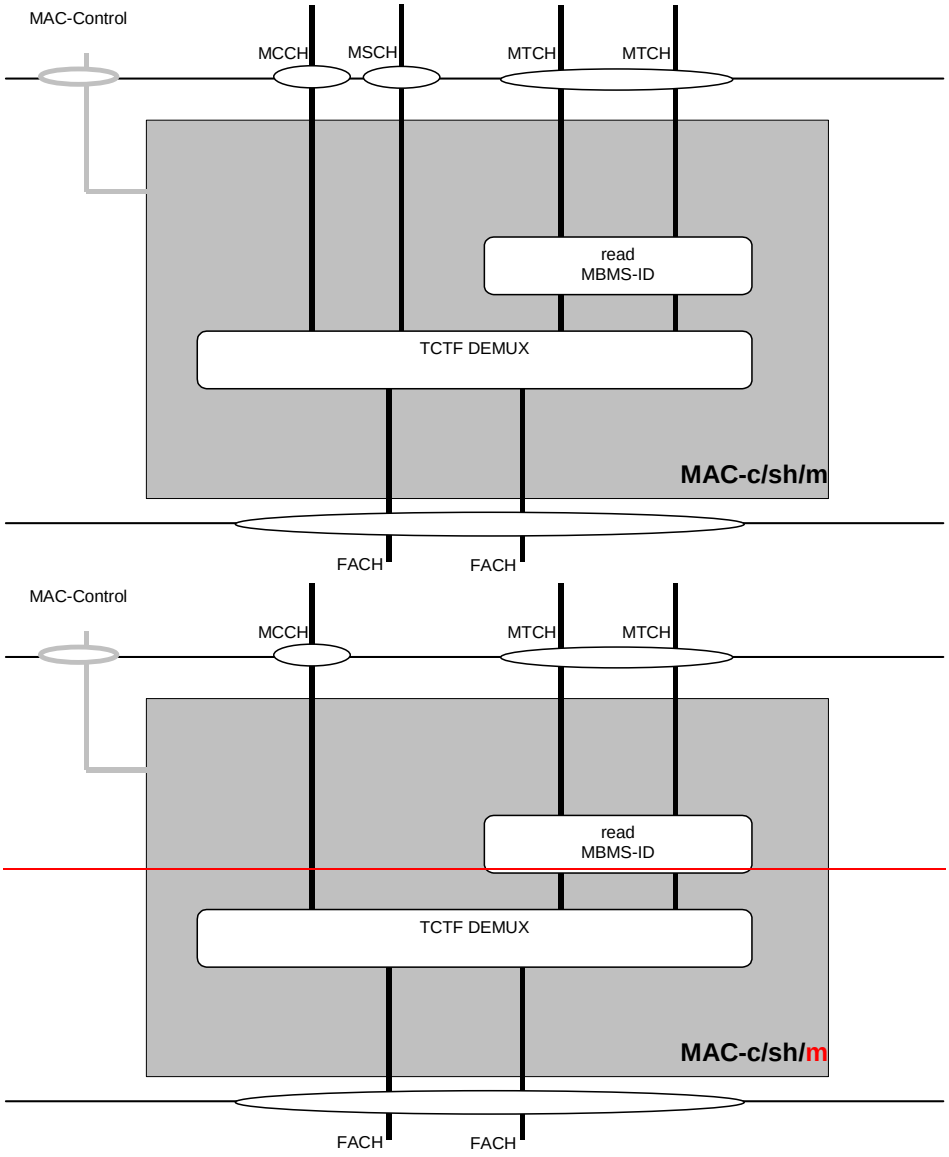

Figure 5.4.3: UE side MAC-m additions to MAC-c/sh

6 MBMS Channel Structure

There exists two transmission modes to provide the MBMS service:

- Point-to-point transmission (p-t-p)
- Point-to-multipoint transmission (p-t-m)

6.1 Point-to-Point Transmission

Point-to-point transmission is used to transfer MBMS specific control/user plane information as well as dedicated control/user plane information between the network and one UE in RRC Connected Mode. It is used only for the multicast mode of MBMS.

For a UE in CELL_FACH and Cell_DCH, DCCH or DTCH is used, allowing all existing mappings to transport channels.

A detailed description of channels used for point-to-point transmission is given in [8].

6.2 Point-to-multipoint Transmission

Point-to-multipoint transmission is used to transfer MBMS specific control/user plane information between the network and several UEs in RRC Connected or Idle Mode. It is used for broadcast or multicast mode of MBMS.

6.2.1 Logical Channels

6.2.1.1 MBMS point-to-multipoint Control Channel (MCCH)

This logical channel is used for a p-t-m downlink transmission of control plane information between network and UEs in RRC Connected or Idle Mode. The control plane information on MCCH is MBMS specific and is sent to UEs in a cell with an activated (joined) MBMS service. MCCH can be sent in S-CCPCH carrying the DCCH of the UEs in CELL_FACH state, or in standalone S-CCPCH, or in same S-CCPCH with MTCH.

The MCCH is always mapped to one specific FACH in the S-CCPCH as indicated on the BCCH. In case of soft combining, the MCCH is mapped to a different S-CCPCH (CCTrCH in TDD) than MTCH.

Reception of paging has priority over reception of MCCH for Idle mode and URA/CELL_PCH UEs.

6.2.1.2 MBMS point-to-multipoint Traffic Channel (MTCH)

This logical channel is used for a p-t-m downlink transmission of user plane information between network and UEs in RRC Connected or Idle Mode. The user plane information on MTCH is MBMS Service specific and is sent to UEs in a cell with an activated MBMS service.

The MTCH is always mapped to one specific FACH in the S-CCPCH as indicated on the MCCH.

6.2.1.3 MBMS point-to-multipoint Scheduling Channel (MSCH)

This logical channel is used for a p-t-m downlink transmission of MBMS service transmission schedule between network and UEs in RRC Connected or Idle Mode. The control plane information on MSCH is MBMS service and S-CCPCH specific and is sent to UEs in a cell receiving MTCH. One MSCH is sent in each S-CCPCH carrying the MTCH.

The MSCH is always mapped to one specific FACH in the S-CCPCH as indicated on the MCCH. Due to different error requirements the MSCH is mapped to a different FACH than MTCH.

6.2.2 Transport Channel

FACH is used as a transport channel for MTCH, MSCH and MCCH.

6.2.3 Physical Channel

SCCPCH is used as a physical channel for FACH carrying MTCH or MCCH or MSCH.

6.2.4 Mapping between channels

Only in downlink, the following connections between logical channels and transport channels exist:

- MCCH can be mapped to FACH
- MTCH can be mapped to FACH
- MSCH can be mapped to FACH

The mappings as seen from the UE and UTRAN sides are shown in Figure 6.2.4-1 and Figure 6.2.4-2 respectively.

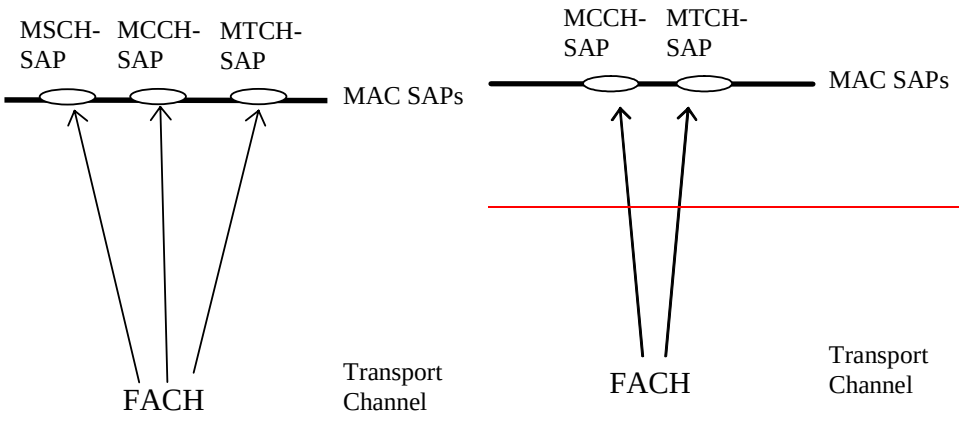

Figure 6.2.4-1: Logical channels mapped onto transport channel, seen from the UE side

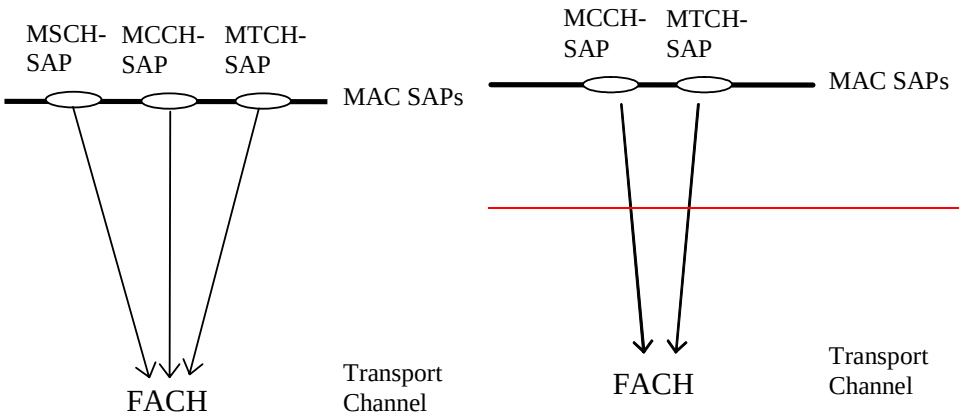

Figure 6.2.4-2: Logical channels mapped onto transport channel, seen from the UTRAN side

6.2.5 Data Flows through Layer 2

6.2.5.1 Data flow for MCCH mapped to FACH

For MCCH, the RLC mode to be employed is UM-RLC, with required enhancements to support out of sequence SDU delivery. A MAC header is used for logical channel type identification.

