3GPP TSG-RAN WG2 Meeting #119 electronic R2-220xxxx

Online, August 17 – August 26, 2022

Source: MediaTek Inc.

**Title: Report of [AT119-e][004][ePowSav] Subgrouping/PEI (MediaTek)**

Agenda Item: 6.9.2

Document for: Discussion and decision

# Introduction

Companies’ contributions [3] – [21] were summarized in [22]. The summary [22] was treated online and we continue identifying agreeable parts and impacts based on online discussion progress.

This document is for the following offline email discussion:

* [AT119-e][004][ePowSav] Subgrouping/PEI (MediaTek)

 Scope: Based on online progress, discussion, R2-2208909 and referenced input, continue identify agreeable parts and impacts. No Need to include Stage-2 etc.

 Intended outcome: Report (with agreements), offline if possible.

 Deadline: W2 Wednesday (can CB W2 Thu if required)

# Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| MediaTek (Rapp) | Mutai Morton Lin | morton.lin@mediatek.com |
| Xiaomi | Yanhua Li | Liyanhua1@xiaomi.com |
| Qualcomm | Linhai He | linhaihe@qti.qualcomm.com |
| Futurewei | Yunsong Yang | yyang1@futurewei.com |
| ZTE | Fei Dong | Dong.fei@zte.com.cn |
| Intel Corporation | Seau Sian Lim | seau.s.lim@intel.com |
| CATT | Pierre Bertrand | pierrebertrand@catt.cn |
| vivo | Chenli | chenli5g@vivo.com |
| Nokia |  Chunli Wu | Chunli.wu@nokia-sbell.com |
| OPPO | Haitao Li | lihaitao@oppo.com |
| Huawei, HiSilicon | Jagdeep Singh | jagdeep.singh6@huawei.com |
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| LGE | SangWon Kim | sangwon7.kim@lge.com |
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|  |  |  |

# Discussion

## UE\_ID based subgrouping

It was agreed we go for solution in the contribution [18] in the Subgrouping/PEI online discussion of RAN2#119-e:

|  |
| --- |
| [R2-2208609](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_119-e%5CDocs%5CR2-2208609.zip) 38.304 Clarifications on SubgroupID for UE-ID based subgrouping Xiaomi, ZTE Corporation,Vivo, Ericsson, CATT draftCR Rel-17 38.304 17.1.0 NR\_UE\_pow\_sav\_enh-Core* Chair wonder if we can agree this.
* Huawei think we should align solution with PO solution already in the TS. Nokia agrees with Huawei and think this proposal is better.
* Xiaomi think HW way can also work, but may need to change the 38300 then.
* Vivo think that we should not depend on UE capability, and just specify in the TS.
* Solution in this doc is agreed
 |

Contribution [18] propose to explicitly clarify the same DRX cycle value is used for the subgroupID calculation in both RRC\_IDLE and RRC\_INACTIVE states.

**Q1: Companies are invited to provide other comment (if any) for agreeing TP change in the CR [18].**

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| --- | --- |
| **Company** | **Comments** |
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**Summary for Offline discussion**

No companies have further comment in Q1.

**Proposal 1**: [To agree] 38.304 Clarifications on SubgroupID for UE-ID based subgrouping, CR R2-2208609 is agreed.

## PEI monitoring

PEI monitoring for RedCap

In RAN2#118-e, the **Proposal 4** is discussed in [2] and all companies (10 out of 10) agreed that we need to move *pei-SearchSpace-r17*, *firstPDCCH-MonitoringOccasionOfPEI-O-r17* to *PDCCH-ConfigCommon* of *initialDownlinkBWP-RedCap-r17* and *initialDownlinkBWP* (already implemented in TS 38.331 v17.1.0).

Contribution [9] proposed to further clarify in description of *pei-Config* that this configuration is for PEI monitoring on *initialDownlinkBWP* and/or on *initialDownlinkBWP-RedCap*.

