3GPP TSG-RAN WG2 #119e R2-220xxxx

eMeeting, 17th – 26th August, 2022

Agenda Item: 5.1.3.3

Source: MediaTek Inc.

**Title: [Draft] Report of [AT119-e][012][NR1516] UE capabilities (MediaTek)**

Document for: Discussion and decision

# 1 Introduction

This is report for the following AT119-e mail discussion.

* [AT119-e][012][NR1516] UE capabilities (MediaTek)

 Scope: Treat R2-2206911, R2-2208501, R2-2208502, R2-2208503, R2-2208504, R2-2207640, R2-2207641, R2-2207049, R2-2207085, R2-2207086, R2-2207094, R2-2207095, R2-2207113, R2-2207114, R2-2208027, R2-2208028, R2-2207331, R2-2207332, R2-2208505, R2-2208506. Determine agreeable parts, For agreeable parts, agree CRs.

 Intended outcome: Report, Agreed CRs, LS out if applicable

 Deadline: Schedule 1

This discussion follows Schedule 1, which is organized as follow:

Discussions with Deadline **Schedule 1**:

A **first round** with **Deadline for comments W1 Friday Aug 19th 1400 UTC** to settle scope what is agreeable etc

A Final round with **Final deadline W2 Thursday Aug 25th 1200 UTC** to settle details / agree CRs etc.

For all discussions: Additional deadlines check points etc if needed are defined by the Rapporteur of each discussion respectively. In case some parts of an email discussion need more time, doesn’t converge, need on-line treatment, then please contact the chair.

# 2 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 |
| Huawei, HiSilicon | Tong Sha | shatong3@hisilicon.com |
| Qualcomm Incorporated | Masato Kitazoe | mkitazoe@qti.qualcomm.com |
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| vivo | Jing Liang | liangjing@vivo.com |
| Intel | Seau Sian Lim | seau.s.lim@intel.com |
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# 3 Discussion

## 3.1 First round: Intended to determine agreeable parts

### **Power Class 1.5**

[1] [R2-2207049](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207049.zip) On early implementation and capability signaling of Power Class 1.5 MediaTek Inc. discussion Rel-16 LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79

[2] [R2-2207094](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207094.zip) Make PC1.5 an early implementation candidate MediaTek Inc. CR Rel-16 38.331 16.9.0 3454 - F LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79

[3] [R2-2207095](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207095.zip) Make PC1.5 an early implementation candidate MediaTek Inc. CR Rel-17 38.331 17.1.0 3455 - A LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79

The discussion paper [1] indicates the necessity in the early implementation of PC1.5 and discloses a special power class reporting strategy which is unclear how would network treat such a UE capability. It proposed:

1. **Add PC 1.5 in the Table C-1 of TS 38.331 as the earliest implementable release is Rel-15.**
2. **The principle “Network regards the highest supported power class among all advertised ones as the supported capability” shall be captured in RAN2 specification.**

Therefore CRs [2][3] propose to make PC1.5 an early implementable feature to resolve prerequisite absence issue.

**Q1: Do companies agree with the intention of the CRs [2][3]?**

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| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Huawei, HiSilicon | Yes |  |
| Qualcomm Incorporated | Yes, but | Why is the proposed text only limit the early implementability to intra-band EN-DC, while the PC1.5 was introduced also for n41 NR SA?[MTK@v12] Text was kept unchanged and it was the title of the original draftCR R2-2006360. (Seems like 29dBm for DC\_(n)41 went earlier than n41 SA in RAN4 somehow) |
| Ericsson | See Comments | We are fine with P1.On P2, we prefer to capture the principle as a UE requirement, e.g. that “UE indicates all power classes it supports”. We typically avoid requirements on Nw impl in UE capabilities. We should keep that principle.[MTK@v12] As per we indicated in subclause 2.4 in [1], it is not viable to report “all power classes UE supports” by ENUMERATED type IE. We are fine to follow RAN2 principle. |
| Apple | OK to P1, no to P2 | Power-class handling has been different to other capabilities. The philosophy of p-max is that UE uses it’s power-class unless NW specifically informs otherwise. We are not sure if anything needs to be captured. UE report the capability and based on presence/absence of power config, the UE uses the relevant Tx power.[MTK@v12] Not sure if we read the comment correctly. So far, we learnt from previous PC1.5 discussion, some infra vendors had concern to commit setting P-max for proper Tx power restriction by NW side. |
| OPPO | Yes | Same comment as Qualcomm |
| Samsung | Fine for P1, but need to clarify P2 | Regarding P2, we would like to ask any inter-operability issue between gNB and UE, i.e. for legacy gNB not supporting Power Class 1.5, the field ue-PowerClass should be also set together with ue-PowerClass-v1610?[MTK@v12] In our understanding UE does not know if serving gNB is legacy one or up to which power class the gNB supports so there are different cases like we summarized in the Table 2-1 in [1]. The scenario you mentioned is also included. The intention of P2 is exact for interoperability problem avoidance. |
| Nokia | Yes | We think the title could be just "powerClass" as well (i.e., no suffixes), but what is being proposed is also fine. |
| vivo | Yes  | We think P1 is OK to us. For P2, no strong view and we can follow the majority. |
| MediaTek | Yes (Proponent) |  |
| Intel | Yes |  |
| ZTE | OK to P1, P2 need to be further clarified | Generally OK, but for the P2 we share the similar as Ericsson. |
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**Summary for Phase 1**

