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

**E-Meeting, 17th – 29th August 2022**

**Agenda Item:** **6.0.2**

**Source:**  **Intel Corporation**

**Title:** **Report of [AT119-e][014][NR17] UE Caps Main (Intel)**

**Document for:** **Discussion/Decision**

# Introduction

This document aims to summarize all the papers that have been submitted to agenda item 8.20.2 of RAN2#118-e and handle the offline discussion below:

* [AT119-e][014][NR17] UE caps Main (Intel)

Scope: Treat R2-2206957, R2-2206971, R2-2207276, R2-2207277, R2-2207962, R2-2207849, R2-2207971, R2-2207972, R2-2208507, R2-2208508, R2-2208509. Take into account ALL relevant incoming LSes. Determine agreeable parts and capture in CRs. Merge WI specific R17 UE caps draft CRs, endorsed in the Wi specific sessions.

Intended outcome: Report, UE caps Mega CRs (agreed in the end), LS out if applicable

Deadlines: Friday 19 August 1000 UTC (Phase 1)

# Companies’ point of contact

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# Release-17 UE capabilities based on R1 and R4 feature lists

[1] and [2] are TS38.306 and 331 CRs capturing further rel-17 UE capabilities based on the RAN1 UE feature list (R1-2205607) and RAN4 UE feature list (R4-2211189).

For these 2 CRs, the review comments should be provided directly to the CRs in the draft folder using RIL format as before.

# Editorial corrections on UE capabilities

[3] contains some editorial comments on the existing implemented Rel-17 UE capabilities as listed below:

1. A few important abbreviations are added

2. Minor typo in mg-ActivationCommPRS-Meas-r17

3. Redundant text in mg-ActivationRequestPRS-Meas-r17

4. Clarifying DL and UL in sub-feature capabilities for srs-AntennaSwitchingBeyond4RX-r17

5. Grant type 1 and Grant type 2 capabilities both can be supported by the UE (clarified in other places using and/or)

6. Clarifying purpose for aperiodicCSI-RS-AdditionalBandwidth-r17

7. Clarifying basic capabilities for aperiodicCSI-RS-FastScellActivation-r17

8. Minor clarifications to codebookComboParameterMixedType-r17 including dependent capability listed twice

9. Minor clarifications to codebookComboParameterMultiTRP-r17

10. Minor clarification to beamManagementType-r16, beamManagementType-CBM-r17

11. Minor clarifications to codebookComboParameterMixedTypePerBC-r17

12. Remove square bracket for sfn-SchemeB-DynamicSwitching-r17

13. Clarifying what TB2 means in maxNumberMIMO-LayersMulticastPDSCH-r17

14. Clarifying description of power control parameter sets in mTRP-PUCCH-IntraSlot-r17

15. Minor clarification to number of entries in cg-TimeDomainAllocationExtension-r17

16. Minor clarification to slotBasedDynamicPUCCH-Rep-r17

17. Minor clarification to concurrentMeasGap-r17

18. Minor clarification to condHandoverWithSCG-NRDC-r17

19. Minor clarification to guardSymbolReportReception-IAB-r17

20. Clarified and/or in Skipping UL configured grant

**4. Do companies agree to the all the above editorial corrections? If not, please list the editorial changes that are not acceptable.**