6.2.5.2 Data flow for MTCH mapped to FACH

For MTCH, the RLC mode to be employed is UM-RLC, with required enhancements to support selective combining. Quick repeat may be used in RLC-UM. A MAC header is used for logical channel type identification and MBMS service identification.

6.2.5.3 Data flow for MSCH mapped to FACH

For MSCH, the RLC mode to be employed is UM-RLC. A MAC header is used for logical channel type identification.

6.3. MBMS Notification Indicator Channel

MBMS notification utilizes a new MBMS specific PICH called MBMS Notification Indicator Channel (MICH) in cell. The exact coding is defined in Stage-3 physical layer specifications.

7 MBMS Reception and UE Capability

7.1 Selective and Soft Combining for MBMS P-T-M transmission

The selective combining for MBMS p-t-m transmission is supported by RLC PDU numbering. Therefore, the selective combining in the UE is possible from cells providing similar MBMS RB bit rate, provided that the de-synchronization between MBMS p-t-m transmission streams does not exceed the RLC re-ordering capability of the UE. Thus, there exist one RLC entity in the UE side.

To support selective combining it is decided to:

- Introduce re-ordering as a configurable feature of RLC-UM, within the RLC specification.
- Use the same mechanism as what is specified for MAC-hs (single T1 timer).

For selective combining there exist one RLC entity per MBMS service utilizing p-t-m transmission in the cell group of the CRNC. All cells in the cell group are under the same CRNC, i.e. Iur support is not considered.

The UE capability requirements to support selective and soft combining are defined in chapter 7.2. In case de-synchronization occurs between MBMS transmissions in neighbouring cells belonging to an MBMS cell group the CRNC may perform re-synchronization actions enabling UEs to perform the selective combining between these cells.

~~For TDD, selection combining and the maximum ratio~~ For TDD, selection combining and soft combining can be used when Node-Bs are synchronised. For FDD soft combining can be used when Node-Bs are synchronized inside UE's soft combining reception window, and the data fields of the soft combined S-CCPCHs are identical during soft combining moments.

When selective or soft combining is available between cells the UTRAN should send MBMS NEIGHBOURING CELL INFORMATION containing the MTCH configuration of the neighbouring cells, available for selective or soft combining. When partial soft combining is applied the MBMS NEIGHBOURING CELL INFORMATION contains the L1-combining schedule, which indicates the time moments when the UE may soft combine the S-CCPCH transmitted in neighbouring cells with the S-CCPCH transmitted in the serving cell. With MBMS NEIGHBOURING CELL INFORMATION the UE is able to receive MTCH transmission from neighbouring cell without reception of the MCCH of that cell.

The UE determines the neighbouring cell suitable for selective or soft combining based on threshold (e.g. measured CPICH Ec/No) and the presence of MBMS NEIGHBOURING CELL INFORMATION of that neighbour cell.

The possibility of performing selective or soft combining should be signalled to the UE.

7.1.bis Simulcast Combining (TDD only)

In contrast to FDD, downlink macro diversity has not been a characteristic of TDD during release '99/4/5. As such TDD receivers are not typically designed to facilitate the simultaneous reception of multiple radio links and the incorporation of such a requirement for MBMS in TDD would have non-trivial impacts on the receiver design.

Much of the receiver complexity increase associated with the combining of multiple radio links in the UE can however be avoided in TDD by combining macro-diversity with timeslot re-use. This also allows for the throughput gains from timeslot re-use to be combined with further gains from macro diversity.

In such a scheme, the transmissions of the same information from the multiple participating cells are arranged such that they arrive at the UE on substantially different timeslots, thereby removing the requirement at the UE to detect multiple cells in the same timeslot.

As such, cells are partitioned into transmission "groups" or "sets". Each transmission set is allocated a timeslot (or set of timeslots) for MBMS transmission. The assigned slots are typically exclusively used by that MBMS set; sets do not transmit when another set is active. The UE attempts to receive information from each set and to combine them either at the physical layer or RLC layer in order to enhance reception reliability.

Figure 7.1.bis shows such a scheme applied to a tri-sectored deployment model. 3 timeslots (t_1, t_2 and t_3) are allocated to each sector for the purposes of MBMS transmission. Each sector is assigned to a particular "MBMS transmission set", set 1, 2 or 3.

An MBMS data unit or transport block is encoded over several radio frames (eg: 80ms TTI). The physical channel bits that result are effectively transmitted three times; once by MBMS set 1 in timeslot t_1, once by MBMS set 2 in timeslot t_2, and once by MBMS set 3 in timeslot t_3.

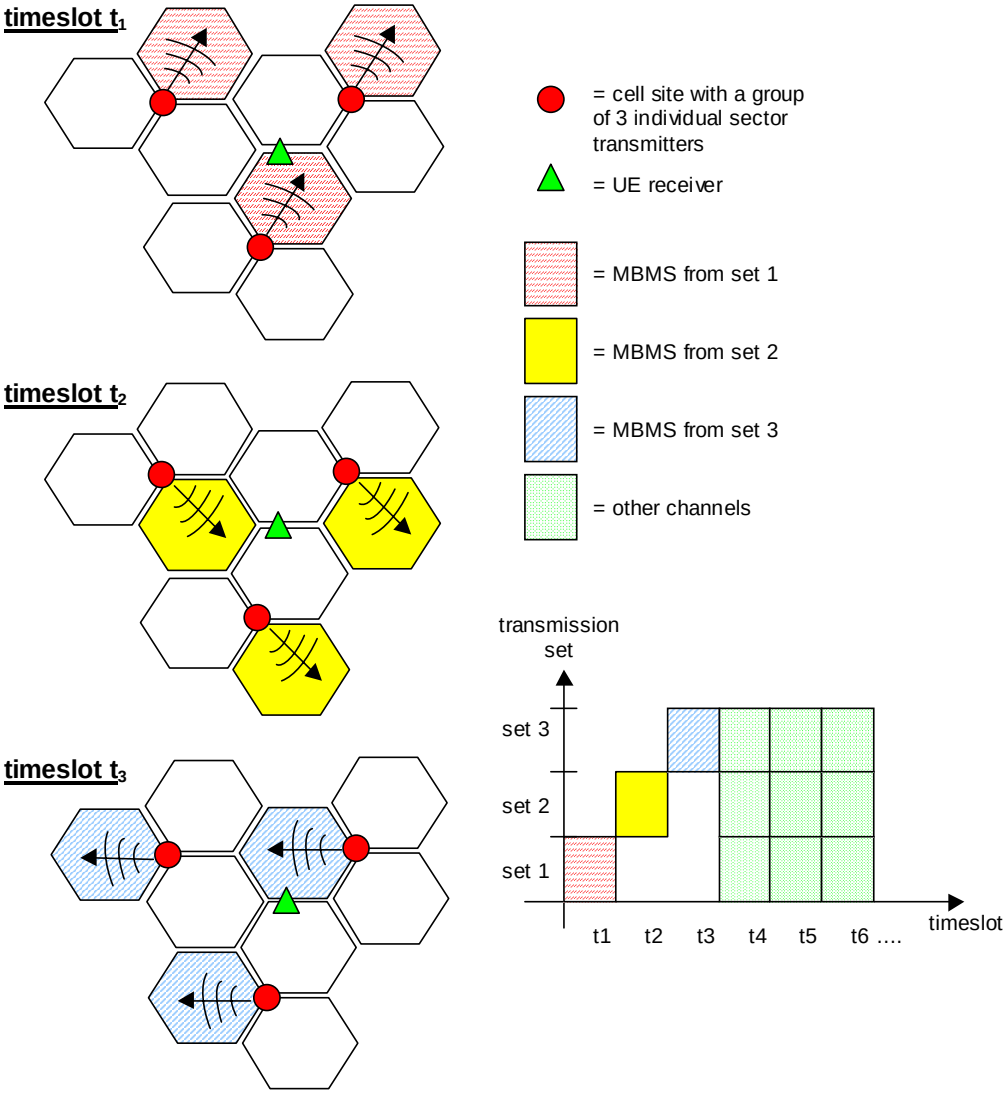

Figure 7.1.bis: Example of non-time-coincident macro diversity transmission

A given UE may be configured to listen to the separate transmissions of the MBMS physical channels (one from each set) which, over the course of the TTI, correspond to the MBMS transport block(s). The signals from each MBMS set are largely non-time-coincident and do not require the use of an extensively modified receiver architecture –a receiver architecture resembling that of a normal "single-radio-link" TDD receiver may be used.

The received transport blocks may be provided to the RLC layer for selective combining, or soft information may be buffered and combined across MBMS sets during the course of the TTI via physical layer ~~maximum~~soft ~~ratio~~ combining .

The UTRAN shall signal to the UE on the MCCH which services may be ~~maximum ratio~~soft combined (and in which cells). The cell group for ~~maximum ratio~~soft combining may be different than the cell group for selective combining. The UE may assume that transmissions of a given service that may ~~be maximum ratio~~soft combined take place in the same frame.

7.2 UE Capability

The UE MBMS capability is not sent to UTRAN and is subject to UE implementation, including the relation between MBMS capability and actual RRC state which is also a UE implementation. A consequence is that a UE may be counted although its actual capability does not allow to receive MBMS transmissions e.g. because of its current RRC state. Further optimizations to avoid counting of useless UEs may be included in Stage 3.

The standard will describe a minimum UE capability requirement in order to allow operators to configure MBMS channels that can be common to all UEs supporting the given service.

