**3GPP TSG-RAN WG2 Meeting #113 electronic *R2-200wxyz***

**Online, Jan 25 - Feb 5, 2021**

Agenda Item: 8.1.x.x

Source: MediaTek Inc.

**Title: Phase-2 discussion of [Post112-e][069][MBS] Delivery mode 2**

Document for: Discussion and decision

# Introduction

This document is to summarize the following email discussion at phase 1 and to kick off the phase-2 discussion:

* [Post112-e][069][MBS] Delivery mode 2 (MediaTek)

      Scope: Progress on solutions CP focus: MCCH or not for PTM configuration. PTM configuration change notification.

      Intended outcome: Report with agreeable proposals / identified open issues

      Deadline: Jan 12 2021 (7:00 UTC)

# Rapporteur summary and proposals based on phase-1 discussion

The following proposals are made based on the email discussion:

**Rapporteur summary-1: According to the feedback provided, clear majority of the companies (20/21) agreed that both idle/inactive UEs and connected mode UEs can receive MBS services transmitted by NR MBS delivery mode 2.**

**Proposal-1: Both idle/inactive UEs and connected mode UEs can receive MBS services transmitted by NR MBS delivery mode 2.**

**Rapporteur summary-2: According to the feedback provided, all companies agreed that the UE receiving Broadcast sessions transmitted by delivery mode 2 is not required to interact with the network before its MBS service reception. Meanwhile, a number of companies replied that the answer is linked to the discussion on Question 3. Some companies assumed that the UE needed to interact with the network before its reception of Multicast sessions transmitted by delivery mode 2 (depending on the discussion on Question 3).**

**Proposal-2a: the UE receiving Broadcast sessions transmitted by delivery mode 2 is not required to interact with the network before its MBS service reception.**

**Proposal-2b: RAN2 discuss if the UE receiving Multicast sessions transmitted by delivery mode 2 is required to interact with the network before its service reception (if Multicast sessions can also be transmitted by delivery mode 2).**

**Rapporteur summary-3: According to the feedback provided, majority companies (14/21) agreed that delivery mode 2 can also support the transmission of multicast sessions. Some companies 5/21 assumed delivery mode 2 only support the transmission of broadcast sessions.**

**Proposal-3: RAN2 discuss if delivery mode 2 can also support the transmission of multicast sessions.**

**Rapporteur summary-4: According to the feedback provided, clear majority companies (19/21) agreed that the two-step based approach (i.e. BCCH and MCCH) as adopted by LTE SC-PTM can be reused for the transmission of PTM configuration for NR MBS delivery mode 2.**

**Proposal-4: The two-step based approach (i.e. BCCH and MCCH) as adopted by LTE SC-PTM is reused for the transmission of PTM configuration for NR MBS delivery mode 2.**

**Rapporteur summary-5: According to the feedback provided, all companies agreed that Alt-1 can be supported for connected UEs to receive the PTM Configuration for MBS services for NR MBS delivery mode 2, i.e. LTE SC-PTM mechanism can be reused. There were some companies (8/21) that indicated the possibility to consider both broadcast and dedicated signaling based reception for PTM Configuration for delivery mode 2. Three replies (among the 8/21) suggested to take broadcast based manner for broadcast service and to take dedicated signaling based manner for multicast service.**

**Proposal-5a: Reuse LTE SC-PTM mechanism for the connected UEs to receive the PTM configuration for NR MBS delivery mode 2, i.e. broadcast based manner.**

**Proposal-5b: RAN2 further discuss if dedicated signaling based reception for PTM configuration is allowed for NR MBS delivery mode 2.**

**Rapporteur summary-6: According to the feedback provided, majority companies (15/21) agreed that MBS SIB, as a regular SIB, can be optionally area specific. However some replies indicated that whether MBS SIB could be area specific should be dependent on the design of MCCH.**