Total 11 companies responded to Q1 and gave input for P1 and P2 in [1]. All companies are okay to P1 to make PC1.5 an early implementable feature. 7 companies agreed with P2, and 4 companies thought it should be further clarified, or be captured in a UE requirement way.

By clear majority of the companies supported P1 in [1] and the Q1 herein, rapporteur proposes the following proposal:

**Proposal 1**: PC1.5 early implementation is agreed. Use [R2-2207094](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207094.zip) and [R2-2207095](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207095.zip) as baseline, CR details are discussed and finalized in Phase 2.

[4] [R2-2207085](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207085.zip) PC1.5 and legacy power class capability reporting clarification MediaTek Inc. CR Rel-16 38.306 16.9.0 0795 - F LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79

[5] [R2-2207086](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207086.zip) PC1.5 and legacy power class capability reporting clarification MediaTek Inc. CR Rel-17 38.306 17.1.0 0796 - A LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79

Based on the proposal in discussion paper [1], CRs [4][5] propose to clarify network interpretation when UE reports more than one PC (to gain better UL coverage in legacy NW).

**Q2: Do companies agree with the intention of the CRs [4][5]?**

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| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Huawei, HiSilicon | Yes |  |
| Qualcomm Incorporated | Yes |  |
| Ericsson | No |  |
| Apple | No |  |
| OPPO | Yes |  |
| Samsung | pending | Need to clarify. See above |
| Nokia | Yes | We think the title could be just "powerClass" as well (i.e., no suffixes), but what is being proposed is also fine. |
| vivo | No strong view |  |
| MediaTek | Yes (Proponent) |  |
| Intel | Yes |  |
| ZTE | FFS | It depends on the Q1, and we prefer to restrict it from the UE side. |
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**Summary for Phase 1**

Total 11 companies responded to Q2. 6 companies agreed the intention, 2 companies disagreed, 1 company had no strong view, and 2 companies thought it needs further clarification. The way to handling multiple power classes reporting in NW and UE side seems still controversial because of the particularity of power class capabilities and interoperability concerns.

By companies’ input (refer to previous section, companies view for P2 in [1]), rapporteur proposes the following proposal:

**Proposal 2**: RAN2 to clarify capability reporting aspects of power class further.

### **CSI-RS capability signaling**

[6] [R2-2207113](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207113.zip) Clarification on codebookParametersPerBC parameter for extension of CSI-RS capabilities reporting MediaTek Inc. CR Rel-16 38.331 16.9.0 3452 - F NR\_newRAT-Core, TEI16

[7] [R2-2207114](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207114.zip) Clarification on codebookParametersPerBC parameter for extension of CSI-RS capabilities reporting MediaTek Inc. CR Rel-17 38.331 17.1.0 3453 - A NR\_newRAT-Core, TEI16

CRs [6][7] point out a conflict that UE is required to report *codebookParametersPerBC* parameter under *CA-ParametersNR* for non-CA band combination and propose to clarify reporting condition.