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| **Companies** | **Yes/No** | **Comments** |
| Intel | Generally ok except for 3) | For 3) on the redundant text for mg-ActivationRequestPRS-Meas-r17, it is clearly mentioned it is to indicate two functions in the R1 feature:  1. Support of using UL MAC CE to request measurement gap activation/deactivation for PRS measurements: The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG  2. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID  By removing the first “preconfiguration of MGs in RRC signalling for PRS measurement”, the second meaning in RAN1 feature lists is missing.  Therefore it would be good to keep the sentence, and change the description as below in red ink  ***mg-ActivationRequestPRS-Meas-r17***  Indicates whether UE supports preconfiguration of MGs in RRC signalling for PRS measurements and supports the use of UL MAC CE, as specified in TS 38.321 [8], to request the activation/deactivation of the preconfigured MG for PRS measurements. The UE can include this field only if the UE supports *mg-ActivationCommPRS-Meas-r17*.  The above changes can be merged directly to the [1] |
| Huawei, HiSilicon | See comments | For 3), we agree that the previous description should keep unchanged according to the latest RAN1 feature list.  For 4), if the field name changes, there should be correction for the field name in 38.331 at the same time.  For 6) aperiodic CSI-RS for tracking has the same meaning of TRS, no need to change  For 7), according to RAN1 feature list, the referenced feature is FG 2-33, which is specified by *csi-RS-IM-ReceptionForFeedback* and *csi-RS-IM-ReceptionForFeedbackPerBandComb*  For 9), according to latest RAN1 feature list, the *supportedCSI-RS-ResourceList* is one of the prerequisite, then it should not be removed |
| Qualcomm Incorporated | See comments | - UE capability parameter name changes under srs-AntennaSwitchingBeyond4RX-r17 are not essential (also proposed in CR to 38.331 in R2-2207972).  - The change to aperiodicCSI-RS-AdditionalBandwidth-r17 can read "Aperiodic CSI-RS bandwidth for tracking".  - The first change to codebookComboParameterMixedType-r17 and codebookComboParameterMixedTypePerBC-r17: The current text is according to RAN1 feature list. Any reason to change?  - We didn't understand the intention for the change in section 6. |
| Nokia | Yes | We are fine with absorbing the changes to rapporteur CR and as companies see fit. |

# Capturing one shot large UL timing adjustment (for HST FR2)

[4] attempts to implement the following RAN4 feature in the RAN4 feature list (R4-2211189):

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| 22. NR\_HST\_FR2 | 22-2 | Support of one shot large UL timing adjustment | 1) Support of one shot large UL timing adjustment | 22-1 Support of FR2 HST operation | Yes | No | UE does not support one shot large UL timing adjustment | Per Band | NO | FR2 only | N/A |  | Optional with capability signaling |

However, [4] only include the new RAN4 UE capability to TS38.306 without TS38.331 update. Hence this change is incomplete. Anyway, this same UE capability has already been implemented in [1] and [2], as part of the implementation of the latest R1 and R4 feature list. Hence, rapporteur suggests to comment any update of the field description of the new RAN4 feature directly in [1].

**5. Do companies agree with rapporteur’s proposal to comment directly on this new RAN4 UE capability directly in [1] and [2] using RIL?**

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| **Companies** | **Yes/No** | **Comments** |
| Intel | Yes | Agree with the rapporteur to comment on the field description text of the new R4 capability directly in [1]. |
| Qualcomm Incorporated | Yes |  |
| Nokia | Yes | Okay to go with rapporteur’s proposal, thanks! |

# Corrections to UE capabilities to TS38.306

The CR [5] has the following reason for change:

Explain the corresponding changes:

1. Clarification to channelBWs-DL-SCS-480kHz-FR2-2-r17, channelBWs-DL-SCS-960kHz-FR2-2-r17, channelBWs-UL-SCS-480kHz-FR2-2-r17, channelBWs-UL-SCS-960kHz-FR2-2-r17. Clarifying that “this feature” means 400 MHz aspect and not the feature with the capability. Also intra-band EN-DC capability is not applicable to these capabilities as there is no FR2-2 relevance for *supportedBandwidthCombinationSetIntraENDC* for FR2-2
2. Clarification to max-HARQ-ProcessNumber-r17 (updating feature applicablility)
3. Clarification to mTRP-PUSCH-TypeA-CB-r17 (capturing the dependency in 23-3-1)
4. Clarification to concurrentMeasGap-r17 (aligning to 19-2 description)

**Q6 Do companies agree with the proposed changes in the CR? If not, please explain**

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| **Company** | **Yes/No** | **Comments** |
| Intel | Partly, see comments | We are fine with the change to 3) and can merge this to [1].  For 1), our understanding is that “this feature” is not just for 400MHz aspect as the channel bandwidths for the respective SCSs are only applicable if the corresponding SCSs are supported by the UE for FR2-2. Hence we do not think 1) is correct. This is also reflected as pre-requiste in the R4 feature list:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | | 15. NR\_ext\_to\_71GHz | 15-3 | UE support of CBW for 480kHz SCS | Support of {800, 1600} CBW for 480kHz SCS | Support of 480kHz SCS | | 15. NR\_ext\_to\_71GHz | 15-4 | UE support of CBW for 960kHz SCS | Support of {800, 1600, 2000} CBW for 960kHz SCS | Support of 960kHz SCS |   For 2), there is a new text added by RAN1 in the feature list as follow and is implemented in [1] and hence it is now made clear the feature applicability:  Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104  For 4), this is already part of change 19 in [3] as editorial clarification. Hence we do not see the need to duplicate this change in 2 draft CRs. |
| Huawei, HiSilicon |  | Agree with Intel |
| Qualcomm Incorporated |  | For 1), there is a CR under 71GHz WI agenda proposing major restructuring. This should be discussed togher in the session. Agree with Intel about 400MHz. Removal of EN-DC looks correct. |
| Nokia |  | Okay to go with the proposal for companies. Removal of EN-DC is important, please don’t forget it. |
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# Corrections to UE capabilities to TS38.331

