**3GPP TSG-RAN WG2 Meeting #117 R2-220xxxx**

**Online, 21st February – 3rd March 2022**

**Agenda item:** 8.11.2.1

**Source:** Apple (moderator)

**Title:** [AT117-e][628][POS] Remaining proposals from latency reduction summary (Apple)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [AT117-e][628][POS] Remaining proposals from latency reduction summary (Apple)

 Scope: Filter remaining proposals from R2-2203596 to determine which issues are critical to resolve, and progress towards consensus on critical issues.

 Intended outcome: Report to Monday CB session

 Deadline: Friday 2022-02-25 1200 UTC

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# 2. Discussion

The scope of the present email discussion is to address the remaining proposals from R2-2203596 which have not been resolved online.

Since the guidance from the chair is to focus on essential issues only, will be two additional options for answer (added where appropriate):

* Not essential to complete the WI
* Can be addressed in the CR discussion

Moderator’s note: proposals for liaisons to RAN1 and RAN3 received no support in the online discussion and therefore are not included; if the proponents feel strongly about discussing them, please indicate so to the moderator and those will be added.

## 2.1 Area ID

According to the meeting minutes, the following two options are on the table

Agreements:

An area ID corresponds to a set of cells on which the UE may use the associated AD. Downselect from the following options:

1. Explicitly list the involved cell IDs in LPP along with the assistance data
2. Broadcast in each cell one or more area IDs that are then referred to in LPP.

Resolve this signalling question in the LPP running CR (coordinating with RRC if necessary).

Moderator’s note: one of the companies indicated offline that their proposal is actually to add a new area ID to AD, without broadcasting it, stating that they would very much like to add it to the discussion.

**Question 1: Which of the following option(s) for area ID definition you prefer?**

1. **Explicitly list the involved cell IDs in LPP along with the assistance data**
2. **Broadcast in each cell one or more area IDs that are then referred to in LPP**
3. **New Area ID IE (INTEGER) is added to AD (without broadcasting it in SI)**
4. **Can be addressed in the CR discussion**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | c | **No need to broadcast area ID in SI.**Reasons:- UE must have known the cell ID where it stays. Then UE can get the associated area ID of this serving cell directly from the pre-configured assistance data according to the high light info as below. - Area ID is always associated with nr-PhysCellID-r16 in each TRP. So no need to broadcast area ID in SI by serving cell again. No RRC impact and LPP is good enough!  **Cell IDs(option a) V.S Area ID(option c): 40Mbits V.S. 2Mbits within the same spec impact**Area ID associated with each TRP has the same mechanism as cell list associated with each TRP in the running CR. But area ID is more straightforward and less on air signalling:Option a: Cell IDs for each TRP       256(TRP)\*16 (cells)\*10bit(PhysCellID) = **40Mbits**Option c: Area ID for each TRP       256 TRP \* 8bit(area ID) = **2Mbits** |
| Xiaomi | a |  |
| OPPO | a | Area ID is needed to be defined clearly in the spec. On the other hand, reusing the cell list could save the efforts. We should follow and respect the majority views in the show of hand result in the online meeting |
| ZTE | a |  |
| Fraunhofer | a (or C 🡪 please see comments) | AreaID needs to be clearly specified to give unambigious meaning, which for Rel. 17 can be mapped to list of cells For example Area ID 1 means area covered by cell {2,3,4} or Area ID 2 means area covered by {5,6,7}. If option C means, we have an identifier (AreaID) which is mapped to list of cells (in Rel. 17) with an intention of mapping to further options in later releases, then we see this is in principle no different to option (a). |
| Ericsson | a  | Agree with OPPO reusing cell list can save the effort; however it appears area ID is also based upon group of cells; i.e group of cells consist of one area. Hence, the spec impact may not be there apart from putting the area ID tag.If the solution is independent of RRC; i.e can work based upon LPP only; we are ok to support C however solution C will have an overhead in terms of UE to gather all the AD and then populate which cells are associated with which area Hence, we would prefer only a which is simple.  |
| Apple | a |  |
| Lenovo, Motorola Mobility | a or c | Support that the Area ID should be clearly defined the spec. |
| Huawei, HiSIlicon | a |  |
| Nokia, Nokia Shanghai Bell | b or c | Solution B would be similar to system information area concept. If possible, we could even reuse the SI area itself for positioning use also. Solution C would require either OAM configuration or some signaling between LMF and UE for signaling the information about mapping of the area ID integer to a list of cells so that UE and LMF have a common view of what ID represents which area.Solution A is inefficient from signaling point of view. How many cells are we talking about when it is explicitly signaled in LPP along with assistance data? |
| Intel | C | First, we think it would be good to clarify whether option a) implies cell ID list would be indicated per TRP in assistance data (understanding that this also being discussed in [606]). If so, we agree with CATT that option A seems to very wasteful and even in case of option B, there seems no need to broadcast this since the UE can infer this based on the received assistance data. |
| Samsung | a |  |
| Qualcomm | c | Agree with CATT. We just need one or more area-IDs included in the TRP list. This should be all what is needed. The UE would use the TRPs for measurement which have the same area ID e.g., as the camped/serving cell. |