There are some UE capability requirements that are common to all eventual service categories:

The minimum UE capability for MBMS capable UE, is one primary CCPCH plus all the configurations below. The UE is not required to support these configurations simultaneously.

1. One PICH and one MICH
2. One S-CCPCH and one MICH
3. One S-CCPCH (dedicated FACH and possibly the FACH, which may carry MCCH) and two S-CCPCH with 80ms TTI for MTCH reception
4. One S-CCPCH (dedicated FACH and possibly the FACH, which may carry MCCH) and three S-CCPCH with 40ms TTI for MTCH reception
5. One PICH and two S-CCPCH with 80ms TTI for MTCH reception
6. One PICH and three S-CCPCH with 40ms TTI for MTCH reception

The requirement one reflects the case when the UE is in Idle mode, or URA_PCH, CELL_PCH state and MBMS reception is not ongoing and requirement five and six are for the case that MBMS reception is ongoing in Idle mode, or URA_PCH, CELL_PCH state.

The requirement two reflects the case when the UE is in CELL_FACH state and MBMS is reception not ongoing and requirement three and four are for the case when MBMS reception is ongoing respectively.

The ability of the UE to receive DPCH/HS-PDSCH simultaneously with S-CCPCH carrying MTCH/MCCH is subject to UE capability.

The minimum MBMS bit rate that all MBMS capable UEs shall support is to be defined in Stage 3.

For FDD, the UE shall support selective combining and ~~may support~~ soft combining ~~(signalling support will be needed)~~. For TDD, the UE shall support ~~both~~ selective, and soft ~~and maximum ratio~~ combining.

The standard may restrict further the UE implementation options by defining certain capability combinations.

If the UE is supporting MBMS ptm reception in CELL_DCH state, it shall have capability to acquire MCCH configuration from BCCH after handover procedure, and after that receive MCCH and MTCH.

7.3 MBMS Reception

The following descriptions add MBMS specific processes to be considered for each RRC State/Mode.

The BCCH contains information regarding the MCCH, while the latter contains information on the MTCH.

In the sub-sections below, how and when the UE reads the MCCH is not described as periodic MCCH transmission is described in 5.2.3. .

NOTE: reception of multiple MBMS services simultaneously is subject to UE capability; selection between these when needed is [FFS].

7.3.1 MBMS Reception in RRC Idle Mode

In idle mode, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH and:

  - if the MBMS service requires the establishment of an RRC Connection

    - inform upper layers that the MBMS Service requires the establishment of an RRC Connection,

  - if the MBMS service does not require the establishment of an RRC Connection :

    - listen to the common transport channel on which the MTCH is mapped.

  - if the UE determines that a neighbouring cell is suitable for selective or soft combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell:

    - performs selective or soft combining of MTCH between the selected cell and the neighbouring cell.

7.3.2 MBMS Reception in RRC Connected Mode: URA_PCH state

In URA_PCH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the URA where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH,

    - if on the MCCH is indicated that the MBMS service in the cell requires a cell update:

      - initiate a cell update procedure. The cause to be used in the cell update procedure is defined in Stage 3.

  - for each MBMS service that the UE has activated and where transmission on a MTCH is indicated in the MCCH, listen to the common transport channel on which the MTCH is mapped,

  - if the UE determines that a neighbouring cell is suitable for selective or soft combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

    - performs selective or soft combining of MTCH between the selected cell and the neighbouring cell.

7.3.3 MBMS Reception in RRC Connected Mode: CELL_PCH state

In CELL_PCH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

  - act on RRC messages received on MCCH

- listen to the common transport channel on which the MTCH is mapped,

- if the UE determines that a neighbouring cell is suitable for selective or soft combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

- performs selective or soft combining of MTCH between the selected cell and the neighbouring cell.

7.3.4 MBMS Reception in RRC Connected Mode: CELL_FACH state

In CELL_FACH, the UE shall:

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available

- act on RRC messages received on MCCH

- listen to the common transport channel on which the MTCH is mapped

- if the UE determines that a neighbouring cell is suitable for selective or soft combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell

- performs selective or soft combining of MTCH between the selected cell and the neighbouring cell.

NOTE: For UEs in CELL_FACH, UTRAN may decide to send MBMS data over DTCH.

7.3.5 MBMS Reception in RRC Connected Mode: CELL_DCH state

In CELL_DCH, the UE shall,

- if the UE supports MBMS and

- if the UE has activated an MBMS service and there is an ongoing session for this service in the cell where the UE is situated, i.e. MTCH and MCCH are available and

- if the UE has the capabilities:

- act on RRC messages received on MCCH

- listen to the common transport channel on which the MTCH is mapped.

- if the UE determines that a neighbouring cell is suitable for selective or soft combining and the UE has valid MBMS NEIGHBOURING CELL INFORMATION of that cell and UE has capability

- performs selective or soft combining of MTCH between the selected cell and the neighbouring cell.

NOTE: For UEs in CELL_DCH, UTRAN may decide to send MBMS data over DTCH

Next modified sections*

8.1.3 Recounting

During a p-t-m MBMS session, UTRAN may perform re- counting to verify if p-t-m is still the optimal transfer mode. The purpose of the re- counting procedure is to count the number of idle mode and URA_PCH state UEs that have joined a specific service. As a result of this procedure, UTRAN may decide to change the transfer mode from p-t-m to p-t-p. This change of transfer mode is outside the scope of this sequence (to be covered by a separate sequence).

The Figure 8.1.3 shows an example of a possible recounting sequence.

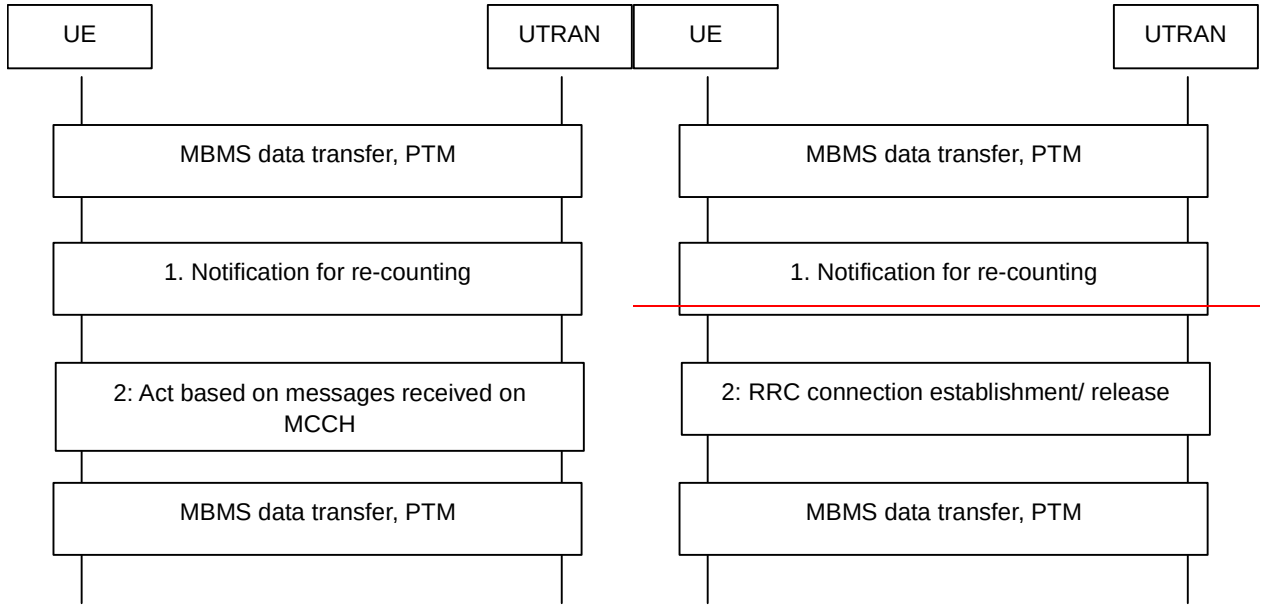

Figure 8.1.3: Recounting with continuation of p-t-m

In case UTRAN applies re- counting to determine the most optimal transfer mode, the following steps are performed:

- UTRAN sends the MBMS CHANGE INFORMATION and the MBMS ACCESS INFORMATION including service ID, and access probability on MCCH
- UEs in idle mode as well as UEs in CELL_PCH, URA_PCH and CELL _FACH receiving an MBMS service provided in p-t-m transfer mode read the MBMS CHANGE INFORMATION at the beginning of each modification period. If service Id of activated MBMS service is indicated in MBMS CHANGE INFORMATION UEs continue reading the rest of MCCH information.
- Upon receiving the MBMS ACCESS INFORMATION including access probability, UEs in idle mode or URA_PCH state for which the probability check passes, initiate RRC connection establishment or cell update procedure respectively. UEs in CELL_PCH or CELL_FACH state ignore the MBMS ACCESS INFORMATION.
- UTRAN counts the UEs interested in the MBMS service using UE linking from CN
- In the case that no UE is counted as present in the cell then UTRAN may decide not to provide any RB for the service in the cell.
- In case a pre- defined threshold is reached, UTRAN continues using the p-t-m transfer mode. Otherwise, UTRAN may repeat the MBMS ACCESS INFORMATION a number of times, using different probability values. If the threshold is not reached, UTRAN switches transfer mode from p-t-m to p-t-p
- In case UTRAN continues using the p-t-m transfer mode, it may return UEs that responded to counting back to idle mode by releasing the RRC connection.

Next modified sections*

8.3.2 MBMS Service Information

Figure 8.3.2: MBMS service information signalling flow

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and PMM-CONNECTED mode.

The purpose of the signalling flow is for RNC to inform UEs of all of MBMS services available in one cell. The MBMS SERVICE INFORMATION shall be transmitted periodically on MCCH to support mobility in the MBMS service.