**Q2: Do companies agree with the intention and TP of the CR [9]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Xiaomi | No | In the current spec, these parameters are configured commonly across BWPs not for per BWP. I do not think there is ambiguity here and would rather to keep as it is. Otherwise, if we introduce new initial DL BWP type, like for R18 eRedcap, we need to update the spec to capture the new initial DL BWP type here. |
| Qualcomm | Yes | We are fine with the proposed change. |
| Futurewei | Yes |  |
| ZTE | No | It seems not an essential CR since the presence condition of the pei-ConfigBWP has implied the intention of the CR, please see below:*InitialBWP-Paging*: his field is optionally present, Need R, if this BWP is the *initialDownlinkBWP* or *initialDownlinkBWP-RedCap*, and *pei-Config* is configured in *DownlinkConfigCommonSIB*. Otherwise this field is absen |
| Intel | Yes | Agree with the intention |
| CATT | No | It has already been clarified on the Cond InitialBWP-Paging of *pei-ConfigBWP-r17*, so it is not necessary. |
| vivo | No | Current text has no ambiguity. If further clarification is needed for pei-Config, then the PCCH-Config and BCCH-Config also need similar clarification. We think the change is not essential. |
| Nokia | No | No strong need. The configuration is cell specific anyway, so applicable to whichever BWP configured with PEI. It’s the same for all the other configurations. |
| OPPO | No | The description of *pei-Config* can be given in the similar way to that of PCCH-Config. For PCCH-Config, there is no such clarification. |
| MediaTek | No | Not an essential change |
| Huawei, HiSilicon | Yes  | We agree with the intention of the CR |
| Ericsson | No | Similar view as ZTE and CATT. |
| LGE | No | Same view as vivo. |
| Apple | No | Agree with CATT |

**Summary for Offline discussion**

Total 13 companies responded to Q2. 4 companies agreed the intention of CR, 9 companies disagreed.

By clear majority of the companies do not support, rapporteur proposes the following proposal:

**Proposal 2**: [To agree] [4/13] Lack of support, CR R2-2207005 is not pursued.

Also in RAN2#118-e, the aspects of paging and PEI monitoring for RedCap and TP were discussed in [2], most companies (7 out of 10) thought field description update could be continued in ePowSav WI and agreed considering the TP as baseline. (i.e. **Proposal 5** in [2])

Contributions [11] and the 2nd change of [21] proposed almost identical TP for updating field description of *InitialBWP-Paging* thus rapporteur suggests treating them together.

Besides, in consideration of a notification from proponent to postpone discussion and to monitor the progress of relevant topic in RadCap WI discussion, rapporteur suggests companies can still gave view here meanwhile please the proponent to bring up-to-date info. from RedCap WI, because our agreement and the conclusion in RedCap session should harmonize. (In any case rapporteur do not want companies to have double effort on the same topic)

**Q3: Do companies agree with the intention and TP of the CR [11] and the 2nd change of [21]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Xiaomi | Yes | Ok to postpone and discuss in Redcap WI. |
| Qualcomm | Yes | We are fine with the TP in [11] |
| Futurewei | Yes |  |
| ZTE | Yes | OK to postpone |
| Intel | Yes | The update to the condition looks ok in our view.  |
| CATT | Yes | We agree with the intention but prefer to let it treated in RedCap session. |
| vivo | Yes | Proponent. But we are ok to postpone and discuss it in RedCap WI. |
| Nokia | Yes |  |
| OPPO | Yes |  |
| MediaTek | Yes | OK to postpone |
| Huawei, HiSilicon | Yes  |  |
| Ericsson | No | W think this is already clear from the paging search space description. Anyways, this is a RedCap specific issue, better discuss under RedCap: ***pagingSearchSpace***ID of the Search space for paging (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive paging in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0..  |
| LGE | Yes |  |
| Apple | Yes |  |

**Summary for Offline discussion**

Total 13 companies responded to Q3. 12 companies agreed the intention of CR, and 5 companies among them including both proponents supported to postpone the discussion in ePowSav. 1 company disagreed but also supported it should be discussed in RedCap WI session.

By clear majority of the companies supported the intention, rapporteur proposes the following proposal:

**Proposal 3**: [To agree] [13/13] Further discussions of CR R2-2207206 and 2nd change of CR R2-2207744 are postponed.

PEI reception during emergency session

Contribution [17] proposed to add a precondition emergency service is not ongoing (same wording as 38.331) to clarify PEI reception.