## 2.2 Validity Time

**Question 2: Do you support introduction of validity time for AD?**

1. **Yes**
2. **Not essential to complete the WI**
3. **Can be addressed in the CR discussion**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | b | The PRS configuration doesn’t have the validity time because PRS is always being transmitted by the TRP which is fixed. |
| Xiaomi | b |  |
| OPPO | a | When the UE is in the RRC\_Connected state, the RAN could use RRC ***InformationRequest*** msg to request the UE to report the mobility history information towards the network, which consists of previous up to 16 cell camping information and the time spent in each cell. From such information, the serving gNB could derive the UE mobility state. If the UE mobility speed is estimated to be high, the network could correspondingly send a pre-configured assistance data with low validity time towards the UE. On the contrary, if the UE mobility speed is estimated to be low, the network could correspondingly send pre-configured assistance data with long validity time. Some companies think that the concept of validity time is similar with validity area technically, but with validity time applied, the UE does not need to check if the current camping cell belonging to the configured validity area every time when it enters a new cell. Instead, the UE only needs to countdown the validity timer, which is power saving and easy to implement.  |
| ZTE | b | If validity timer and area are both configured, it means UE can only use the pre-configured AD when validity area and timer are both satisfied, which brings more limitation to this feature  |
| Fraunhofer | a | However different to OPPO, we think the AD is valid when the validity time has not expired and the UE is within its validity area.  |
| Ericsson | a | It will simplify. This is similar to what we have for posSIB etc; so UE may not need to store the information for ever, |
| Apple | b |  |
| Lenovo, Motorola Mobility | b | a) may be useful but area ID may be sufficient for now |
| Huawei, HiSilicon | b |  |
| Nokia, Nokia Shanghai Bell | b |  |
| Intel | a | We think it would be useful to support. However, for the sake of timely completion, we can accept the majority view if companies do not want to pursue at this stage |
| Samsung | a | Same view with Ericsson. It can allow the UE to not store all the previous PRS configuration that can be not valid anymore. |
| Qualcomm | b | We also don't see how the network can reliably predict a validity time for DL-PRS assistance data, in particular with the on-demand PRS feature. |

## 2.3 Modification/release of AD

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This question is no longer relevant due to the following agreement

Agreement:

If the UE receives assistance data for a PRS-ID+cell ID combination for which it has already stored assistance data, it overwrites the stored assistance data. If the UE receives assistance data for a PRS-ID+cell ID for which it has not stored assistance data, it maintains its stored assistance data for other PRS-ID+cell ID combinations.

UE capability for the number of PRS-ID+cell ID combinations for which the UE can store AD.

## 2.4 UL MAC CE for MF activation and deactivation

**Question 4.1: Do you agree that UL MAC CE for MG activation and deactivation is triggered by upper layers?**

1. **Yes**
2. **No**
3. **Can be addressed in the CR discussion**

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| **Company** | **Preferred Option** | **Comments**  |
| Xiaomi | a |  |
| OPPO | a |  |
| ZTE | a |  |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | a | Otherwise, how can it be triggered. |
| Apple | a |  |
| Lenovo, Motorola Mobility | A |  |
| Huawei, HiSilicon | a |  |
| Nokia, Nokia Shanghai Bell | a |  |
| Intel | a) | As we mentioned in our contribution, the trigger should be based on the upper layer request to when UE requires measurement gaps and preconfigured MG is configured (and similarly for deactivation). |
| Samsung | a | POS measurement would be triggered by the LPP signalling and the required pre-MG configuration would be given by RRC signalling. Thus, it seems natural that the UL MAC CE for MG activation/deactivation is triggered by upper layers (e.g., LPP, RRC) |
| Qualcomm | a | This should be the same as in Rel-15 already, but now with a MAC-CE. |