The MBMS SERVICE INFORMATION contains MBMS service ids and p-t-m indication. The MBMS service ids indicate the MBMS services which are being served in the cell or the MBMS services which can be served if the UE requests it. P-t-m indication indicates that the MBMS service is on p-t-m in the cell, thus it informs the UE of the need of reception of the MBMS RADIO BEARER INFORMATION. More information may be included in the MBMS SERVICE INFORMATION.

8.3.3 MBMS Radio Bearer Information

Figure 8.3.3: MBMS radio bearer information signalling flow

This signalling flow is applicable for handling MBMS to UEs in IDLE and PMM-CONNECTED mode.

The purpose of the signalling flow is for the RNC to inform UE(s) regarding the MTCH radio bearer information. MBMS RADIO BEARER INFORMATION is only available for p-t-m transmission. MBMS RADIO BEARER INFORMATION shall be transmitted periodically on MCCH to support mobility in the MBMS service.

MBMS RADIO BEARER INFORMATION includes MBMS Service Id, MBMS UTRAN Cell Group Identifier, logical channel, transport channel and physical channel information per MBMS service. An MBMS UTRAN Cell Group Identifier is used to indicate to UEs which MBMS Cell Group the cell pertains to. More information may be included in MBMS RADIO BEARER INFORMATION.

8.3.4 MBMS Access Information

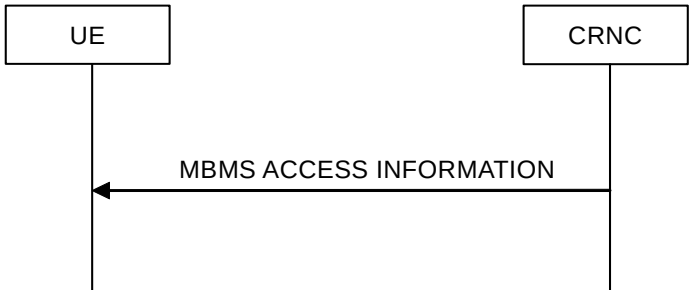

Figure 8.3.4: MBMS Access Information signalling flow

This signalling flow is applicable for handling MBMS UEs in IDLE mode.

The purpose of the signalling flow is for the RNC to inform UE(s) interested in a particular service of the potential need to establish an RRC connection. The MBMS ACCESS INFORMATION is transmitted during counting and re-counting on MCCH. The MBMS ACCESS INFORMATION includes MBMS service id for each service for which counting is required and the associated access "probability factor". More information may be included in MBMS ACCESS INFORMATION.

8.3.5 MBMS Neighbouring Cell Information

Figure 8.3.5: MBMS Neighbouring Cell Information signalling flow

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode.

The purpose of the MBMS NEIGHBOURING CELL INFORMATION signalling flow is for the UTRAN to inform to UEs of the MTCH configuration of the neighbouring cells which are available for selective combining. In case of partial soft combining, the MBMS NEIGBOURING CELL INFORMATION contains the L1-combining schedule, which indicates when the soft combining is applicable between the specific S-CCPCH of the cell and the specific S-CCPCH of the neighbouring cell. With MBMS NEIGHBOURING CELL INFORMATION the UE is able to receive MTCH transmission from neighbouring cell without reception of the MCCH of that cell. The MBMS NEIGHBOURING CELL INFORMATION shall be repeatedly transmitted on MCCH when selective or soft combining is utilized in the MBMS p-t-m transmission in the given cell group.

8.3.6 MBMS Joined Indication

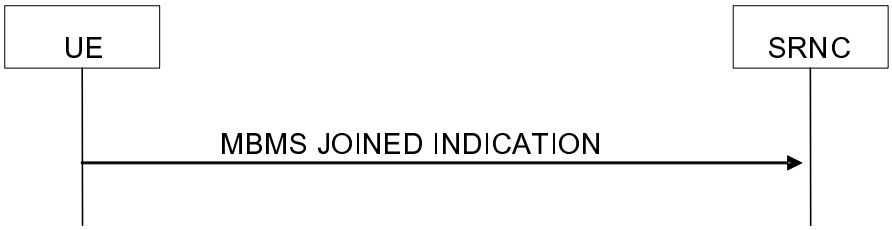

Figure 8.3.6: MBMS joined indication signalling flow

This signalling flow is applicable for handling MBMS to UEs in RRC-Connected, PMM-IDLE state. The MBMS JOINED INDICATION is sent over the DCCH.

The signalling flow is initiated by the UE after entering RRC-Connected, PMM-IDLE state. The purpose of the signalling flow is to enable the UE to inform the SRNC that the user has joined at least one MBMS service. The SRNC requests the MBMS services the UE has joined from the SGSN as defined in subclause 8.2.10.

In SRNC relocation this information is transmitted from source RNC to target RNC.

NOTE: If SRNC has valid linking information the complete service list of activated services is also transmitted from source RNC to target RNC in SRNC relocation.

8.3.7 MTCH Scheduling Information

Figure 8.3.7: MTCH scheduling information.

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode.

~~1.~~The purpose of the signalling flow is to enable UEs to perform discontinuous reception of MTCH. The UE may discontinuously receive MTCH based on scheduling information indicated by the MTCH SCHEDULING INFORMATION. This signalling is transmitted on MSCH mapped on SCCPCH carrying MTCH. The MTCH SCHEDULING INFORMATION is signalled ~~at~~ on ~~predetermined intervals~~each MSCH repetition period. The MSCH repetition period and the offset from the MCCH modification period are indicated on MCCH. In case of soft combining, the MSCH repetition period is same for all soft combinable S-CCPCH. ~~-~~The scheduling information allows to cover different periods for different MBMS services.

The MTCH SCHEDULING INFORMATION includes for each service :

- MBMS service Id (The actual coding is defined in stage-3)

- Beginning and duration of MBMS data transmission (one contiguous block or more is defined in Stage-3).

- Duration can be infinite (no DTX). This option could be signalled in the MCCH (Stage-3 definition)

-Indication of no MBMS data transmission for either this period or several consecutive periods (a period is expressed in MSCH repetition period)~~The beginning and duration for possible MBMS service transmissions on this SCCPCH.~~

8.3.8 MBMS Change Information

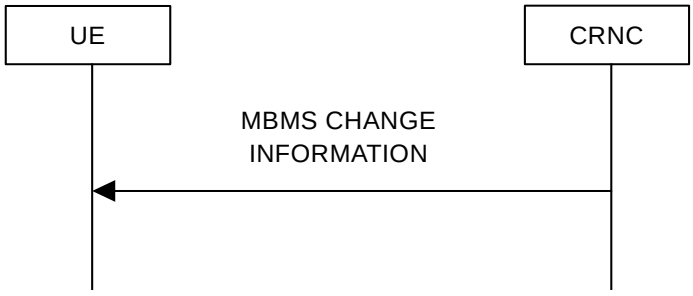

Figure 8.3.8: MBMS change information.

This signalling flow is applicable for handling MBMS to UEs in PMM IDLE and CONNECTED mode. UTRAN should transmit this signalling flow in beginning of each modification period on MCCH and repeat it at least in every repetition period of that modification period. UE shall read this information flow when detecting that MICH bits set for a service that UE has activated, or periodically at the begin of each modification period when receiving MTCH.

The purpose of the signalling flow is to indicate MBMS services whose MCCH information is changed in that modification period. The content of MBMS CHANGE INFORMATIO shall be minimized, so that the MCCH reading time for the UEs, activated MBMS service whose MCCH information is not modified on that modification period, is minimized.

The MBMS CHANGE INFORMATION includes:

- The MBMS service Ids for which MCCH information is modified on that modification period.

9 Security for MBMS

Ciphering for MBMS multicast data is done between the BM-SC and the UE as defined in [7]. Therefore, for MBMS p-t-m data transmissions no radio interface ciphering is applied.

In case of p-t-p MBMS data transmissions, if the security is activated for the UE the ciphering is also applied for p-t-p MBMS data RB as for any other RB of the UE.

10 Mobility Procedures for MBMS

One of the requirements in [5] is: "Data loss during cell change should be minimal". Therefore, when the UE receiving an MBMS session in idle mode or connected mode (not including CELL_DCH) re-selects between cells, it should be possible to provide service continuity to this UE.

The following mechanism has been identified to minimise the data loss on cell change. ~~Additional mechanisms allowing to send the MBMS bearer type notification when new mobiles arrive or leave a cell are [FFS].~~

10.1 Use of Periodical Transmission of MBMS Critical Information~~hannel Type Notification~~

In this mechanism, the cell periodically transmits an MBMS ~~Channel Type Notification from the UTRAN~~critical information, informing all MBMS services ~~subscribers if it is~~ currently configured for p-t-m transmission or p-t-p transmission. If ~~it~~ MBMS service is configured for p-t-m transmission, the ~~channel~~ periodical transmission of MBMS critical information may also contain the Radio Bearer ~~parameters~~ information corresponding to ~~the TMGI of~~ each MBMS service and Neighbouring cell information. ~~Thus no UE signalling would be required towards the UTRAN.~~

~~[However, if it is necessary for the UE to instead initiate reception of the RB parameters, such a mechanism similar to the Cell Update procedure may be more suitable.]~~

If the cell is configured for p-t-p transmission, then the UE would perform a normal RRC connection establishment.

~~Additionally, the UE in a cell receiving MBMS p-t-m, could be periodically checking the MBMS Channel Type Notification in neighbour MBMS cells to acquire information about whether p-t-m or p-t-p transmission is required if it accesses that cell.~~

10.2 UE Actions for Mobility

The UE mobility between intra frequency cells is not affected by the MBMS reception. The mobility between different frequency layers is affected by the Frequency Layer Convergence process as defined in 11.2, if used by the network.