**Proposal-6: The MBS SIB, as a regular SIB, can be optionally area specific.**

**Rapporteur summary-7: According to the feedback provided, more than half companies (11/21) agreed that MCCH can be area specific, which is a network implementation and some of the rest companies (6/21) have no strong view or are not sure. The left companies (4/21) assumed that MCCH should be cell specific.**

**Proposal-7: RAN2 further discuss if MCCH should be cell specific or area specific for PTM configuration of NR MBS delivery mode 2.**

**Rapporteur summary-8: According to the feedback provided, a slight majority companies (13/21) prefer to reuse LTE SC-PTM mechanism (i.e. Broadcast mode based MCCH transmission) or reuse LTE SC-PTM mechanism as the baseline. The rest companies (8/21) select Alt2 (i.e.** **NR MCCH/PTM configuration can be transmitted either by using Broadcast mode or on-demand following network configuration).**

**Proposal-8: Reuse LTE SC-PTM mechanism (i.e. Broadcast mode based MCCH transmission) as the baseline for NR MBS delivery mode 2 and FFS for on-demand based MCCH transmission.**

**Rapporteur summary-9: According to the feedback provided, a number of companies prefer to study the support of multiple MCCH based PTM configuration (including 5 clear supporters and 3 companies that did not show their position explicitly). Meanwhile the rest companies (12/20) prefer to not support multiple MCCH based PTM configuration.**

**Proposal-9: RAN2 further discuss if multiple MCCH based PTM configuration can be supported for NR MBS delivery mode 2.**

**Rapporteur summary-10: According to the feedback provided, the majority companies (20/21) agreed that PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to session start for delivery mode 2 of NR MBS. One company did not see the need.**

**Proposal-10: PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to session start for delivery mode 2 of NR MBS.**

**Rapporteur summary-11: According to the feedback provided, the majority companies (13/21) agreed that PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to other purpose (e.g. modification of the transmission cycle for a service) for delivery mode 2 of NR MBS. However some companies (4/21) commented that it was not LTE SC-PTM approach during the reply. It would be better to take online discussion for the issue.**

**Proposal-11: RAN2 to discuss if PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to other purpose (e.g. modification of the transmission cycle for a service) for delivery mode 2 of NR MBS.**

**Rapporteur summary-12: According to the feedback provided, the majority companies (18/21) prefer to take LTE SC-PTM approach as baseline for PTM change notification for delivery mode 2 of NR MBS.**

**Proposal-12: Take LTE SC-PTM approach as baseline for PTM change notification for delivery mode 2 of NR MBS.**

**Rapporteur summary-13: According to the feedback provided, the slight majority companies (13/21) think that it is too early to discuss the enhancement for PTM change notification (i.e. Group based PTM change notification). Meanwhile there are some interests in discussing both Alt1 (Multiple MCCHs based) and Alt2 (Group paging based) or its variants for PTM change notification for delivery mode 2 of NR MBS.**

**Proposal-13: Mark the enhancement for PTM change notification as an open issue for delivery mode 2 of NR MBS.**

**Rapporteur summary-14: According to the feedback provided, a number of companies (12/21) prefer not to support the counting procedure for NR MBS delivery mode 2 for connected mode UEs. However, there are also quite a number companies (7/21) see the need.**

**Proposal-14: RAN2 further discuss if delivery mode 2 support counting procedure for connected mode UEs.**

**Rapporteur summary-15: According to the feedback provided, a number of companies (13/21) prefer not to support the counting procedure for NR MBS delivery mode 2 for Idle/Inactive mode UEs. However, there are also quite a number companies (7/21) see the need.**

**Proposal-15: RAN2 further discuss if delivery mode 2 support counting procedure for Idle/Inactive mode UEs.**

**Rapporteur summary-16: According to the feedback provided, clear majority companies (17/21) prefer not to support counting procedure for Idle/Inactive mode UEs without mandating the UEs to enter RRC connected mode. This can also be revisited after we decide whether to allow Idle/Inactive UEs based counting.**