**Q3: Do companies agree with the intention of the CRs [6][7]?**

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| **Company** | **Yes or No** | **Comments** |
| Huawei, HiSilicon | No | This is NBC. In current specification, it is required that both codebookParametersPerBC and codebookParametersPerBand should be reported together by UE if supported, regardless whether the BC is for CA or not. Then for the legacy NW, the NW would consider a UE not reporting codebookParametersPerBC as not supporting the corresponding enhanced codebook capability. If a UE is implemented according to the CR, then the enhanced codebooks can never be configured for a non-CA BC. We should avoid such a NBC change for a Rel-16 capability at this stage.  |
| Qualcomm Incorporated | Yes | But backward compatibility to legacy network must be assessed by infra-vendors. |
| Ericsson | Yes | The RAN1 LS stated that the per BC parameter is to be used to limit the CSI-RS resources that can be used across carriers, it was not meant for single CC case. How exactly would the NW use the per BC parameter in case of single CC case? |
| OPPO | Yes | But agree that the inter-operability issue needs to be considered by NW vendors. |
| Samsung | Yes | For the case of non-CA band combination, it is unclear what codebookParametersPerBC means.It seems less reasonable to include codebookParametersPerBC even for the case of non-CA band combination, due to the reason that non-CA band combination is also in BandCombinationList. |
| Nokia | Open to discuss | We agree with Huawei the CR seems NBC as it is written now.Although we agree that it seems counter-intuitive how to reconcile the non-CA BC i.e., single CC case with *CA-ParametersNR.* At least let’s first have a common understanding how the network is supposed to interpret the existing signalling and then we can maybe clarify. |
| vivo | Yes | The intention is OK to us but agree with companies that backward compatibility needs to be further evaluated. |
| MediaTek | Yes (Proponent) | Possible interoperability problem was mentioned in the coversheet. But we need to clarify and fix this issue by considering more release-independent NR bands are going to be introduced. |
| Intel | Yes | We agree that the change is NBC. As mentioned by Nokia, it is not clear why UE will populate CA-ParametersNR in a non-CA band combination just to add the codebookParametersPerBC. Also not clear why network will need this information for a non-CA case.  |
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**Summary for Phase 1**

Total 9 companies responded to Q3. 7 companies agreed to the intention, 1 company disagreed, and 1 company is open to discuss. Most companies supported the intention, but some concerned about backward compatibility check and asked for further clarification to these information handling/interpretation in UE and NW side.

By companies’ input, rapporteur proposes the following proposal:

**Proposal 3**: RAN2 continues technical clarification based on the CRs [R2-2207113](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207113.zip) and [R2-2207114](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207114.zip), and check the major concern from infra vendors and companies.

### **Beam management**

[8] [R2-2207331](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207331.zip) Correction on beamManagementSSB-CSI-RS Qualcomm Incorporated CR Rel-16 38.306 16.9.0 0765 - F TEI16

[9] [R2-2207332](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207332.zip) Correction on beamManagementSSB-CSI-RS Qualcomm Incorporated CR Rel-17 38.306 17.1.0 0766 - A TEI16

CRs [8][9] indicate that the current R2 specification does not correctly capture the RAN1 conclusion in RAN1#101-e regarding to the beam management capability and propose corresponding corrections.

**Q4: Do companies agree with the intention of the CRs [8][9]?**

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| **Company** | **Yes or No** | **Comments** |
| Huawei, HiSilicon | No | We do not see the description in the CR reflected in the RAN1 feature list nor in the LS to RAN2, thus it is not necessary to be captured in the 38.306.Besides, for FR2, it is confused how the UE indicates the capability according to the smallest SCS configured for PDSCH, since UE has no idea what is the smallest SCS of the serving cell(s) configured by the NW when reporting the capability information. Assuming that UE reports the capability according to the supported smallest SCS for FR2 band (e.g. 60kHz), then it is contradictory with the conclusion of the smallest SCS configured for PDSCH.We suggest to send RAN1 a LS, asking to clarify what does it mean by “For FR2, the parameter indicates the total number of resources across serving cells within 1 slot of the smallest subcarrier spacing configured for PDSCH in FR2”.  |
| Qualcomm Incorporated | Yes | At least the current text is incorrect and must be corrected.As for the FR2 capability (Huawei’s question), it is our understanding that the UE capability is semi-static regardless of the size of the smallest SCS that may be configured.We are OK sending an LS to RAN1, if majority prefer. |
| Ericsson |  | Fine to go with Huawei suggestion and ask clarifications to RAN1. |
| Apple | Yes | Same view as Qualcomm. |
| OPPO | Yes | Same view as Qualcomm |
| Samsung | Yes | Assume to reflect RAN1 conslusion |
| Nokia | Yes | Looks okay |
| vivo | Yes |  |
| MediaTek | No | By current specification, the number of CSI-RS resources are only counted **per FR without SCS constraint**. The TP reverses current specification without actual RAN1 agreement, thus it is a NBC which is unacceptable to us. |
| Intel | See comments | Agree with Huawei that the description is not reflected in the Rel-15 R1 feature list. However, if there is an issue with the current text, the concern from Huawei needs to be addressed.Note this may be functional NBC |
| ZTE | Yes[Rapp@v15] Not sure why Yes here. | Same view as Huawei |
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**Summary for Phase 1**

Total 11 companies responded to Q4. 7 companies agreed to the proposal, 2 company disagreed, and 2 companies shared same concern as other companies and thought the concerns on the TP changes needs to be addressed.