**Q4: Do companies agree with the intention and TP of the CR [17]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Xiaomi | No? | The cover sheets quoted from SA2's LS that UE should not indicate its support of WUS Assistance Information during an attach for emergency. I think then the NW will not page the UE by PEI, right?[MTK@v10] Yes. But what if there was already an ongoing PEI reception by previous negotiated assistance information? We think it also needs to be suspended during emergency PDN session is established.And this issue is for R16 LTE. But I checked 36.304, and found there is no description on this issue. Why we need to capture this in NR?[MTK@v10] Agreed with your observation. The reason is due to the feature difference between ePowSav and WUS WI. Our intention is to avoid confusion that UE may still use UE\_ID based subgroupID to monitor paging when CN controlled subgrouping is expected to be suspended during emergency PDN session is established. They should be suspended together and so does PEI reception. |
| Qualcomm | Yes |  |
| Futurewei | Yes |  |
| ZTE | Yes | We think the intention of the issue is valid. As xiaomi comments, maybe 36.304 need to be fixed as well?[MTK@v10] Like Xiaomi’s observation, but we focused on ePowSav now.Anyway, regarding the wording, we think it can be merged with the case of multicast, such as:The UE may use Paging Early Indication (PEI) in RRC\_IDLE and RRC\_INACTIVE states in order to reduce power consumption. If PEI configuration is provided in system information, the UE in RRC\_IDLE or RRC\_INACTIVE state supporting PEI (except for the UEs expecting multicast session activation notification or being aware of an ongoing emergency service) can monitor PEI using PEI parameters in system information according to the procedure described below.[MTK@v10] We can merge the suggestion if CR intention is agreed. |
| Intel |  | It is unclear to us why the PEI with UE-ID based subgrouping should be prohibited when emergency session is ongoing, as long as network and UE are in sync of the UE capability. [MTK@v10] If the network stop using PEI to page UE, then UE should not use PEI or paging miss occurs. |
| CATT | Yes | To align with text in 24.501. |
| vivo | Yes  |  |
| Nokia | - | Not sure if it needs to be made visible in AS since we have no definition of "emergency service is not ongoing", can AMF take care of it and indicate no subgroup ID and not supporting PEI/subgrouping to gNB?[MTK@v10] UE should still take action on ongoing PEI reception once an emergency PDN session is established. |
| OPPO | Yes |  |
| Huawei, HiSilicon | See comment | The motivation is reasonable to us; however, it is unclear how the UE could determine whether there is paging for emergency services. In other words, before the UE is paged, how could it know there will be emergency service. |
| Ericsson | - | What is the reason for not using PEI reliability? And UE and gNB need to synced when to start and stop using PEI, i.e. can this be left to UE implementation? Does start and stop reduce reliability? |
| LGE |  | We have the same concern as Nokia. It would be better for NW to take care of it without AS intervention. |
| Apple | Yes |  |

**Summary for Offline discussion**

Total 12 companies responded to Q4. 6 companies agreed the intention of CR, and 6 companies disagreed or are unable to answer by not only seeing unclear technical background but also lack of analogue in previous power saving technique (WUS) to support the CR.

Rapporteur proposes the following proposal:

**Proposal 4**: [To agree] [6 v.s. 6] CR R2-2208334 is postponed.

## Other issues

### General clarification for subgrouping

In contributions [8][14], general UE subgrouping specification clarifications are proposed for subclause 7.3.0 of TS 38.304, especially for the wording “otherwise” in the paragraph. Since both TPs are for the same paragraph but with different approaches so rapporteur suggests treating them together and let’s come out a final version for agreement if consensus is reached.