**Proposal-16: Mark the discussion of the mechanism for counting procedure for Idle/Inactive UEs based counting as an open issue for delivery mode 2 of NR MBS. To be revisited after we decide whether to allow Idle/Inactive UEs based counting.**

**Rapporteur summary-17: According to the feedback provided, clear majority companies (19/21) agreed that MBS Interest Indication can be supported for UEs in connected mode for delivery mode 2. Two companies did not see the need.**

**Proposal-17: MBS Interest Indication is supported for UEs in connected mode for NR MBS delivery mode 2.**

**Rapporteur summary-18: According to the feedback provided, clear majority companies (20/21) agreed that MBS Interest Indication should not be supported for UEs in idle/inactive mode for delivery mode 2.**

**Proposal-18: MBS Interest Indication is not supported for UEs in idle/inactive mode for NR MBS delivery mode 2.**

**Rapporteur summary-19: According to the feedback provided, clear majority companies (16/21) did not see the need to merge the** **MBS Interest Indication with on demand MBS/PTM configuration request procedure for delivery mode 2, even though the support of on demand MBS/PTM configuration request procedure was not decided yet. Three companies see the need. The rest two companies put it FFS.**

**Proposal-19: RAN2 decide if the** **MBS Interest Indication can be merged with on demand MBS/PTM configuration request procedure for delivery mode 2 after the decision on the support of on demand MBS/PTM configuration request procedure.**

**Rapporteur summary-20: According to the feedback provided, clear majority companies (20/21) see the need to have** **service continuity for NR MBS Delivery mode 2. Many companies indicated to follow the same motivation as LTE SC-PTM.**

**Proposal-20: Service continuity is needed for NR MBS Delivery mode 2.**

**Rapporteur summary-21: According to the feedback provided, clear majority companies (19/21) agreed that both USD and system information can be provided for purpose of service continuity for NR MBS Delivery mode 2 (i.e. reuse legacy approach for LTE SC-PTM). Meanwhile, during the reply, many companies indicated that the general principle in SC-PTM can be reused, but the exact content within USD is out of scope of RAN2.**

**Proposal-21: In general, the mechanism to ensure service continuity of LTE SC-PTM is reused for NR MBS Delivery mode 2 (i.e. both USD and system information can be provided for purpose of service continuity).**

**Rapporteur summary-22: According to the feedback provided, clear majority companies (17/21) agreed to support UE awareness of MBS services on frequency basis for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism). Meanwhile, some companies (among the companies that did not reply Yes) indicated that LTE SC-PTM already provides the neighbor cell information for the service, i.e., scptm-NeighbourCellList in SC-MCCH (SCPTMConfiguration). However that information was not applied in the criteria of cell reselection for LTE MBMS/SC-PTM.**

**Proposal-22: Support UE awareness of MBS services on frequency basis for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism).**

**Rapporteur summary-23: According to the feedback provided, clear majority companies (18/21) agreed to support frequency prioritization during cell reselection for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism). Meanwhile, the rest three companies prefer to put is as FFS (depending on the outcome of Q21,Q22).**

**Proposal-23: Support frequency prioritization during cell reselection for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism).**

**Rapporteur summary-24: According to the feedback provided, all companies agreed that PTM configuration should include MTCH configuration as LTE SC-PTM. A majority companies (17/21) agreed that PTM configuration should include neighbor cell information as LTE SC-PTM. However, some companies (4/21) questioned the need to have neighbor cell information within PTM configuration. Rapporteur suggests to reuse the high-level concept of LTE SC-PTM service continuity for delivery mode 2, while the details can be left open.**

**Proposal-24: Fdor NR MBS delivery mode 2, PTM configuration can include both MTCH configuration and neighbor cell information.**

# Proposals

**Proposal-1: Both idle/inactive UEs and connected mode UEs can receive MBS services transmitted by NR MBS delivery mode 2.**

