**3GPP TSG-RAN WG2 Meeting #113bis-e R2-210xxxx**

**E-meeting, 12th – 20th April 2021**

**Title: [DRAFT] LS on broadcast session delivery and MCCH design**

**Response to:**

**Release: Release 17**

**Work Item: NR\_MBS-Core**

**Source: Huawei [To be RAN2]**

**To: RAN1**

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**Attachments:** **N/A**

1 Overall description

RAN2 discussed the details of broadcast session delivery and the following agreements were made during RAN2#113-e meeting:

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| * **Both idle/inactive UEs and connected mode UEs can receive MBS services transmitted by NR MBS delivery mode 2 (Broadcast service as already agreed, TBD other). The ability for connected mode UEs to receive this may depend on the network provisioning of the service (e.g. which freq), UE connected mode configuration and UE capabilities.**
* **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.**
* **Assume it is possible to 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.**
* **Assume that MCCH change notification mechanism is used to notify the changes of MCCH configuration due to session start for delivery mode 2 of NR MBS (other cases FFS, if any).**
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For RAN1 to better understand the above agreements, RAN2 would like to clarify that RAN2 is working on two MBS delivery modes (DM1 and DM2), summarized as follows:

* DM1 is used for multicast session delivery and is applicable to UEs in RRC Connected state (FFS UEs in RRC Inactive, but this scenario is down-prioritized). The UE is provided with MBS configuration e.g. G-RNTI using dedicated RRC signalling when the UE is in RRC Connected state. DM1 can use both Point-to-Point and Point-to-Multipoint transmissions and can take advantage of UL UE feedback (e.g. HARQ) when the UE is in RRC Connected.
* DM2 is used for broadcast session (FFS for multicast session for UEs in RRC Inactive, but this scenario is down-prioritized) delivery and is applicable to UEs in all RRC states. The UE is provided with MBS configuration using common RRC signalling in a two-step based approach, i.e. SIB will be used to provide the transmission configuration of MCCH. Based on the MCCH configuration received via SIB, UE reads MCCH, which carries transmission configuration of MTCH(s), e.g. G-RNTI. The MTCH configuration acquired from MCCH is applied by the UE for MTCH reception regardless of UE’s RRC state (for RRC\_CONNECTED state, the possibility to receive MTCH can be further subject to UE’s configuration and capabilities).

It was also agreed that RAN2 will prioritize multicast session reception in RRC Connected mode in Rel-17. If time permits multicast support for RRC Inactive can be considered later, once connected mode Multicast solution and Broadcast solution become more mature.

Furthermore, RAN2 defines two types of logical channels used at least for broadcast session delivery using DM2:

* MTCH: A point-to-multipoint downlink channel for transmitting traffic data from the network to the UE.
* MCCH: A point-to-multipoint downlink channel used for transmitting MBS control information from the network to the UE, for one or several MTCH(s).
	+ In RAN2, some companies think it should be allowed to configure multiple MCCH(s) for different services, but other companies disagree with the need for multiple MCCH and RAN2 has not made a decision on this issue yet.

During RAN2#113bis-e meeting, RAN2 discussed further aspects of MCCH scheduling and MCCH change notification leading to the following agreements with RAN1 impacts:

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| * **The concept of MCCH transmission window, similar to the one used for LTE SC-PTM, is used for NR MCCH scheduling. The exact parameters to define the window are FFS (discussed in the following proposals).**
* **The MCCH transmission window is defined by MCCH repetition period, MCCH window duration and radio frame/slot offset.**
* **New RNTI is defined for scheduling MCCH.**
* **Common search space is needed for MCCH scheduling. RAN2 should request RAN1 to discuss the details of CSS for MCCH.**
* **R2 assumes PDCCH occasions for MCCH search space are associated with SSBs in a pre-defined manner so that the UE can receive MCCH scheduling on PDCCH occasions according to its detected SSB.**
* **R2 assumes, In case searchSpace#0 is configured for MCCH (if allowed, pending RAN1 decision), the mapping between PDCCH occasions and SSBs is the same as for SIB1.**
* **R2 assumes that If common search space other than searchSpace#0 is configured for MCCH (if allowed, pending RAN1 decision), the PDCCH monitoring occasions for MCCH message which are not overlapping with UL symbols are sequentially numbered from one in the MCCH transmission window and mapped to SSBs using the similar rule as defined for OSI in TS 38.331.**
* **Request RAN1 to discuss the details of the configuration of the bandwidth for MCCH reception.**
* **UE in RRC IDLE/INACTIVE should be able to monitor/read both MCCH channel and SI/Paging without BWP switch. It is up to RAN1 to decide how this is ensured.**
* **It is up to RAN1 to decide about the RNTI and DCI format used for MCCH change notifications.**
* **RAN2 will discuss and down-select from the following two options for the UE to get aware of session stop/modification:**
	+ **Reading MCCH once per each MCCH modification period when receiving an ongoing broadcast session**
	+ **DCI used for MCCH notification indicates the change of an ongoing broadcast session**

**RAN1 should be informed about those options considered by RAN2 and, consider it for DCI design for MCCH notification and provide feedback, as necessary.** |

The agreements made by RAN2 require further discussions in RAN1. In particular, RAN2 would like to request RAN1 to investigate and provide feedback on the following aspects, considering the above agreements made by RAN2:

* + - 1. Details of Common Search Space design for MCCH channel, e.g. is SS#0 allowed to be configured as a search space for MCCH, is search space other than SS#0 allowed to be configured as a search space for MCCH.
			2. Details of the allowed transmission bandwidth/BWP configurations for MCCH transmission.
			3. Details of the RNTI and DCI design for carrying MCCH change notifications.
				* NOTE: RAN2 is still discussing some aspects that may have an impact on this issue, e.g. whether or not to support multiple MCCH or whether or not a notification about the modification/stop of an ongoing session is needed, as indicated above. RAN2 will update RAN1 as soon as further agreements are made on these items.

2 Actions

**To RAN1 group:**

**ACTION:**

RAN2 respectfully asks RAN1 to take RAN2 agreements into account in their work on MBS and discuss RAN1 aspects of MCCH as requested above.

3 Dates of next RAN2 meetings

TSG-RAN2 Meeting #114-e May 19 – May 27, 2021 E-Meeting