By companies’ input, rapporteur proposes the following proposal:

**Proposal 4**: RAN2 to discuss whether to send LS to RAN1 to clarify the original intention of the capability *beamManagementSSB-CSI-RS*, and to discuss what is current interpretation based on existing text.

### **MMSE-IRC**

[10] [R2-2207640](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207640.zip) CR to TS 38.306 on UE capability of MMSE-IRC receiver China Telecom CR Rel-15 38.306 15.17.0 0775 - F NR\_newRAT-Core

[11] [R2-2207641](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207641.zip) CR to TS 38.306 on UE capability of MMSE-IRC receiver China Telecom CR Rel-16 38.306 16.9.0 0776 - A NR\_newRAT-Core

CRs [10][11] propose new MMSE-IRC receiver capability shall be specified in TS 38.306 for Rel-15 based on RAN4 LS.

**Q5: Do companies agree with the intention of the CRs [10][11]?**

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| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Qualcomm Incorporated | Yes, but | Fine in principle. We do not see the need to talk about FDD/TDD differentiation for mandatory feature without signalling. Ideally, reference to RAN4 specification / section should be added so that it is clear what the corresponding feature is. |
| Ericsson | No | If the feature is mandatory for Rel-17, it seems odd to include an optional feature on 38.306 for Rel-15/16 that will later disappear from the specifications. Nothing would be broken if we do not capture anything. |
| Huawei, HiSilicon | Yes | Agree with the intention. |
| China Telecom | Yes | We think it is better to add the new MMSE-IRC receiver capability in R15 and R16 to make it clear. And we are also fine with Qualcomm’s suggestion on the detailed CR wording. |
| Samsung | Yes |  |
| Nokia | Yes, but the CR needs revisions | The CR is not totally ok although the intent may ok. The CR text talks about capability although this is feature without capability signaling. Also, the CR cover pages talks about new UE capability although this should be 'Optional features without UE radio access capability parameters'. The actual spec change seems to be correct but the cover page should be changed to indicate optional feature without UE capability to make sure that other companies won't propose a new capability as correction later.  RAN4 had decided that "Optional without capability signalling for Rel-15 and Rel-16. Mandatory without capability signalling from Rel-17". Thus, no new UE capability should be specified for this as indicated in RAN4's UE feature list attached to the LS. This same feature list also says that gNB does not need to know about this.Also, in our view this feature does not impact Radio Network as the RAN4 UE feature list already mentions that the network does not need to know it. This means that the network does not need to implement anything due to this CR.**1st change: Cover page changes****2nd change: Description updated** |
| vivo | Yes | Agree with the intention. |
| China Telecom | Yes | Thanks Nokia for the kind suggestion on the cover page and description update. We are fine to go for the revision suggested by Nokia. |
| MediaTek | No strong view | We are fine to capture RAN4 agreement in their feature list but in this case, we think RAN2 do not even mention the new hardware related capability which is optional without signaling in the Rel-15/16 specification in such a late stage. |
| Intel | Yes | This is aligned to R4 feature list for Rel-15 and Rel-16 that the UE cap is optional without signalling. |
| ZTE | Yes | Yes with Qualcomm and nokia’s comments |
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**Summary for Phase 1**

Total 10 companies responded to Q5. 8 companies agreed to the proposal but thought the CRs need revision, 1 company disagreed, and 1 company had no strong view. Clear majority of the companies agreed with the intention or supported that RAN2 should capture RAN4 feature list in principle. Additional feedbacks to TP wording and coversheet are valid and non-controversial.

By companies’ input, rapporteur proposes the following proposal:

**Proposal 5**: Proponent to provide the revision for [R2-2207640](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207640.zip) and [R2-2207641](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207641.zip). AS release scope and details of revision CRs are discussed and finalized in Phase 2.

### **Aperiodic CSI-RS**

[12] [R2-2208027](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208027.zip) Correction on crossCarrierA-CSI-trigDiffSCS-r16 (38.306) Ericsson CR Rel-17 38.306 17.1.0 0786 - A LTE\_NR\_DC\_CA\_enh-Core

[13] [R2-2208028](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208028.zip) Correction on crossCarrierA-CSI-trigDiffSCS-r16 (38.306) Ericsson CR Rel-16 38.306 16.9.0 0787 - F LTE\_NR\_DC\_CA\_enh-Core

CRs [12][13] proposed to clarify the meaning of the term. "A-CSI trigger" and to remove prerequisite capability description because the prerequisite had been already mandated to report.