**Proposal-2a: the UE receiving Broadcast sessions transmitted by delivery mode 2 is not required to interact with the network before its MBS service reception.**

**Proposal-2b: RAN2 discuss if the UE receiving Multicast sessions transmitted by delivery mode 2 is required to interact with the network before its service reception (if Multicast sessions can also be transmitted by delivery mode 2).**

**Proposal-3: RAN2 discuss if delivery mode 2 can also support the transmission of multicast sessions.**

**Proposal-4: The two-step based approach (i.e. BCCH and MCCH) as adopted by LTE SC-PTM is reused for the transmission of PTM configuration for NR MBS delivery mode 2.**

**Proposal-5a: Reuse LTE SC-PTM mechanism for the connected UEs to receive the PTM configuration for NR MBS delivery mode 2, i.e. broadcast based manner.**

**Proposal-5b: RAN2 further discuss if dedicated signaling based reception for PTM configuration is allowed for NR MBS delivery mode 2.**

**Proposal-6: The MBS SIB, as a regular SIB, can be optionally area specific.**

**Proposal-7: RAN2 further discuss if MCCH should be cell specific or area specific for PTM configuration of NR MBS delivery mode 2.**

**Proposal-8: Reuse LTE SC-PTM mechanism (i.e. Broadcast mode based MCCH transmission) as the baseline for NR MBS delivery mode 2 and FFS for on-demand based MCCH transmission.**

**Proposal-9: RAN2 further discuss if multiple MCCH based PTM configuration can be supported for NR MBS delivery mode 2.**

**Proposal-10: PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to session start for delivery mode 2 of NR MBS.**

**Proposal-11: RAN2 to discuss if PTM change notification mechanism can be used to notify the changes of PTM configuration (e.g. carried by MCCH) due to other purpose (e.g. modification of the transmission cycle for a service) for delivery mode 2 of NR MBS.**

**Proposal-12: Take LTE SC-PTM approach as baseline for PTM change notification for delivery mode 2 of NR MBS.**

**Proposal-13: Mark the enhancement for PTM change notification as an open issue for delivery mode 2 of NR MBS.**

**Proposal-14: RAN2 further discuss if delivery mode 2 support counting procedure for connected mode UEs.**

**Proposal-15: RAN2 further discuss if delivery mode 2 support counting procedure for Idle/Inactive mode UEs.**

**Proposal-16: Mark the discussion of the mechanism for counting procedure for Idle/Inactive UEs based counting as an open issue for delivery mode 2 of NR MBS. To be revisited after we decide whether to allow Idle/Inactive UEs based counting.**

**Proposal-17: MBS Interest Indication is supported for UEs in connected mode for NR MBS delivery mode 2.**

**Proposal-18: MBS Interest Indication is not supported for UEs in idle/inactive mode for NR MBS delivery mode 2.**

**Proposal-19: RAN2 decide if the** **MBS Interest Indication can be merged with on demand MBS/PTM configuration request procedure for delivery mode 2 after the decision on the support of on demand MBS/PTM configuration request procedure.**

**Proposal-20: Service continuity is needed for NR MBS Delivery mode 2.**

**Proposal-21: In general, the mechanism to ensure service continuity of LTE SC-PTM is reused for NR MBS Delivery mode 2 (i.e. both USD and system information can be provided for purpose of service continuity).**

**Proposal-22: Support UE awareness of MBS services on frequency basis for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism).**

**Proposal-23: Support frequency prioritization during cell reselection for service continuity for NR MBS delivery mode 2 (i.e. Reuse LTE SC-PTM mechanism).**

**Proposal-24: For NR MBS delivery mode 2, PTM configuration can include both MTCH configuration and neighbor cell information.**

# Company input to Phase 2 discussion

There may be issues on the Rapporteur’s summary and Proposals in previous sections, please show company’s comments at this section.