In CELL_FACH and in CELL_DCH state the RRC operation has priority over MBMS reception, thus UE performs the inter frequency and inter RAT measurements as configured by the SRNC. UTRAN should utilize different periodicities

between MCCH transmissions and CELL_FACH state measurement occasion, such that CELL_FACH state measurements and MCCH transmissions are not constantly overlapping for some UE.

In Idle mode and in CELL_PCH, URA_PCH states the measurements are performed as configured by the network based on the Release 5. The MBMS specific measurement occasions to S-CCPCH for UEs in idle mode and in CELL_PCH, URA_PCH states are not introduced and measurements have priority over MBMS reception. The usage of channel protection (channel coding) to recover some of the lost transport blocks is possible.~~to be checked with RAN1~~.

UEs may have DRx occasions for specific MBMS service when UE can stop decoding S-CCPCH and perform measurements. DRx occasion are based on scheduling information. ~~UE may also have possibility to skip the complete MCCH transmission based on e.g. "value tag".~~

R99 standards have some means to reduce need for number of measurements, which can be utilized for MBMS.

When the UE reselects the cell due to the mobility or returns to on service from out of service, the UE shall acquire the MCCH information if the interested MBMS service is available in the selected cell for the reception of the service. The service is available when the session has been already started and the service is being served on p-t-p/p-t-m in the cell, or the service can be served in the cell if the UE requests it.

If the MBMS service is available in the cell, the UE will perform an action for the service reception in the cell. For example, if the service is on p-t-p, the idle mode UE will initiate RRC connection establishment procedure. Otherwise, the UE does not need to perform such an action in the cell. The UE, which moves to the new cell, will operate according to the RRC state/mode as follows.

Whenever the UE moves between p-t-m cells, UE shall receive the MBMS RADIO BEARER INFORMATION, which includes an MBMS UCG-Id.~~, which is included in the MBMS RADIO BEARER INFORMATION~~. If the MBMS UCG-Id received in a new cell is the same as the MBMS UCG-Id received in an old cell, then the UE receives MTCH without re-establishment of its PDCP as the new cell is processed by the same PDCP entity as the old cell. If the MBMS UCG-Ids differs between old on new cell, the UE re-establishes its PDCP entity according to the RADIO BEARER INFORMATION. In case that RLC entity is shared in CRNC between old and new cell, the UE receives MTCH without re-establishment of its RLC, If old and new cell does not share RLC entity in CRNC the UE shall re-establish its RLC. UE shall re-establish MAC and physical layer protocol entities upon cell change.

10.2.1 RRC idle mode

Idle mode UE shall:

- if BCCH contains information regarding the MCCH in the new cell:
  - listen to the MCCH and receive the MBMS SERVICE INFORMATION;
  - if the MBMS SERVICE INFORMATION contains the interested MBMS service–id:
    - if MBMS SERVICE INFORMATION indicates that the service is on p-t-m:
      - receive the MBMS RADIO BEARER INFORMATION and listen to the MTCH;
    - else:
      - initiate RRC connection establishment procedure;
  - if the UE receive the MBMS RADIO BEARER INFORMATION before the MBMS SERVICE INFORMATION and;
  - if MBMS RADIO BEARER INFORMATION contains the interested MBMS service id:
    - listen to the MTCH without the need of receiving the MBMS SERVICE INFORMATION.

10.2.2 URA_PCH State

URA_PCH state UE shall:

- perform URA update procedure if needed;
- if BCCH contains information regarding the MCCH in the new cell:

- listen to the MCCH and receive the MBMS SERVICE INFORMATION;
- if MBMS SERVICE INFORMATION contains the interested MBMS service id:
  - if MBMS SERVICE INFORMATION indicates that the service is on p-t-m:
    - receive the MBMS RADIO BEARER INFORMATION and listen to the MTCH;
  - else:
    - initiate cell update procedure
- if the UE receive the MBMS RADIO BEARER INFORMATION before MBMS SERVICE INFORMATION message and;
- if MBMS RADIO BEARER INFORMATION contains the interested MBMS service id:
  - listen to the MTCH without the need of receiving the MBMS SERVICE INFORMATION.

10.2.3 CELL_PCH

CELL_PCH state UE shall:

- perform cell update procedure;

~~- if cell update confirm message contains MBMS radio bearer information:~~

~~- listen to the MBMS radio bearer;~~

~~- else:~~

- if BCCH contains information regarding the MCCH in the new cell:
  - listen to the MCCH and receive the MBMS SERVICE INFORMATION;
  - if MBMS SERVICE INFORMATION contains the interested MBMS service id and;
    - if MBMS SERVICE INFORMATION indicates that the service is on p-t-m:
      - receive the MBMS RADIO BEARER INFORMATION message and listen to the MTCH
  - if the UE receive the MBMS RADIO BEARER INFORMATION before the MBMS SERVICE INFORMATION and;
  - if MBMS RADIO BEARER INFORMATION contains the interested MBMS service id:
    - listen to the MTCH without the need of receiving the MBMS SERVICE INFORMATION.

10.2.4 CELL_FACH

CELL_FACH state UE shall~~, depending on UE capability~~:

- perform cell update procedure

~~- if cell update confirm message contains MBMS radio bearer information:~~

~~- listen to the MBMS radio bearer;~~

~~- else:~~

- if BCCH contains information regarding the MCCH in the new cell:
  - listen to the MCCH and receive the MBMS SERVICE INFORMATION;
  - if MBMS SERVICE INFORMATION contains the interested MBMS service id and;
    - if MBMS SERVICE INFORMATION indicates that the service is on p-t-m:

- receive the MBMS RADIO BEARER INFORMATION and listen to the MTCH;

- if the UE receive the MBMS RADIO BEARER INFORMATION before the MBMS SERVICE INFORMATION and;

- if MBMS RADIO BEARER INFORMATION contains the interested MBMS service id:

  - listen to the MTCH without the need of receiving the MBMS SERVICE INFORMATION.

10.2.5 CELL_DCH State

CELL_DCH state UE shall:

- act on the RRC message received on DCCH in handover.

- if UE has capability to support MBMS in CELL_DCH:

  - if BCCH contains information regarding the MCCH in the new cell:

    - listen to the MCCH and receive the MBMS SERVICE INFORMATION;

    - if MBMS SERVICE INFORMATION contains the interested MBMS service id and;

      - if MBMS SERVICE INFORMATION indicates that the service is on p-t-m:

        - receive the MBMS RADIO BEARER INFORMATION and listen to the MTCH;

    - if the UE receive the MBMS RADIO BEARER INFORMATION before the MBMS SERVICE INFORMATION and;

    - if MBMS RADIO BEARER INFORMATION contains the interested MBMS service id:

- listen to the MTCH without the need of receiving the MBMS SERVICE INFORMATION.

Next modified sections*

11.2 Frequency layer Convergence

Frequency Layer Convergence denotes the process where the UTRAN requests UEs to preferentially re-select to the frequency layer on which the MBMS service is intended to be transmitted. This layer preference could be done by an additional MBMS session related Layer Convergence Information (LCI) such as offset and target frequency. The FLC is supported by specifications for both networks utilizing HCS and for networks not utilizing HCS.

The preferred layer (PL) is indicated per MBMS service and the LCI (offset) is the same for all MBMS services on a given preferred layer. UTRAN can consist of multiple preferred layers and the PL for given services is decided by RRM. Thus the PL for an MBMS service might be different in different parts of the service area. Network co-ordination between RNCs may be added for the Rel-7.

The LCI can be signalled to UEs by the CRNC after the session start is received over Iu interface until reception of the session stop. The UEs shall take LCI into account whenever it is signalled on the MCCH in Idle mode and URA_PCH, CELL_PCH and in CELL_FACH states. The FLC is not applicable in CELL_DCH state, as it is only effecting UEs cell re-selection procedure.

The UE shall ignore Sintersearch parameter only for the potential preferred layers when LCI is signalled and on preferred layer the UE shall apply the Sintersearch parameter. In case of UE is in CELL_FACH state without measurement occasions, the UE may not be able to measure cells on preferred layers.

In the case that the UE has joined multiple services and they have different frequencies as preferred layer, the UE should apply the FLC applicable for the highest priority MBMS service, which it has activated and has a PL. The priority setting of different MBMS services is decided by NAS.

Based on RRM decision, a given MBMS service can be provided on non-preferred layer by p-t-p or p-t-m transfer mode.

The details of the mechanism are defined in state 3.

3GPP TSG-RAN WG3 Meeting #45
Shin-Yokohama, Japan, 15th-19th of November

Tdoc ⌘R2-042702

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.346** **CR** **008** ⌘ **rev** **-** ⌘ Current version: **6.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Corrections to UE Linking, Session Start and addition of URA Linking and Information Exchange procedure
Source:	⌘	RAN WG2
Work item code:	⌘	MBMS-RAN
Date:	⌘	19/11/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*
Rel-7 *(Release 7)*

Reason for change: ⌘

R3-041559: Correction to Session Start procedure
The RNC may send a positive response even if it has not the resources at the exact moment it receives the session start.

R3-041448: Notification of the MBMS PTP RAB IDs to UTRAN
The CR is updated of R3-041282, which is agreed in principle at the RAN3#44 meeting in Sophia Antipolis. In this new CR the change to 8.2.10 is deleted. Meanwhile we use the same description with the new version of the RANAP draft CR.

R3-041475 MBMS Attach/Detach changes for MBMS stage 2 TS:
The MBMS Attach/Detach functionality is not well described. The procedures performing this functionality is not clearly given, especially when this functionality is done in the DRNC implicitly.
A new function conveying APN and IP multicast address over Iur is introduced to decrease the signalling load over Iur.