**Question 4.2: Do you agree to specify conditions for triggering UL MAC CE for MG activation and deactivation?**

1. **Yes**
2. **No (leave it for UE implementation)**
3. **Can be addressed in the CR discussion**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | a/c | UE behaviors should be specified. |
| Xiaomi | b | The legacy trigger condition for UE requesting the MG via RRC can be reused for UE to trigger pre-configured MG request, whether UE requests MG via RRC or requests pre-configured MG via MAC CE is based on UE implementation.  |
| OPPO | b | It is UE freedom to choose when to trigger UL MAC CE for MG activation/deactivation. UE can decide the when and which MG to be used to trigger UL MAC CE for performing the requested DL-PRS measurement. |
| ZTE | B/c | The only necessary condition is UE should firstly receive pre-configured MG then UE can send UL MAC CE |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | b |  |
| Apple | b |  |
| Lenovo, Motorola Mobility | B |  |
| Huawei, HiSIlicon | A | When to trigger UL MAC CE and RRC message should be clearly specified |
| Nokia, Nokia Shanghai Bell | a | Conditions like the way it is specified now for the trigger of *LocationMeasurementIndication* message should be specified. |
| Intel | a/c | Without the conditions, it is unclear to us how the UL MAC CE is triggered. At the most basic level, we can capture something along the lines of : “if and only if upper layers indicate to start performing location measurements towards NR and the UE requires measurement gaps for these operations, while measurement gaps are either not configured or not sufficient and preconfigured MG is configured, the UE shall trigger the transmission of the UL MG activation request MAC CE (containing the requested pre-configured MG ID)”.We are fine to discuss during CR discussions (assuming it is agreed to specify them) |
| Samsung | b | No need to specify all possible triggering conditions in detail. Some general condition (as in ZTE’s comment) would be enough. |
| Qualcomm | a (slightly) | We think we can copy the text (with proper adaption) from the RRC LocationMeasurementIndication procedure.Otherwise, b should also be O.K. |

**Question 4.3: Do you agree to define LPP signaling for LMF to indicate to UE whether to send/not send the UL MAC CE for positioning MG activation request?**

1. **Yes**
2. **No**
3. **Can be addressed in the CR discussion**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | b | What’s the benefit for latency reduction? Pre-MG is introduced for latency reduction but the new LPP signaling from LMF to UE will increase the latency. |
| Xiaomi | a | The LMF needs to indicate to UE whether to send or not send activation request and then the duplicate request can be avoid. The indication can be included in the location information request and no additional latency introduced. |
| OPPO | b |  |
| ZTE | b | If gNB coordinates well then no duplicated request will happen. For example, when gNB receives LMF’s request, gNB will not send pre-configured MGs to UE. |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | b | Do not see such need. Motivation is unclear. |
| Apple | b |  |
| Lenovo, Motorola Mobility | b |  |
| Huawei, HiSIlicon | b |  |
| Nokia, Nokia Shanghai Bell | c | We would like to wait and see what clarifications we get back from RAN1 on the pre-configured MG issue. Also, if both UE and LMF can send the activation/deactivation request to gNB then we must either specify clearly that it is up to implementation to choose only one of the two options or there must be some gNB behavior specified as to how it handles when activation request comes from both UE and LMF. |
| Intel | b | If the pre-MG has been provided to the UE, it should be implicitly clear that the UE can send the UL MAC CE for MG activation request. Then, we just need to specify the triggering conditions as discussed in question above. No need to define further signaling |
| Samsung | b | Same view with ZTE.  |
| Qualcomm | b | We don't think an LMF would be able to decide on this with the current specification framework. |

**Question 4.4: Do you agree to define the priority for the MAC CE below the MAC CE for BSR (with exception of BSR included for padding) and above the PHR MAC CE?**

1. **Yes**
2. **No**
3. **Can be addressed in the CR discussion**
4. **Other (please clarify)**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | a |  |
| Xiaomi | c |  |
| ZTE | c |  |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | d | Same as MAC CE for BSR.Since this MAC CE can trigger SR similar as BSR MAC CE; we think the MAC CE can also contain BSR information. This is needed to save latency especially for the case when UE sends deactivation request; i.e it already knows how much measurement data size it has to send. Hence, UE can also include BSR information (Octet) in the same MAC CE. |
| Apple | c |  |
| Lenovo, Motorola Mobility | c | Also ok to address in CR discussion |
| Huawei, HiSIlicon | D | Should be jointly discussed with the other UL MAC CEs and logical channels introduced in R17. It does not make sense to have isolated discussion here considering there are other MAC CEs |
| Nokia, Nokia Shanghai Bell | c | This needs to be checked also with other UP experts outside positioning discussions to make sure we are not creating any inadvertent negative side effects. |
| Intel | a |  |
| Samsung | c | As discussed in the main session, RAN2 anyway has to discuss the priority of all the MAC CEs introduced in Rel-17, so can be discussed later. |

**Question 4.5: Which of the following options to cancel a triggered UL MAC CE for MG activation and deactivation should be captured in the spec?**