**Q6: Do companies agree with the intention of the CRs [12][13]?**

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| **Company** | **Yes or No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes (Proponent) |  |
| Apple | Ok |  |
| Huawei, HiSilicon | Yes |  |
| China Telecom | Yes |  |
| Samsung | Yes |  |
| Nokia | Yes |  |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes on the first change | For the second change of removal of pre-requisite, the csi-RS-IM-ReceptionForFeedback is a mandatory UE capability with signalling (i.e. IOT bit). There does not seem to be any mistake in ensuring that this bit is set for the feature to be set. Hence we think that the pre-requisite should not be removed.  |
| ZTE | Yes |  |
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**Summary for Phase 1**

Total 11 companies responded to Q6. All companies agreed to the proposal but one with a different view for the 2nd change of the CRs. Clear majority of the companies agreed with the CRs.

By companies’ input, rapporteur suggests discussing the additional view on TP details in next phase and proposes the following proposal:

**Proposal 6**: Correction on *crossCarrierA-CSI-trigDiffSCS-r16* is agreed. Use [R2-2208027](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208027.zip) and [R2-2208028](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208028.zip),as baseline, CR details are discussed and finalized in Phase 2.

### **PDCCH blind detection**

[14] [R2-2206911](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2206911.zip) Reply LS on PDCCH Blind Detection in CA (R1-2205320; contact: Huawei) RAN1 LS in Rel-17 NR\_L1enh\_URLLC-Core To:RAN2

[15] [R2-2208501](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208501.zip) Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-16 38.306 16.9.0 0789 - F NR\_L1enh\_URLLC-Core

[16] [R2-2208502](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208502.zip) Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-17 38.306 17.1.0 0790 - A NR\_L1enh\_URLLC-Core

[17] [R2-2208503](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208503.zip) Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-16 38.331 16.9.0 3429 - F NR\_L1enh\_URLLC-Core

[18] [R2-2208504](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208504.zip) Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-17 38.331 17.1.0 3430 - A NR\_L1enh\_URLLC-Core

The TP in CRs [15][16][17][18] to capture agreements from RAN1 LS R2-2200079 and R2-2206911 [14]. Late non-critical extensions are added to avoid NBC problem.

**Q7: Do companies agree with the intention of the CRs [15][16][17][18]?**

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| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Ericsson |  | For 38.331, shouldn’t it be a choice structure between pdcch-BlindDetectionCA-MixedExt-r16 and pdcch-BlindDetectionCG-UE-MixedExt-r16? So the UE could report the CA value on the CA branch and the NR-DC value on the NR-DC branch.For 38.306: We don’t need to capture the aspects 2) and 3) from the coversheet (also pasted below) because they are already clear from ASN.12) Clarify that only one between pdcch-BlindDetectionCA-Mixed-r16 and pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16 can be reported by UE, only one between pdcch-MonitoringCA-r16 and pdcch-MonitoringCA-NonAlignedSpan-r16 can be reported by UE.3) Clarify that pdcch-BlindDetectionMCG-UE-Mixed-r16 for MCG and pdcch-BlindDetectionSCG-UE-Mixed-r16 for SCG should be reported together if supported by UE.This sentence is awfully long. Possible to increase readability by splitting to more sentences?: “If a UE supports *pdcch-BlindDetectionCA-Mixed-r16*or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16*, then the capability defined by *pdcch-BlindDetectionCA-Mixed-r16*or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16* is applied to the combination of *pdcch-BlindDetectionMCG-UE-Mixed-r16 and pdcch-BlindDetectionSCG-UE-Mixed-r16*, if a UE supports *pdcch-BlindDetectionCA-Mixed-v16xy* or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16xy*, then the capability defined by *pdcch-BlindDetectionCA-Mixed-v16xy* or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16xy* is applied to the combination of *pdcch-BlindDetectionMCG-UE-Mixed-v16xy and pdcch-BlindDetectionSCG-UE-Mixed-v16xy* correspondingly as defined in clause 10 in TS 38.213.”The formatting of the RRC CRs seems wrong. The spacing between lines is larger than it should be and some indentations are incorrect. If/when merged these should be fixed. |
| Apple | Yes, we agree with the intent. |  |
| OPPO (Zhe) | Yes |  |
| Huawei, HiSilicon | Yes | We share our understanding according to the comments from Ericsson,For 38.331,According to RAN1 LS, one combination of (*pdcch-BlindDetectionMCG-UE-r15, pdcch-BlindDetectionSCG-UE-r15, pdcch-BlindDetectionMCG-UE-r16, pdcch-BlindDetectionSCG-UE-r16*) corresponds to one combination of (*pdcch-BlindDetectionCA-r15, pdcch-BlindDetectionCA-r16*) reported for FG 11-2c or FG 11-2g, that means pdcch-BlindDetectionCA-MixedExt-r16 and pdcch-BlindDetectionCG-UE-MixedExt-r16 can be reported simultaneously and they are one-to-one mapping. That’s why we put them together within one entry of a SEQUENCE type of list.For 38.306,The clarification of 2) 3) is for the legacy Rel-16 capability fields. For 2), in current spec, the pdcch-BlindDetectionCA-Mixed-r16 and pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16 are two separate capability fields both defined as OPTIONAL, then according to RAN1 LS, it should be clarified that only one between them can be reported. There is similar issue for 3). As Ericsson mentioned, to avoid confusion, for the extended combinations added in the CR, ASN.1 signalling has been improved to reflect such restrictions. But it is still necessary to make some clarification for the legacy fields in 38.306 since we use a backward-compatible way to introduce the extended combinations in addition to the existing ones. For the long sentence, perhaps we can have a combined description for legacy field and the extended capability fields, like“If a UE supports *pdcch-BlindDetectionCA-Mixed*or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan*, then the capability defined by *pdcch-BlindDetectionCA-Mixed*or *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan* is applied to the combination of *pdcch-BlindDetectionMCG-UE-Mixed and pdcch-BlindDetectionSCG-UE-Mixed,* as defined in clause 10 in TS 38.213.” |
| China Telecom | Yes |  |
| Samsung | Yes |  |
| Nokia | Yes | Some feedback from our side:1. For this change ***pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16, pdcch-BlindDetectoinCA-Mixed-NonAlignedSpan-v16xy*** we should have this note here again: “Only one between *pdcch-BlindDetectionCA-Mixed-r16* and *pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16* can be reported by UE.”
2. ***pdcch-MonitoringCA-NonAlignedSpan-r16*** Similar comment, repeat the note of the capability above here: “Only one between pdcch-MonitoringCA-r16 and pdcch-MonitoringCA-NonAlignedSpan-r16 can be reported by UE.”
 |
| vivo | Yes |  |
| MediaTek | Yes | We agree with the intent. |
| Intel | Yes | We agree with the CRs. The details can be discussed in the second phase. |
| ZTE | Yes |  |
|  |  |  |