R3-041477 Corrections on UE Linking principles and complement of UE De-Linking principles
1. The current text (Section 5.1.6) describes the procedure if an UE is unlinked from the MBMS Service Context in the DRNC. However, this section does not contain the concept description of the UE De-Linking.
2. How to perform UE De-Linking procedure in the SRNC is not included.
3. How to perform UE De-Linking procedure via Iur interface is not clear, if an UE is in CELL_DCH or CELL_FACH state.
4. MBMS Detach procedure is used for UE De-Linking process but not UE

	Linking process. And therefore item 6 and 7 of UE Linking procedure via Iur in current version should be part of UE De-Linking principles. 5. In the current text, Linking/De-linking does not allow more than one MBMS Service at a time. This contribution is combined with the above R3-04175 in chapter 5.1.6 UE Linking/Unlinking
Summary of change: ⌘	R3-041559: Correction to Session Start procedure One ambiguous sentence removed in 8.2.1 on session start procedure. R3-041448: Notification of the MBMS PTP RAB IDs to UTRAN In section 8.2.8, MBMS PTP RAB IDs (e.g. mapped from NSAPIs) shall be provided together with the corresponding list of MBMS Service Ids activated by the UE when performing UE Linking procedure. R3-041475 MBMS Attach/Detach changes for MBMS stage 2 TS: The defintion of UE Link is added. A new term URA Link is defined. Refine the MBMS UE Linking chapter to classify the scenarios in detail. A separate section MBMS URA Linking/Unlinking are added to give the handling mechansim for URA_PCH UE, which has activated MBMS services. Information Exchange Initiation procedure is enhanced to convey APN and IP multicast address from the SRNC to the DRNC. R3-041477 Corrections on UE Linking principles and complement of UE De-Linking principles. This contribution is combined with the above R3-04175 in chapter 5.1.6 UE Linking/Unlinking .
Consequences if not approved: ⌘	The decisions in RAN3#45 are not captured in TS25.346.

Clauses affected:	⌘	3.1, 5.1.1, 5.1.6, 5.1.x, 8.2.1, 8.2.8, 8.2.x,			
Other specs affected:	⌘	**Y**	**N**	Other core specifications	⌘
				Test specifications	
				O&M Specifications	
Other comments:	⌘				

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

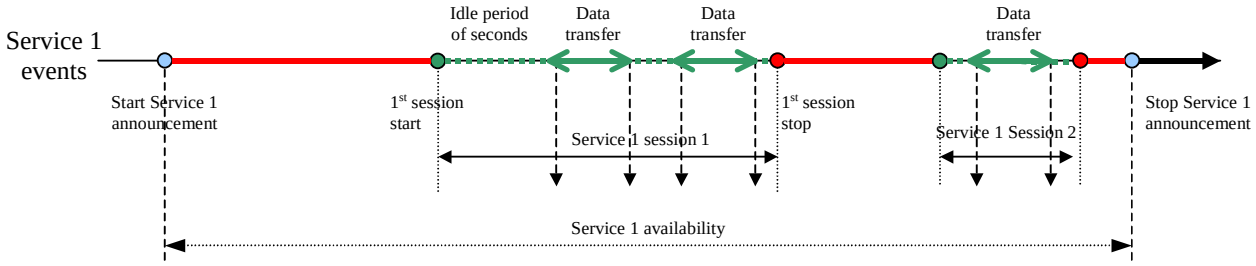

Figure 3.1: MBMS Timeline, based on [4].

MBMS session start is the point at which the BM-SC is ready to send data.

MBMS notification informs the UEs about forthcoming and about ongoing MBMS data transfer.

MBMS Cell Group is a group of multiple cells belonging to one RNS and sharing one PDCP and RLC entity to utilize p-t-m transmission of the MBMS Service

MBMS session stop is the point at which the BM-SC determines that there will be no more data to send for some period of time.

Data transfer is the phase when MBMS data are transferred to the UEs.

MBMS service availability is the phase between start of service announcement and the end of the last session or stop of service announcement.

MBMS Iu data bearer denotes the data bearer established between SGSN and RNC to transport MBMS data

MBMS radio bearer denotes the data bearer established between RNC and UE(s) to transport MBMS data

MBMS RAB denotes both, the MBMS Iu data bearer and the MBMS radio bearer

MBMS Service Context contains the necessary information for the UTRAN to control the MBMS Service in UTRAN.

MBMS Iu signalling connection denotes the signalling connection established between the RNC and the CN node to serve one MBMS Service Context.

MBMS Service Announcement: Mechanism to allow users to be informed about the MBMS services available [4]

Pool area: see definition in ref.[6]

MBMS Multicast Service Activation: see description in ref.[4]

Critical Information: MBMS Neighbouring Cell Information, MBMS Radio Bearer Information and MBMS Service Information sent on MCCH.

Non-critical information: MBMS Access Information sent on MCCH.

MBMS Service Area: The area in which a specific MBMS Bearer Service is available. It is defined individually per MBMS Bearer Service. [4]

UE Link denotes the stored information in the RNC on MBMS services joined by the UE in the state other than URA_PCH in the course of the UE Linking procedure.

URA Link denotes the stored information in the RNC on MBMS services joined by a UE in URA_PCH state in the course of the URA Linking procedure.

********** Unchanged parts omitted **********

5 MBMS UTRAN and protocol architecture

5.1 MBMS UTRAN architecture principles

5.1.1 MBMS Service Context in CRNC

Each RNC-which is controlling one or several cells within an MBMS Service area maintains an MBMS Service Context for each MBMS service.

1 Each CRNC MBMS Service Context is associated with an MBMS service ID, i.e. TMGI.

2 The CRNC MBMS Service Context contains a list of PMM connected mode UEs which are present in one or several cells of the CRNC and which have activated ~~an~~ the MBMS service and/or a list of URAs in which there is at least one URA_PCH UE which has activated the MBMS service. The list includes at least the U-RNTI of the UEs in the state other than URA_PCH and/or URA-IDs.

NOTE: The MBMS Service Context in the CRNC contains no information about RRC Idle mode UEs.

3 The MBMS Service Context is created in the CRNC either

- if the SGSN informs the RNC that a UE has activated the MBMS Service in a cell controlled by the CRNC by the UE Linking procedure. In this case, the CRNC is the SRNC of the UE,
- or if the RNC is notified of an MBMS Session Start,
- or if the RNC serves as a Drift RNC for a PMM-CONNECTED UE and receives for this UE a UE Link from the SRNC containing the MBMS Service Id of the concerned MBMS Service~~.~~,
- or if the RNC receives a URA Link containing the MBMS Service Id of the concerned MBMS Service.

4 Each RNC which is informed by the SGSN that a UE has activated one (or several) MBMS Service(s) by the UE Linking procedure maintains an MBMS Service Context for each indicated MBMS service, irrespectively of the MBMS Service Area.

5 The MBMS Service Context is released by the CRNC either

- if the MBMS Service Context does not contain any UE/URA information after a UE/URA Unlinking procedure from a SGSN and there is no active MBMS Session for the concerned MBMS Service,
- or if the MBMS Service Context does not contain any UE Link/URA Link at the time of a Session Stop
- or if the RNC receives a CN De-Registration for MBMS Service

6 Associated functionalities:

6.1 Bearer type selection for MBMS transmissions based on information in the CRNC MBMS Service Context. The decision process requires inter-working with Radio Resource Management and with the UE's SRNC in the case of p-t-p bearers.

6.2 MBMS RB control for p-t-m bearers in each cell, based on information in the CRNC MBMS Service Context.

6.3 Update of the MBMS Service Context when a PMM-CONNECTED UE, which has activated an MBMS Service, has entered a cell. Update of the MBMS Service Context via Iur is performed by UE Linking.

6.4 Update of the MBMS Service Context when a PMM-CONNECTED UE, which has activated an MBMS Service, has left a cell. Update of the MBMS Service Context via Iur is performed by UE Un-Linking.

Note: For further details of UE linking via the Iur interface see chapter 5.1.~~5~~6**.**

********** Unchanged parts omitted **********

5.1.6 UE Linking/De-linking

UE Linking denotes the process where a UE, which has joined ~~the~~ one or several MBMS services, is linked to ~~an~~ one or several MBMS service context in the RNC.

MBMS UE linking procedure in the SRNC is performed in following cases.

1. When the UE, which has joined ~~the~~ a MBMS service, is moved to PMM-CONNECTED and sets up a PS RAB This may happen at any point in time during the whole MBMS service availability (i.e. before, during and between MBMS sessions).

2. When the UE joins ~~the~~ a MBMS service and is in PMM-CONNECTED due to an existing PS RAB. This may happen at any point in time during the whole MBMS service availability (i.e. before, during and between MBMS sessions).

3. When the UE is moved to PMM-CONNECTED only for MBMS purpose, e.g. to respond to counting/recounting indication or respond to p-t-p bearer indication from RNC. This may happen at any point in time during MBMS sessions.

Keeping UEs in PMM-CONNECTED only for MBMS between sessions is implementation specific. The UE linking in the SRNC is performed via UE dedicated Iu procedures. An entry for the UE is added to the related MBMS service context(s) in the SRNC. If ~~the~~ a MBMS service context doesn't exist yet it needs to be created.

In cases where a UE is present in a cell under the control of a drift RNC, ~~or a UE in URA_PCH state is present within a URA containing one or more cells that are controlled by one or more drift RNCs,~~ the UE Linking is performed via Iur in the following way.

1. When the UE, which has activated one or several MBMS services, is in CELL_DCH ~~or CELL_FACH~~ state and starts to consume radio resources from one or several cells controlled by the DRNC, MBMS UE Linking in the DRNC is performed via UE dedicated Iur procedures. After that the DRNC shall update the MBMS Service context on the request of every radio link setup/release from the SRNC.