1. **When the MAC CE is transmitted**
2. **When a downlink command from gNB to activate or deactivate the gaps is received**
3. **When a new measurement gap configuration from the network is received**
4. **When a request from upper layers to transmit a new request to gNB for a new/modified gap configuration is received**
5. **When an indication from upper layers that the gaps are not needed any more or a gap with a new id needs to be activated is received**
6. **On MAC reset**
7. **Can be addressed in the CR discussion**
8. **Other (please clarify)**
9. **Not essential to complete the WI**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | A,d,e |  |
| Xiaomi | i |  |
| OPPO | A d e f |  |
| ZTE | A c d f | If the new measurement gap in (c) means the r16 measurement gap then it is reasonable |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | h | Since, we do not specify the trigger condition in spec; we then do not need to have explicit cancellation of trigger just for this; however other common cancellation trigger can still be applicable based upon existing spec |
| Apple | a | No strong view though |
| Lenovo, Motorola Mobility | G |  |
| Huawei, HiSilicon | a, b, c, d, e, f,  |  |
| Nokia, Nokia Shanghai Bell | g | This needs to be checked also with other UP experts outside positioning discussions to make sure we are not creating any inadvertent negative side effects. |
| Intel | A, D, E, F | It is not clear whether upper layer refers to RRC or LPP. We assume that if we specify the triggering conditions, they shall be done by RRC. So, a), d), e) and f) should apply. We assume that) and c) will be handled by the upper layer triggering a cancellation |
| Samsung | A, b, d, e, f | (a) and (b) are not mutually exclusive. As per RAN1 LS, both LMF and UE may request gNB for activation/deactivation of gap. So it is possible that UE receives gap activation command before the request is transmitted. Hence we think (a) and (b) are needed. (d),(e) and (f) are needed to ensure that the transmitted MAC CE is valid, and to ensure that both gNB and UE has same understanding about the activated/deactivated gaps.(c) seem to be covered by (d), (e) and may not be needed. |

**Question 4.6: Do you agree to adopt a common MAC CE design for PPW and Measurement gap?**

1. **Yes**
2. **No**
3. **Can be addressed in the CR discussion**
4. **Other (please clarify)**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | c |  |
| Xiaomi | c |  |
| OPPO | c |  |
| ZTE | c |  |
| Fraunhofer |  | No strong opinion. Support the majority view.  |
| Ericsson | a |  |
| Apple | c |  |
| Lenovo, Motorola Mobility | c |  |
| Huawei, HiSilicon | c |   |
| Nokia, Nokia Shanghai Bell | c |  |
| Intel | c |  |
| Samsung | c |  |

**Question 4.7: Do you agree that the gNB should provide Measurement Gap config ID to be activated as part of pre-configuration or any RRC Reconfiguration?**

1. **Yes**
2. **No**
3. **Can be addressed in the CR discussion**
4. **Other (please clarify)**

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| **Company** | **Preferred Option** | **Comments**  |
| CATT | a |  |
| Xiaomi | b | We understand only MAC CE is agreed by RAN1. |
| OPPO | a | Part of pre-configuration is preferred, for latency reduction purpose. |
| ZTE | a | Pre-configured MG in RRC should carry IDs for UL MAC CE to pick up |
| Fraunhofer | a |  |
| Ericsson | a | Agree with OPPO. |
| Apple | a |  |
| Lenovo, Motorola Mobility | a |  |
| Huawei, HiSilicon | a |  |
| Nokia, Nokia Shanghai Bell | b | The gNB pre-configuring the UE with MGs and the gNB activating a specific MG are independent/separate steps. gNB activating a MG at the time of pre-configuring the UE looks like a corner optimization scenario. |
| Intel | b | The following was agreed in RAN2#116bis-e meeting:Proposal 5c (modified): A new DL MAC CE for positioning measurement gap activation and deactivation command is introduced for positioning latency reduction. LS to RAN1/4 indicating our conclusion, and confirming that DL MAC CE can also be used for positioning measurement gap deactivation as well as activation (to be drafted by email).Proposal 5d: The new DL MAC CE for positioning measurement gap activation and deactivation command includes at least the ID of the pre-configured positioning measurement gap configuration which has been configured/activated by the gNB. Other parameter are FFS.Then, we have similar view as Nokia; we are not sure why this additional enhancement needs to be supported |
| Samsung | See comment | Same understanding with ZTE. Meanwhile, the question is a bit unclear to me and it seems to include two different issues together. a) delivery of MG config ID for UL MAC CE to pick up via RRC signallingb) activation of pre-configured MG via RRC signalling |

# 3. Summary of Proposals for Discussion