The CR [6] has the following reason for change:

1. Clarification to max-HARQ-ProcessNumber-r17 (updating feature applicablility)
2. Editorial correction clarifying DL and UL in sub-feature capabilities for srs-AntennaSwitchingBeyond4RX-r17

**Q7 Do companies agree with the proposed changes in the CR?**

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| **Company** | **Yes/No** | **Comments** |
| Intel | Partly Yes | The 2nd change is fine as it aligns with the (4) in [3] and can be merged directly to the rapporteur CR in [2]. For the 1st change, the changes are to the configuration part of the field description and this cannot be included/merged to the mega CR. |
| Qualcomm Incorporated | No | - The changes to PDSCH-ServingCellConfig and PUSCH-ServingCellConfig and are not related to UE capability. Should not be captured in a UE capability CR.  - First change to nrofHARQ-ProcessesForPUSCH is wrong since there is no nrofHARQ-ProcessesForPUSCH (without suffix).  - UE capability parameter name changes in BandCombinationList are not essential. (also proposed in R2-2207849). |
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# Correction on positioning SRS transmission capability

The discussion paper [7] and the corresponding CRs [8, 9]. The reason for change is as follow:

1) According to the latest RAN1 UE features list, the FG 27-15a indicates positioning SRS transmission capability in RRC\_INACTIVE state for initial BWP with semi-persistent SRS capability. The FG 27-15a is optional with capability signalling. From RAN1 understanding, a UE supporting FG 27-15a shall indicate support of FG 27-15 as prerequisite, while a UE supporting FG 27-15 may not support FG 27-15a.

However, in current 38.331, the features introduced for FG 27-15 and FG 27-15a are included as mandatory fields within the IE *srs-PosResourcesRRC-Inactive-r17*. That means FG 27-15 and FG 27-15a have to be signalled together. A UE supporting FG27-15 must indicate support of FG 27-15a. This is not aligned with RAN1 feature list.

2) Besides, in current 38.331, the capability fields for FG 27-15b and FG 27-15c are all defined as optional. To make the feature group workable and usable by the network, it should be clarified that the fields for FG 27-15c should be signalled together if supported by UE, and the fields for FG 27-15b should be signalled together except for the ones especially indicated as optional according to the NOTEs.

3) Lastly, there is a mistake on the referred capability field of *maxNumOfSemiPersistentSRSposResourcesPerSlot-r17* in the note2 for *posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17*.

**Q7 Do companies agree with the proposed changes in the CR?**

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| **Company** | **Yes/No** | **Comments** |
| Intel | Yes, with comments | We are fine with changes 1) and 3). For change 2), we normally do not specify such condition in a capabilities but would be ok to go with the majority. |
| Huawei, HiSilicon | Yes | For 2), our understanding is, generally if the components within a feature group are madantory to report, then they should be defined as mandatory sub-fields within a capability field/IE, e.g. like *SRS-PosReousrces-r16*. However, considering the sub-fields for FG25-15b/c have been defined as OPTIONAL in 38.331, it is necessary to clarify in 38.306 that these sub-fields should be reported together by UE if the feature is supported, otherwise, the feature can not be configured by the NW. |
| Qualcomm Incorporated | Yes, but | For R2-2208508, we wonder if NOTE 2, 3 and 4 are really necessary. They are simply stating the opposite of UE capability definitions, i.e. incapability in case of absence. (We understand these are what RAN1 feature list indeed says, but..). |
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# Conclusion