2. When the UE, which has activated one or several MBMS services, is in CELL_FACH state and starts to consume radio resources from one cell controlled by the DRNC, MBMS UE Linking in the DRNC is performed via UE dedicated Iur procedures. After that the DRNC shall update the MBMS Service context in the DRNC at every intra-DRNC cell change without the need to receive UE Link from the SRNC.

~~2.~~3. If the UE is in CELL_DCH and CELL_FACH state and there is no dedicated RNL signalling activity ongoing for this UE and UE Linking is performed in the SRNC for an MBMS Service, MBMS UE Linking in the DRNC is performed via the MBMS Attach procedure.

~~3.~~4. If the UE is in CELL_PCH and moves to a cell within the DRNC area for the first time ~~a cell controlled by the DRNC~~, the MBMS UE Linking in the DRNC is performed. The cell the UE moved to is indicated to the DRNC. After that at every intra-DRNC cell change the DRNC shall update the MBMS Service context in the DRNC ~~needs to be updated at every intra-DRNC cell change~~ without the need to receive UE Link from the SRNC.

~~4a. If the UE is in URA_PCH, having activated one or more MBMS services, is the first UE for the particular MBMS service to move to a URA which contains one or more cells that are controlled by one or more DRNCs, the UE is linked to the MBMS Service context in each applicable DRNC. The URA the UE moved to will be indicated. The MBMS Service context in each applicable DRNC needs to be updated at every intra-DRNC URA change.~~

~~4b. As long as the SRNC serves UEs in URA_PCH in URAs containing cells controlled by one or more DRNCs, the SRNC shall keep the other RNCs informed about every URA in which UEs having activated certain MBMS services have to be notified. This is done when the first UE enters the URA, by indicating to the other RNCs a list of URAs and the corresponding MBMS Services.~~

~~NOTE: Bullet points 4a and 4b above may be merged in a future version of this document.~~

5. If the UE is in CELL_PCH ~~or URA_PCH~~ and there is no mobility related signalling activity ongoing for this UE and UE Linking is performed in the SRNC for an MBMS Service, MBMS UE Linking in the DRNC is performed via the MBMS Attach procedure.

6. If the UE is in RRC connected mode and UE Linking is performed in the SRNC for an MBMS Service and a session of this MBMS Service is ongoing UE Linking in the DRNC needs to be performed immediately.

At MBMS UE linking in the DRNC the MBMS service context in the DRNC needs to be updated. If an MBMS service context does not exist yet then it shall be created and if needed, DRNC can acquire the APN and IP Multicast Address from the SRNC for the specific service via Information Exchange procedure.

UE De-linking denotes the process where a UE, which has joined MBMS service(s), is removed from one or several MBMS service contexts in the RNC.

MBMS UE De-linking procedure in the SRNC is performed in following cases.

1. When the UE has left the MBMS service and is in PMM-CONNECTED due to an existing PS RAB. This may happen at any point in time during the whole MBMS service availability (i.e. before, during and between MBMS sessions).

2. When CN decides to de-link a certain PMM-CONNECTED mode UE due to e.g. error cases.

MBMS UE De-linking in the SRNC is performed via UE dedicated Iu procedure. The entry for the UE is removed from the concerned MBMS service context(s) in the SRNC.

MBMS UE De-linking procedure in the DRNC is performed via Iur in the following way:

1. If the UE is in CELL_DCH or CELL_FACH state and stops consuming the radio resources from one or several cells controlled by the DRNC, MBMS UE is De-linked from the MBMS Service Context in the DRNC via UE dedicated Iur procedure.

2. If the UE is in CELL_DCH or CELL_FACH state and there is no dedicated RNL signalling activity ongoing for this UE and UE De-linking is performed in the SRNC for an MBMS Service, MBMS UE De-linking in the DRNC is performed via the MBMS Detach procedure.

~~6.~~3. If the UE is in CELL_PCH and leaves for a cell out of the DRNC area ~~a cell controlled by the DRNC~~ the UE is ~~un~~delinked from the MBMS Service context in the DRNC via the MBMS Detach procedure. The cell the UE moved out of is indicated to the DRNC.

~~7.If the UE is in URA_PCH and, for the particular MBMS service, is the last UE to leave a URA which contains one or more cells controlled by one or more DRNCs the UE is unlinked from the MBMS Service context in each applicable DRNC via the MBMS Detach procedure.~~

4. If the UE is in RRC connected mode and UE De-linking is performed in the SRNC for an MBMS Service and a session of this MBMS Service is ongoing UE De-linking in the DRNC needs to be performed immediately.

- ~~At MBMS UE linking in the DRNC the MBMS service context in the DRNC needs to be updated. If an MBMS service context does not exist yet then it shall be created and acquire the APN and IP Multicast Address from the SRNC for the specific service via Information Exchange procedure.~~

5.1.x URA Linking/De-linking

URA Linking denotes the process where a URA, which contains one or more cells in which at least one URA_PCH UE has joined the MBMS service, is linked to an MBMS service context in the RNC. An entry for the URA is added to the MBMS service context in the RNC.

If the UE in URA_PCH state, which has activated one or several MBMS Services, is present within a URA containing one or more cells that are controlled by one or more drift RNCs, the URA Linking is performed in the following way.

1. If the UE is in URA_PCH, having activated one or more MBMS services, is the first UE for the particular MBMS service to move to a URA which contains one or more cells that are controlled by one or more DRNCs, the URA is linked to the MBMS Service context in each applicable DRNC. The URA the UE moved to will be indicated.

2. As long as the SRNC serves UEs in URA_PCH in URAs containing cells controlled by one or more DRNCs, the SRNC shall keep the other RNCs informed about every URA in which UEs having activated certain

MBMS services have to be notified. This is done when the first UE enters the URA, by indicating to the other RNCs a list of URAs and the corresponding MBMS Services via MBMS Attach procedure.

NOTE: Bullet points 1 and 2 above may be merged in a future version of this document.

At MBMS URA linking in the RNC the MBMS service context in the RNC needs to be updated. If an MBMS service context does not exist yet then it shall be created and acquire the APN and IP Multicast Address from the SRNC for the specific service via Information Exchange procedure.

URA De-linking denotes the process where a URA is removed from one or several MBMS service contexts in the RNC.

~~3~~1. If the UE is in URA_PCH and, for the particular MBMS service, is the last UE to leave a URA which contains one or more cells controlled by one or more DRNCs the URA is de-linked from the MBMS Service context in each applicable DRNC via the MBMS Detach procedure.

********** Unchanged parts omitted **********

8.2 MBMS RNC Signalling Flows

8.2.1 MBMS Session Start procedure

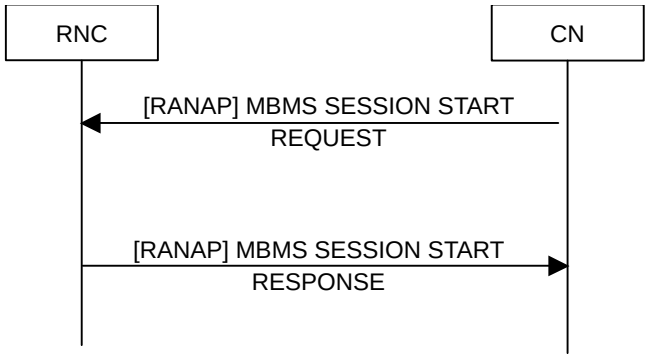

Figure 8.2.1: MBMS Session Start procedure. Successful operation.

The MBMS Session Start procedure is initiated by the CN when an MBMS Session is started. The MBMS SESSION START REQUEST is sent to each RNC that is connected to the CN (in case of Iu-flex the RNC may receive more than one MBMS SESSION START REQUEST message).

The MBMS SESSION START REQUEST contains the MBMS Service Id, MBMS Bearer Service Type and the MBMS Session Attributes (MBMS Service Area Information, QoS parameters…) It may also include a list of RAs which lists each RA that contains at least one PMM-IDLE UE that has activated the service.

MBMS Session Start procedure also provides the MBMS Iu Data Bearer Establishment functionality. ~~If the RNC cannot provide resources at all the RNC shall inform the CN accordingly.~~ In case of Iu-flex the RNC shall not establish more than one MBMS Iu bearer for a certain service towards a pool area and shall inform the respective CN nodes accordingly.

8.2.2 MBMS Session Update procedure

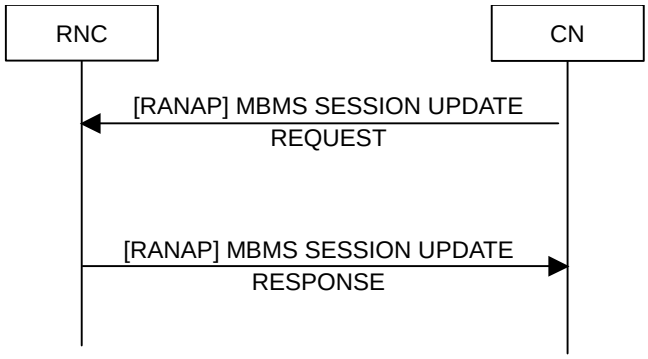

Figure 8.2.2: MBMS Session Update procedure. Successful operation.

The MBMS Session Update procedure is initiated by the CN when an MBMS Session is ongoing and SGSN notices that there is a need to update the list of RAs. The MBMS SESSION UPDATE REQUEST contains the MBMS Service Id, List of RAs with PMM Idle UEs,…).