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| Company | Comments on Rapporteur’s summary and Proposals  |
| TD Tech&Chengdu TD Tech | Our comments on the above proposals.1. Common to all proposals: SC-MCCH/SC-MTCH is used to indicate the control/traffic channel in NR MBS

During the email discussion, LTE SC-PTM is used to denote the MBS method for SC-PTM in LTE. In the LTE SC-PTM, SC-MCCH and SC-MTCH are used to differentiate LTE SC-PTM from LTE MBSFN. Therefore, we think it’s better to use SC-MCCH/SC-MTCH instead of MCCH/MTCH in LTE MBSFN.1. Proposal 2a/2b: we think these two proposals are updated as below.

**Proposal-2a: the UE receiving Broadcast sessions transmitted by delivery mode 2 is not required to interact with the network for taking session join and/or authentication at NAS layer before its MBS service reception.** **Proposal-2b: RAN2 discuss if the UE receiving Multicast sessions transmitted by delivery mode 2 is required to interact with the network for taking session join and/or authentication at NAS layer before its service reception (if Multicast sessions can also be transmitted by delivery mode 2.**We think the content of the interaction with the network should be added in the proposals 2a and 2b to clarify the conclusions more clearly without excluding the other possible interaction scenarios. For example, a UE in RRC\_IDLE/RRC\_INACTIVE wants to receive an MBS delivered by mode 2, but the PTM configuration of the MBS is NOT OK to the UE ( for instance, the BWP providing the MBS has a wider bandwidth beyond the RF capability of the UE). In order to receive the MBS, a possible method for the UE is to report its interest and RF capability to the network. We think the above scenario for UE in RRC\_IDLE/RRC\_INACTIVE to report its interest and RF capability is NOT excluded and can be discussed later.1. Proposal 3: we suggest to delete “also” from the description of proposal 3.

**Proposal-3: RAN2 discuss if delivery mode 2 can support the transmission of multicast sessions.**1. Proposal 5a:

We think proposal 5a can be updated as below to make the conclusion more clearly.Proposal-5a: Reuse LTE SC-PTM mechanism for the connected UEs to receive the PTM configuration for NR MBS delivery mode 2, i.e. broadcast based manner (by SC-MCCH or BCCH).1. Proposal 6: we think proposal 6 can be updated as below.

**Proposal-6: The MBS SIB (carrying the SC-MCCH configuration information), as a regular SIB, can be optionally area specific.**1. Proposal 7: we think proposal 7 can be updated as below to make the conclusion more clearly.

**Proposal-7: RAN2 further discuss if the PTM configuration of an MBS delivered by mode 2 can be cell specific or area specific.**We think concept “the PTM configuration of an MBS” is different from concept “SC-MCCH”.SC-MCCH carries the PTM configurations of each MBS delivered by mode 2. That SC-MCCH is area specific means that the content of SC-MCCH is same in each cell in the corresponding area. That is, the area specific SC-MCCH has the following features.1. Each MBS has the same PTM configuration in each cell in the corresponding area.
2. Each cell in the area provides the same MBSs.

That SC-MCCH is cell specific is obvious: in general, each cell provides the different MBSs. Area specific MCCH can be realized according to the network configuration.For an MBS delivered by mode 2, the PTM configuration of this MBS is cell specific in general. But in order to improve the service continuation of this MBS in the UE mobility scenario and simplify the PTM configuration of this MBS in each cell, the PTM configuration of this MBS can be area specific. According to our understanding, if the PTM configuration of an MBS is area specific, it means that it has the following features:1. The cells in an area can be classified into two groups: each cell in group 1 broadcast this MBS with mode 2 while each cell in group 2 doesn’t broadcast this MBS.
2. The same PTM configuration of this MBS is applied in each cell in group 1.