**Summary for Phase 1**

Total 12 companies responded to Q7. 11 companies agreed to the proposal but with some feedbacks to the TP. 1 company pointed out concerns on ASN.1, TPs, and coversheet and the understanding was also shared by proponent. Clear majority of the companies supported the CRs or the intent with few further comments.

By companies’ input, rapporteur suggests that further comments on TP details can be discussed further in next phase. Therefore, the proposal is as below:

**Proposal 7**: Proponent to provide the revision for [R2-2208501](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208501.zip), [R2-2208502](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208502.zip), [R2-2208503](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208503.zip) and [R2-2208504](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208504.zip), CR details are discussed and finalized in Phase 2.

### **PUSCH repetition**

[19] [R2-2208505](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208505.zip) Clarification on pusch-RepetitionTypeA-r16 capability Huawei, HiSilicon CR Rel-16 38.306 16.9.0 0791 - F NR\_L1enh\_URLLC-Core

[20] [R2-2208506](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208506.zip) Clarification on pusch-RepetitionTypeA-r16 capability Huawei, HiSilicon CR Rel-17 38.306 17.1.0 0792 - A NR\_L1enh\_URLLC-Core

CRs [19][20] propose to capture prerequisites for FG11-6 mentioned in RAN1 feature list, and also to clarify corresponding parameters for unlicensed band case.

**Q8: Do companies agree with the intention of the CRs [19][20]?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Comments** |
| Qualcomm Incorporated | Yes, but | The first change in pusch-RepetitionTypeA-r16 does not seem necessary. It is merely explaining how the feature works. Usually, we only provide a pointer to the feature itself, and do not explain the feature itself in detail. |
| Ericsson | Yes | Agree with QC. |
| Apple | Yes but | While we agree with the intention and think that the CRs are ok in general, we think that the capability description needs an update (not directly related but should be corrected). The statement *"Indicates whether the UE supports PUSCH transmission with or without slot aggregation”* does not make sense since PUSCH transmission without slot aggregation is basic functionality and does not need to be covered by a UE capability. The feature is not about whether the UE supports slot aggregation or not (which is provided by of type2-PUSCH-RepetitionMultiSlots and pusch-RepetitionMultiSlots). Instead, it is about whether the UE supports the dynamic indication of the number of repetitions. In the RAN1 UE feature list, “with or without aggregation” was used because the dynamic indication could indicate a value of 1, meaning no slot aggregation, or a value of larger than 1, meaning with slot aggregation.We would suggest correcting the above statement by replacing the text with: *“Indicates whether the UE supports the dynamic indication of the number of repetitions for PUSCH transmission, as specified in TS 38.214 [12], clause 6.1.2.1.”* |
| OPPO (Zhe) | Yes, but | We suggest removing the first change because there is usually no detailed explanation of one feature in 306 spec. |
| Huawei, HiSilicon | Yes | We agree with Apple that the current field description doesn’t capture the actual meaning for the Rel-16 capability introduced by RAN1, thus it is necessary to make some correction to differentiate it from the Rel-15 capability.The text proposed by Apple is fine for us. |
| China Telecom | Yes |  |
| Samsung | Yes |  |
| Nokia | Yes, but | Agree with Qualcomm |
| vivo | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| ZTE | Yes, but | Agree with Qualcomm |
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**Summary for Phase 1**