********** Unchanged parts omitted **********

8.2.8 MBMS UE Linking

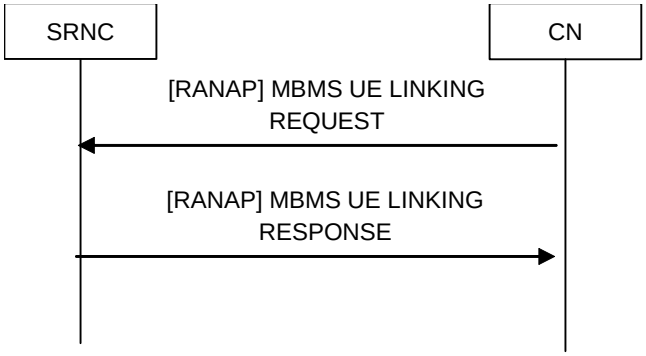

Figure 8.2.8: MBMS UE linking signalling flow

This signalling flow is only applicable for handling UEs in PMM-CONNECTED mode with activated MBMS Services.

The signalling flow is used to link a specific UE to one or several MBMS service contexts in the SRNC. The MBMS UE LINKING REQUEST message contains the whole list of MBMS Service Ids and MBMS PTP RAB IDs (e.g. mapped from NSAPIs) activated by the UE. If there has not been a MBMS service context related to an MBMS Service Id then SRNC creates a MBMS service context as a result of this procedure.

********** Unchanged parts omitted **********

8.2.12 MBMS Channel Type Reconfiguration over Iur

These signalling flows need further study.

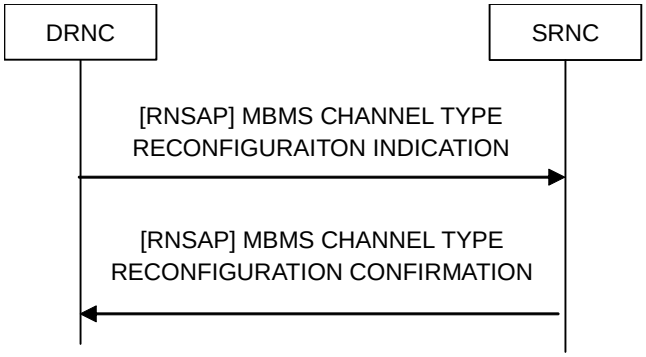

Figure 8.2.12: Channel Type Reconfiguration signalling flow: Successful Operation.

This signalling flow is only applicable for handling MBMS UEs in RRC connected mode.

The purpose of this signalling flow is that the CRNC informs the selected channel type to the SRNCs used in a cell under the CRNC. The MBMS CHANNEL TYPE RECONFIGURATION INDICATION contains a list of U-RNTI, Channel type and MBMS Service Id corresponding to the UEs connected to the SRNC.

8.2.x Information Exchange over Iur

These signalling flows is used by the DRNC to acquire the MBMS related information for MBMS service identified by TMGI.

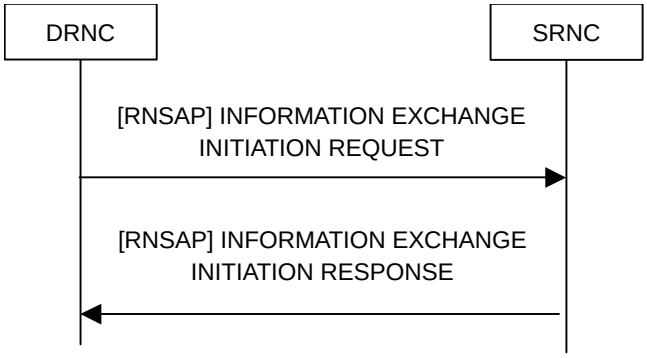

Figure 8.2.x: Information Exchange Initiation signalling flow: Successful Operation.

The purpose of this signalling flow is that the DRNC request the APN and IP multicast address for an MBMS service. The INFORMATION EXCHANGE INITIATION REQUEST includes the TMGI for which the APN and IP multicast address are requested. In the INFORMATION EXCHANGE INITIATION RESPONSE message, the corresponding APN and IP multicast address are included.

8.3 MBMS Uu Signalling Flows

********** Unchanged parts omitted **********

3GPP TSG-RAN WG2 WG RAN2#45 ***R2-042703***
Yokohama, Japan, 15th – 19th November 2004

CR-Form-v7

CHANGE REQUEST

⌘ **25.346** **CR** **009** ⌘ **rev** **-** ⌘ Current version: **6.2.0** ⌘

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Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Update of Annex B
Source:	⌘	RAN WG2
Work item code:	⌘	MBMS-RAN
Date:	⌘	15th November 2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	To update tables 2 and 3 of Annex B to bring into line with current status.
Summary of change:	⌘	Replacement of Annex B tables 2 and 3 to bring them into agreement with current understanding of MBMS control signalling.
Consequences if not approved:	⌘	Annex B will be incorrect

Clauses affected:	⌘	Annex B

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Annex B (informative):
MBMS Control Information

Table 2 and 3 identifies MBMS control information and describes their mapping on BCCH, MCCH and DCCH.

Table 2: Mapping of MBMS Control Parameters in DL

Information Element	Description	*DCCH*	*BCCH*	*MCCH*
MBMS Signalling Radio Bearer Information (MCCH)				
MBMS SRB Info MCCH Indicator	Information to configure the MBMS signalling radio bearer mapped on S-CCPCH/FACH, this information includes the identification of a FACH transport channel carrying the MCCH.		X	
MBMS Radio Bearer Information (MTCH)				
MBMS RB Info	Information to configure a p-t-m radio bearer mapped on S-CCPCH/FACH for transmission of an MBMS service.			X
Service related Control Information				
MBMS Service ID(s)	Identifies all MBMS services that are potentially available in one cell (service area indication). Identifies also the MBMS service related to a specific signalling procedure.			X
p-t-m Indicator	Indicates that a p-t-m bearer type is established in one cell in order to transmit data for a particular MBMS service and the UE is required read the MBMS RB Info on MCCH.			X
RRC Connection Establishment Indicator	Indicates to idle mode UEs that transition to RRC connected mode is required for counting.			X
Required MBMS RB configuration	Indicates to the UE that an MBMS service is transmitted using a certain RB configuration in order to achieve a specific QoS.			X
RACH Access Probability Factor	Controls RACH access in order to avoid RACH overload if transition to RRC connected mode is required.			X

Table 3: Mapping of MBMS Control Parameters in UL

Information Element	Description	*DCCH*
Service related Control Information		
MBMS Joined flag	Indicates that a PMM IDLE state UE in RRC connected mode has joined at least one MBMS service	X

Tables 2 and 3 describe MBMS control information in the downlink and uplink.

Table 2: Mapping of MBMS Control Parameters in DL

Information Element	Description
MICH – Transmitted continuously – Can be modified at a modification period boundary	
MBMS Notification Indicators	Indicates when new information is to be transmitted on MCCH in the next modification period.
BCCH - Transmitted periodically	
MCCH System Information	Includes: - Configuration of the radio bearer carrying MCCH, - MCCH schedule information (access info, repetition and modification periods). Additional parameters may be identified in stage 3.
MCCH – Non Critical Information – Transmitted at access info events – Can be modified at any transmission	
MBMS Access Information	Contains parameters that control, for the purposes of counting, whether UEs should establish an RRC connection (idle mode) or make a cell update (URA_PCH state). It may include for each service for which counting is in progress: - MBMS service identity, - Probability factor (Idle mode), - Probability factor (URA_PCH), Additional parameters may be identified in stage 3.
MCCH – Critical Information – Transmitted at repetition period Events – Can be modified at a modification period boundary	
MBMS Change Information	Identifies MBMS services for which parameters are modified in this modification period. It may include for each service listed: - MBMS service identity, - MBMS session identity. Additional parameters may be identified in stage 3. In stage 3, MBMS Change Information is contained in the MBMS MODIFIED SERVICES INFORMATION message.
MBMS Service Information	Identifies MBMS services that are available in the cell. It may include for each service listed: - MBMS service identity, - MBMS session identity, - Indication that a p-t-m bearer is established for the service in the cell, - RB release indication, - Preferred frequency layer information. Additional parameters may be identified in stage 3. In stage 3, MBMS Services Information for a service is contained in either the MBMS MODIFIED SERVICES INFORMATION or the MBMS UNMODIFIED SERVICES INFORMATION messages depending upon the change status of the service.
MBMS Radio Bearer Information	Contains, for one or more MBMS services information describing the radio bearer and the p-t-m bearer that is used within the serving cell. It may include for each service listed: - MBMS service identity, - MBMS cell group identity, - Physical channel information, - Transport channel information, - Radio Bearer information. Additional parameters may be identified in stage 3.
MBMS Neighbouring Cell Information	Contains, for one or more MBMS services transmitted in neighbour cells that can be used for soft or selective combining, information describing the p-t-m bearer to which it is mapped in the neighbour cell. It may include for each service listed: - MBMS service identity, - Cell identification information, - Physical channel information, - Transport channel information, - Radio Bearer information, - L1 scheduling information, - Soft/ selective combining information. Additional parameters may be identified in stage 3.

MSCH – Transmitted periodically	
MTCH Scheduling Information	Contains information that enables UEs to perform discontinuous reception of MTCH. It may include for each of one or more services: - MBMS service identity, - The start time and duration of a period of data transmission, - Indication that there is no data transmission for one or more MSCH repetition periods.

Table 3: Mapping of MBMS Control Parameters in UL

Information Element	Description
DCCH - Service Related Control Information	
MBMS Joined Indication	Indicates that a PMM IDLE state UE in RRC connected mode has joined at least one MBMS service
MBMS P-T-P Modification Request	UEs in CELL_DCH state may transmit this signalling flow to request the release of a p-t-p MBMS RB for a higher priority MBMS service.