**Option 1**: Agree to use TP in [8] as baseline, provide further comment if any.

**Option 2**: Agree to use TP in [14] as baseline, provide further comment if any.

**Option 3**: Others. Provide a different view (included Do Not Agree) or comment.

**Q5: With which option do companies agree and any further comment?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1, 2 or 3** | **Comments** |
| Xiaomi | 1 | Change in [8] is OK.No strong view in [14], as the current spec is clear. |
| Qualcomm | 3 | No strong view. Both [8] and [14] seem to be text optimization. |
| Futurewei | 3 | No strong view on [14] as the change is about formality. Can go with the majority.The leading sentence of the three bullets is currently described from the viewpoint of a single UE. Changes proposed in [8] are from the viewpoint of a group of UEs. Therefore, the changes in [8] create a mismatch. In addition, some changes in [8] are unnecessary. For example, it is unnecessary to add “for the UEs supporting PEI”, because the whole subclause is based on the premise “If PEI and subgrouping are configured, …” However, we support the first editorial change in [8], i.e., changing “formed” to “derived”.We also suggest the following change to the first bullet in the current spec, because it applies to the UE only when the UE has a CN-assigned subgroup ID, while the third paragraph covers the case where the UE doesn’t have a CN-assigned subgroup ID.- If *subgroupsNumForUEID* is absent in *subgroupConfig*, the subgroup ID based on CN assigned subgrouping as specified in clause 7.3.1, if available to the UE, is used in the cell.  |
| ZTE | 1 | Proponent, we think the option 1 can improve the readability of specification. |
| Intel | 1 | Change in [8] seems sufficient.  However, we are fine to also go with [14]  |
| CATT  | 1 | We agree with the intention and prefer ZTE’s CR as it is clearer. |
| vivo  | 1 | Both are not essential. But changes in [8] make it clearer. |
| Nokia | 2 | 38.304 should be written in a UE’s point of view. |
| OPPO | 1 or 2 | We agree with the intention. We are fine with both options.  |
| MediaTek | 2 | No strong view but prefer the way [14] goes. |
| Huawei, HiSilicon | 1 | We agree with the intention of the CRs and prefer ZTE’s CR as it is simple and clear. |
| Ericsson | 1 and 2 |  |
| LGE | 1 | Only the wording ‘otherwise’ is misleading.  |
| Apple | 1  | Agree with intention |

**Summary for Offline discussion**

Total 13 companies responded to Q5:

 Option 1: 10 companies supported (including companies said option 1 is okay)

 Option 2: 5 companies supported (including companies said option 2 is okay)

 Option 3: 1 (can go with the majority)

Rapporteur proposes the following proposal:

**Proposal 5**: [To discuss] [10 v.s. 5] For general UE subgrouping specification clarifications, using 38.304 CR R2-2208554 as baseline together with comments received in email discussion for detailed wording.

The 2nd change of contribution [20] indicated *noLastCellUpdate* is applied to PEI-capable UEs only. The condition needs to be added in the field description, as it currently is for the field description of *lastUsedCellOnly*.

**Q6: Do companies agree with the intention and the 2nd change of the CR [20]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Xiaomi | Yes |  |
| Qualcomm | Yes |  |
| Futurewei | Yes |  |
| ZTE | Yes |  |
| Intel | Yes |  |
| CATT | Yes | Proponent. Consistent with wording in field description of *lastUsedCellOnly.* |
| vivo | Yes  |  |
| Nokia | Yes |  |
| OPPO | Yes |  |
| MediaTek | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Yes |  |
| LGE | Yes |  |
| Apple | Yes |  |

**Summary for Offline discussion**

Total 13 companies responded to Q6. All companies agreed the intention of CR. Rapporteur proposes the following proposal:

**Proposal 6**: [To agree] [13/13] The 2nd change of 38.331 CR R2-2207398 is agreed, and to be merged by proponent if 1st part is also agreed in [003] RLM/BFD discussion.

### Capabilities

Contribution [13] proposed to rephrase field description to avoid possible misleading in TS 38.306.

**Q7: Do companies agree with the intention and the 2nd change of the CR [13]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Xiaomi | No | The current spec is Ok since we have agreed supporting PEI and UE-id based subgrouping go together. |
| Qualcomm | Yes | It seems an editorial change with an intention to make the text clearer. |
| Futurewei | - | No strong preference. Can go with the majority. |
| ZTE | No strong view |  |
| Intel | No strong view | The current text seems ok to us. But if companies think that there is ambiguity, we are also fine with the new added text.  If the change is agreed, the draftCR should just be endorsed for merging with the mega CR.  |
| CATT | Yes |  |
| vivo | Yes | Not essential, but the updated text is more accuracy.  |
| Nokia | Yes | Current wording implies PEI is not used for CN-assigned subgrouping which is incorrect. |
| OPPO | No strong view | We can go with the majority. |
| MediaTek | Yes |  |
| Huawei, HiSilicon | - | The proposed change seems not needed as the current text seems ok to us.Can go with the majority |
| Ericsson | Yes | In our understanding there is a dependence between the NAS and AS capability:If the UE indicates to support NR-PSSI at NAS, then the UE shall indicate support of ***pei-SubgroupingSupportBandList-r17*** in at least one band:

|  |
| --- |
| NR paging subgroup support indication (NR-PSSI) (octet 6, bit 4) |
| This bit indicates the capability to support NR paging subgrouping |
| Bit |  |  |  |  |
| 4 |  |  |  |  |
| 0 |  |  |  | NR paging subgrouping not supported |
| 1 |  |  |  | NR paging subgrouping supported |