Total 12 companies responded to Q8. All companies agreed to the proposal but with some suggestions to the TP. Clear majority of the companies supported the CRs.

By companies’ input, rapporteur proposes the following proposal:

**Proposal 8**: Clarification on *pusch-RepetitionTypeA-r16* is agreed. Proponent to provide the revision for [R2-2208505](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208505.zip) and [R2-2208506](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208506.zip), CR details are discussed and finalized in Phase 2.

## 3.2 Second round: Further discussion

### **Power Class 1.5**

For **Proposal 2** in phase 1 discussion, companies are invited to provide views on following questions to further check whether RAN2 specification change is necessary for multiple UE power class capability reporting: (We intend to check if any ambiguity in multiple UE power classes capability reporting scenario needs to be captured in the RAN2 specification.)

**Q9: Please companies provide the agreeable option and comments if any:**

**Option 1: UE can report both (*ue-PowerClass* / *powerClass*) and (*ue-PowerClass-v1610* / *powerClass-v1610*) capability it supports and there is no interoperability problem is foreseen.**

**Option 2: UE can report either (*ue-PowerClass* / *powerClass*) or (*ue-PowerClass-v1610* / *powerClass-v1610*) it supports.**

 **Option 3: Other (Provide your views/comments)**

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| **Company** | **Option 1, 2, or 3** | **Comments** |
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**Q10: Based on the answer in Q9, any foreseeable ambiguity should be further clarified and captured in RAN2 spec?**

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| **Company** | **Yes or No** | **Comments** |
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### **CSI-RS capability signaling**

For **Proposal 3** in phase 1 discussion, companies are invited to provide views on following questions:

**Q11: Do companies agree that UE only includes IE *CA-ParametersNR* and its child capability parameters for carrier aggregation operation for a given CABC?**

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| **Company** | **Yes or No** | **Comments** |
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**Q12: By summary for [6]** [**R2-2207113**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207113.zip)**, [7]** [**R2-2207114**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207114.zip) **in phase 1 discussion, please companies check backward compatibility issue for the non-CA operation, and provide your choice and comments:**

**Option 1: As per [6][7].**

**Option 2: Use [6][7] but to add additional field description to address the alternative of *codebookParametersPerBC* for non-CA operation.**

**Additional FD example: …the field *codebookParametersPerBand* as an alternative of *codebookParametersPerBC* in codebook operation for a given non-CA band combination…**

 **Option 3: Other (Please provide your alternatives for resolution or comments)**

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| **Company** | **Option 1, 2, or 3** | **Comments** |
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### **Beam management**

For **Proposal 4** in phase 1 discussion, companies are invited to provide views on following questions:

**Q13: Do companies agree that current definition of parameter *beamManagementSSB-CSI-RS* is unclear or even incorrect, and RAN2 needs to send LS to RAN1 for further clarification? (Provide your current interpretation based on existing 38.306 text as well.)**

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| **Company** | **Yes or No** | **Comments** |
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# 4 Conclusions

**Phase 1**

**Proposal 1**: PC1.5 early implementation is agreed. Use [R2-2207094](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207094.zip) and [R2-2207095](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207095.zip) as baseline, CR details are discussed and finalized in Phase 2.

**Proposal 2**: RAN2 to clarify capability reporting aspects of power class further.

**Proposal 3**: RAN2 continues technical clarification based on the CRs [R2-2207113](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207113.zip) and [R2-2207114](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207114.zip), and check the major concern from infra vendors and companies.

**Proposal 4**: RAN2 to discuss whether to send LS to RAN1 to clarify the original intention of the capability *beamManagementSSB-CSI-RS*, and to discuss what is current interpretation based on existing text.

**Proposal 5**: Proponent to provide the revision for [R2-2207640](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207640.zip) and [R2-2207641](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2207641.zip). AS release scope and details of revision CRs are discussed and finalized in Phase 2.