Therefore, proposal 7needs to be updated.We think the PTM configuration of an MBS delivered by mode 2 can be area specific. For example, the PTM configuration of an MBS is same in the current cell and adjacent cells of the current cell. If more than one cells of a GNB-CU need to broadcast this MBS with mode 2, the same PTM configuration can be used in these cells.It's difficult to make SC-MCCH area specific due to the fact that an MBS may be broadcast only in some cells of an area. But if the area is small enough, SC-MCCH can be area specific. From our point of view, the PTM configuration of an MBS can be area specific and such scenarios exist with two examples as below.1. The area consists of the current cell and the adjacent cells of the current cell.
2. The area consists of the cells of a gNB-CU.
3. **Proposal 9:**

**We think there’s the requirement for the different modification periods and the different repetition periods for the different types of MBS. Furthermore, there exist the different methods to satisfy such requirement. Supporting more than one SC-MCCHs is just a possible method. We have another method to satisfy such requirement. Therefore, we hope proposal 9 can be updated as below:****Proposal-9: RAN2 further discuss if the different modification/repetition periods for the different MBS types can be supported for NR MBS delivery mode 2.****Our method is simply described as below.****In our method, only one SC-MCCH is needed to provide the different modification/repetition periods for the different types of MBS.**1. **Configure the modification period and repetition period for each type of MBS. Use Trmin (unit: radio frame) to denote the minimum repetition period among the repetition periods of different types of MBS.**
2. **SC-MCCH is transmitted within each transmission period of Trmin radio frames. SC-MCCH carries the different PTM configuration information in different transmission periods.**

**For example:** **Trmin=2 raido frames or Trmin=20ms****MBS type 1: Modification/Repetition period is 40ms/20ms,** **MBS type 2: Modification/Repetition period is 160ms/40ms****The transmission period of SC-MCCH is Trmin=20ms long.****For MBS type 1, the repetition period of MBS type 1 is just Tmin radio fames long. In each transmission period, SC-MCCH carries the PTM configuration information of each MBS belonging to MBS type 1.** **For MBS type 2, the repetition period of MBS type 2 is 40ms long. Each 40ms-long repetition period of MBS type 2 includes two 20ms-long transmission periods.****SC-MCCH carries the PTM configuration information of each MBS belonging to MBS type 2 in the first 20ms-long transmission period with the second 20ms-long transmission period not used for MBS type 2.****For MBS type1, the modification period is 40ms long. Each 40ms-long modification period of MBS type1 includes two 20ms-long repetition periods of MBS type 1 and two 20ms-long transmission periods.** **When a new MBS of MBS type 1 is broadcast, the PTM configuration information of this new MBS is sent from the nearest 40ms-long modification period of MBS type 1.****For MBS type 2, the modification period is 160ms long. Each 160ms-long modification period of MBS type 2 includes four 40ms-long repetition periods of MBS type 2 and 8 20ms-long transmission periods.****When a new MBS of MBS type 2 is broadcast, the PTM configuration information of this new MBS is sent from the nearest 160ms-long modification period of MBS type 2.****We hope our method can be provided for discussion. The features of our method are listed below:**1. **Only one SC-MCCH is transmitted: have no influence on the number of SC-MCCHs**
2. **Different MBS types can have the different modification/repetition periods**
* **Satisfy the requirement listed above**
* **save the radio resource compared with the unitary modification/repetition period for all MBS types**
* **save UE power if UE is interested in an MBS with the repetition period larger than the SC-MCCH transmission period**

**（8）Proposal-24:****In LTE SC-PTM, SC-MTCH configuration contains the SC-MTCH scheduling information. But in NR MBS, PDSCH has many parameters. Without these parameters, UE can NOT receive PDSCH. Therefore, we hope proposal 24 is updated as below.** **Proposal-24: For NR MBS delivery mode 2, PTM configuration can include both MTCH configuration and neighbor cell information where MTCH configuration includes** MBS session info, G-RNTI, MTCH scheduling info and PDSCH related information**.** |
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# References

1. *[Post112-e][069][MBS] Delivery mode 2 (MediaTek) \_ Phase 1 summary\_v1 Rapp*