To be added latter

# References

[1] R2-2207276 Release-17 UE capabilities based on R1 and R4 feature lists (TS38.306) Intel Corporation CR Rel-17 38.306 17.1.0 0764 - B NR\_MBS-Core, NR\_IAB\_enh-Core, NR\_IIOT\_URLLC\_enh-Core, NR\_UE\_pow\_sav\_enh-Core, NR\_NTN\_solutions-Core, NR\_pos\_enh-Core, NR\_redcap-Core, NR\_SL\_enh-Core, NR\_FeMIMO-Core, NR\_cov\_enh-Core, NR\_DL1024QAM\_FR1, NR\_HST\_FR2, NR\_HST\_FR1\_enh, NR\_BCS4-Core, NR\_FR2\_FWA\_Bn257\_Bn258-Core, NR\_SAR\_PC2\_interB\_SUL\_2BUL, NR\_MG\_enh-Core, NR\_ext\_to\_71GHz-Core, NG\_RAN\_PRN\_enh-Core, NR\_QoE-Core, NR\_ENDC\_SON\_MDT\_enh-Core, NR\_SL\_relay-Core, NR\_SmallData\_INACTIVE, LTE\_NR\_MUSIM-Core, NR\_RF\_FR1\_enh, NR\_UDC-Core, LTE\_NR\_DC\_enh2-Core, NR\_slice-Core, NR\_RF\_FR2\_req\_enh2-Core, NR\_DSS-Core

[2] R2-2207277 Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331) Intel Corporation CR Rel-17 38.331 17.1.0 3244 - B NR\_MBS-Core, NR\_IAB\_enh-Core, NR\_IIOT\_URLLC\_enh-Core, NR\_UE\_pow\_sav\_enh-Core, NR\_NTN\_solutions-Core, NR\_pos\_enh-Core, NR\_redcap-Core, NR\_SL\_enh-Core, NR\_FeMIMO-Core, NR\_cov\_enh-Core, NR\_DL1024QAM\_FR1, NR\_HST\_FR2, NR\_HST\_FR1\_enh, NR\_BCS4-Core, NR\_FR2\_FWA\_Bn257\_Bn258-Core, NR\_SAR\_PC2\_interB\_SUL\_2BUL, NR\_MG\_enh-Core, NR\_ext\_to\_71GHz-Core, NG\_RAN\_PRN\_enh-Core, NR\_QoE-Core, NR\_ENDC\_SON\_MDT\_enh-Core, NR\_SL\_relay-Core, NR\_SmallData\_INACTIVE, LTE\_NR\_MUSIM-Core, NR\_RF\_FR1\_enh, NR\_UDC-Core, LTE\_NR\_DC\_enh2-Core, NR\_slice-Core, NR\_RF\_FR2\_req\_enh2-Core, NR\_DSS-Core

[3] R2-2207849 Editorial corrections on UE capabilities Nokia, Nokia Shanghai Bell CR Rel-17 38.306 17.1.0 0779 - F NR\_IIOT\_URLLC\_enh, LTE\_NR\_DC\_enh2, NR\_FeMIMO-Core, LTE\_NR\_DC\_enh2-Core, NR\_IAB\_enh-Core, NR\_RF\_FR2\_req\_enh2-Core, NR\_MG\_enh-Core, NR\_pos\_enh, NR\_cov\_enh2-Core

[4] R2-2207962 Capturing one shot large UL timing adjustment Nokia, Nokia Shanghai Bell CR Rel-17 38.306 17.1.0 0783 - B NR\_HST\_FR2\_enh-Core

[5] R2-2207971 Corrections to UE capabilities Nokia, Nokia Shanghai Bell CR Rel-17 38.306 17.1.0 0784 - F NR\_FeMIMO-Core, NR\_IIOT\_URLLC\_enh-Core, NR\_NTN\_solutions-Core, NR\_MG\_enh-Core

[6] R2-2207972 Corrections on UE capabilities Nokia, Nokia Shanghai Bell CR Rel-17 38.331 17.1.0 3339 - F NR\_NTN\_solutions-Core

[7] R2-2208507 Discussion on positioning SRS transmission capability Huawei, HiSilicon discussion Rel-17 NR\_pos\_enh-Core

[8] R2-2208508 Correction on positioning SRS transmission capability Huawei, HiSilicon CR Rel-17 38.306 17.1.0 0793 - F NR\_pos\_enh-Core

[9] R2-2208509 Correction on positioning SRS transmission capability Huawei, HiSilicon CR Rel-17 38.331 17.1.0 3431 - F NR\_pos\_enh-Core