**Proposal 6**: Correction on *crossCarrierA-CSI-trigDiffSCS-r16* is agreed. Use [R2-2208027](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208027.zip) and [R2-2208028](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208028.zip),as baseline, CR details are discussed and finalized in Phase 2.

**Proposal 7**: Proponent to provide the revision for [R2-2208501](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208501.zip), [R2-2208502](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208502.zip), [R2-2208503](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208503.zip) and [R2-2208504](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208504.zip), CR details are discussed and finalized in Phase 2.

**Proposal 8**: Clarification on *pusch-RepetitionTypeA-r16* is agreed. Proponent to provide the revision for [R2-2208505](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208505.zip) and [R2-2208506](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119-e/Docs/R2-2208506.zip), CR details are discussed and finalized in Phase 2.

# 5 References

1. R2-2207049 On early implementation and capability signaling of Power Class 1.5 MediaTek Inc. discussion Rel-16 LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79
2. R2-2207094 Make PC1.5 an early implementation candidate MediaTek Inc. CR Rel-16 38.331 16.9.0 3454 - F LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79
3. R2-2207095 Make PC1.5 an early implementation candidate MediaTek Inc. CR Rel-17 38.331 17.1.0 3455 - A LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79
4. R2-2207085 PC1.5 and legacy power class capability reporting clarification MediaTek Inc. CR Rel-16 38.306 16.9.0 0795 - F LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79
5. R2-2207086 PC1.5 and legacy power class capability reporting clarification MediaTek Inc. CR Rel-17 38.306 17.1.0 0796 - A LTE\_NR\_B41\_Bn41\_PC29dBm, HPUE\_PC1\_5\_n77\_n78, NR\_UE\_PC1\_5\_n79
6. R2-2207113 Clarification on codebookParametersPerBC parameter for extension of CSI-RS capabilities reporting MediaTek Inc. CR Rel-16 38.331 16.9.0 3452 - F NR\_newRAT-Core, TEI16
7. R2-2207114 Clarification on codebookParametersPerBC parameter for extension of CSI-RS capabilities reporting MediaTek Inc. CR Rel-17 38.331 17.1.0 3453 - A NR\_newRAT-Core, TEI16
8. R2-2207331 Correction on beamManagementSSB-CSI-RS Qualcomm Incorporated CR Rel-16 38.306 16.9.0 0765 - F TEI16
9. R2-2207332 Correction on beamManagementSSB-CSI-RS Qualcomm Incorporated CR Rel-17 38.306 17.1.0 0766 - A TEI16
10. R2-2207640 CR to TS 38.306 on UE capability of MMSE-IRC receiver China Telecom CR Rel-15 38.306 15.17.0 0775 - F NR\_newRAT-Core
11. R2-2207641 CR to TS 38.306 on UE capability of MMSE-IRC receiver China Telecom CR Rel-16 38.306 16.9.0 0776 - A NR\_newRAT-Core
12. R2-2208027 Correction on crossCarrierA-CSI-trigDiffSCS-r16 (38.306) Ericsson CR Rel-17 38.306 17.1.0 0786 - A LTE\_NR\_DC\_CA\_enh-Core
13. R2-2208028 Correction on crossCarrierA-CSI-trigDiffSCS-r16 (38.306) Ericsson CR Rel-16 38.306 16.9.0 0787 - F LTE\_NR\_DC\_CA\_enh-Core
14. R2-2206911 Reply LS on PDCCH Blind Detection in CA (R1-2205320; contact: Huawei) RAN1 LS in Rel-17 NR\_L1enh\_URLLC-Core To:RAN2
15. R2-2208501 Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-16 38.306 16.9.0 0789 - F NR\_L1enh\_URLLC-Core
16. R2-2208502 Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-17 38.306 17.1.0 0790 - A NR\_L1enh\_URLLC-Core
17. R2-2208503 Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-16 38.331 16.9.0 3429 - F NR\_L1enh\_URLLC-Core
18. R2-2208504 Correction on PDCCH Blind Detection capability in CA Huawei, HiSilicon CR Rel-17 38.331 17.1.0 3430 - A NR\_L1enh\_URLLC-Core
19. R2-2208505 Clarification on pusch-RepetitionTypeA-r16 capability Huawei, HiSilicon CR Rel-16 38.306 16.9.0 0791 - F NR\_L1enh\_URLLC-Core
20. R2-2208506 Clarification on pusch-RepetitionTypeA-r16 capability Huawei, HiSilicon CR Rel-17 38.306 17.1.0 0792 - A NR\_L1enh\_URLLC-Core