We are not sure if CT1 captures this type of dependencies though.  |
| LGE | No strong view |  |
| Apple | Yes | Editorial change |
|  |  |  |

**Summary for Offline discussion**

Total 13 companies responded to Q7. 6 companies agreed the intention of CR, 6 companies had no strong view or can go with majority, and 1 company disagreed. Rapporteur proposes the following proposal:

**Proposal 7**: [To agree] [6(+6)/13] Capability CR R2-2208016 is endorsed to be merged into capability mega CR.

# Conclusion

Proposals for easy agreement:

**Proposal 2**: [To agree] [4/13] Lack of support, CR R2-2207005 is not pursued.

**Proposal 3**: [To agree] [13/13] Further discussions of CR R2-2207206 and 2nd change of CR R2-2207744 are postponed.

**Proposal 4**: [To agree] [6 v.s. 6] CR R2-2208334 is postponed.

**Proposal 6**: [To agree] [13/13] The 2nd change of 38.331 CR R2-2207398 is agreed, and to be merged by proponent if 1st part is also agreed in [003] RLM/BFD discussion.

**Proposal 7**: [To agree] [6(+6)/13] Capability CR R2-2208016 is endorsed to be merged into capability mega CR.

Proposals need further email discussion and merged by 38.304 CR proponent:

**Proposal 1**: [To agree] 38.304 Clarifications on SubgroupID for UE-ID based subgrouping, CR R2-2208609 is agreed.

**Proposal 5**: [To discuss] [10 v.s. 5] For general UE subgrouping specification clarifications, using 38.304 CR R2-2208554 as baseline together with comments received in phase-2 discussion for detailed wording.

# Reference

1. R2-2206458 Report of [AT118-e][072][ePowSav] PEI and Subgrouping (Mediatek) MediaTek Inc.
2. R2-2206775 [DRAFT] Report of [Post118-e][072][ePowSav] PEI and Subgrouping (MediaTek) MediaTek Inc.

(RAN2#119-e Subgrouping/PEI related tdocs listed in the order of Agenda v2)

1. [R2-2206932](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119-e/Docs/R2-2206932.zip) Reply LS on PEI and UE Subgrouping (R3-224004; contact: ZTE) RAN3
2. [R2-2207070](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119-e/Docs/R2-2207070.zip) Stage-2 correction on UE-ID based subgrouping OPPO
3. R2-2207742 Miscellaneous CR on TS 38.304 for ePowSav vivo
4. R2-2208015 Stage 2 correction on power saving Nokia, Nokia Shanghai Bell
5. R2-2208227 Corrections for UE power saving enhancements In 38.300 Huawei, HiSilicon
6. R2-2208554 CR on 38.304 for PEI and pagingsubgrouping ZTE Corporation,Sanechips
7. R2-2207005 Clarification of PEI monitoring related parameters Samsung Electronics Co., Ltd
8. R2-2207051 Correction to UE ID based subgrouping OPPO
9. R2-2207206 38.331 Corrections on PDCCH-ConfigCommon for PEI Xiaomi Communications
10. R2-2207745 Correction on idle/inactive TRS for ePowSav vivo
11. R2-2208016 Clarification on PEI and subgrouping capability Nokia, Nokia Shanghai Bell
12. R2-2208017 Clarification on subgrouping descriptions Nokia, Nokia Shanghai Bell
13. R2-2208089 PDCCH monitoring adaptation and C-DRX (RIL V146) Ericsson
14. R2-2208226 Correction on the UE\_ID based subgrouping Huawei, HiSilicon
15. R2-2208334 Clarification on paging early indication with paging subgrouping during emergency call MediaTek Inc.
16. R2-2208609 38.304 Clarifications on SubgroupID for UE-ID based subgrouping Xiaomi, ZTE Corporation,Vivo, Ericsson, CATT
17. R2-2208090 PDCCH skipping in RAN1 and RAN2 specifications Ericsson
18. R2-2207398 Miscellaneous CR on TS 38.331 for ePowSav CATT, Xiaomi
19. R2-2207744 Correction on RLM/BFD relaxation and PEI configuration vivo
20. R2-2208909 Summary of Subgrouping/PEI contributions (MediaTek) MediaTek inc.