**3GPP TSG-RAN WG4 Meeting # 98-e R4-21XXXXX**

**Electronic Meeting, 25 January – 5 February 2021**

**Agenda item:** 4.2.3, 7.5.1, 15.2

**Source:** Ericsson

**Title:** Email discussion summary for [98e][108] LTE\_NR\_DC\_CA\_enh\_RF

**Document for:** Information

# Introduction

This email discussion concerns three topics

1. Maintenance of 38.101-1, 38.101-3 and 38.307 (EN-DC and NR-DC)
2. Reply LS to RAN2 on P-Max for FR2
3. Single uplink operation (including action upon the LS from RAN in RP-202622)

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round:
	+ decide on which of the maintenance CRs to pursue
	+ decide on which one of the submitted draft RAN2 reply LSs to send
	+ decision on how to capture single-UL only (SUO) in the RAN4 specifications and need for an LS to RAN/RAN2
* 2nd round: TBA

# Topic #1: Maintenance of 38.101-1, 38.101-3 and 38.307

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2100798 | MediaTek Inc. | MSD due to wider BW evaluation for DC\_28\_n5(Background to CR in R4-2100844) |
| R4-2100844 | MediaTek Inc.  | Title: CR for 38.101-3 Correction on EN-DC MSD due to cross band isolation for DC\_28\_n5 (R16)CR to 38.101-3 Rel-16 (Cat F)Reason for change: MSD due to introducing wider CBW was further discussed and more IMD impairment shall be considered due to wider NR channel BW. There is MSD due to CIM5 for DC\_28\_n5. Corrections are needed.Summary of change: Add MSD due to CIM5 due to NR wider CBW according to R4-2100798 |
| R4-2102207 | ZTE Corporation, CHTTL | Title: CR to TS 38.307 on the definition of the duplex-mode for the band configurationsCR to 38.307 (Rel-15)Reason for change: In current 38.307 spec, there are no definitions for the ‘duplex-mode’ in the table. Due to there are lots of types of band configurations including ENDC, NR-CA, SUL, etc, it is necessary to add the NOTE in the table to describe the meaning of the ‘duplex-mode’ for a certain type of band configuration, especially more and more types of configurations will be added in future.Also, several ‘FDD and TDD’ inter-band ENDC for PC3 are defined in Rel-15.Summary of change: By using the similar method of TS36.307, the NOTE for each ‘duplex-mode’ in the table is added. Also duplex mode of ‘FDD and TDD’ is added for PC3 inter-band ENDC.*Moderator comment: related CR in R4-2101989 under agenda 4.2.1 [102]* |
| R4-2102408 | Qualcomm Incorporated | Title: Missing parent clause for NR-DC PCMAXCR to 38.101-1 (Rel-16)Reason for change: Sub-clauses 6.2B.4.1 and 6.2B.4.2 without parent clause 6.2B.4. Summary of change:Add missing parent clause |

## Open issues summary

No open issues listed, the CRs submitted are for ‘close-to-finalized Rel-16’ work (comments in sub-clause 1.3.2).

### Sub-topic 1-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-1: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 1-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 1-2: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

Comments on the CRs in the next sub-clause.

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2100844TS 38.101-3 CR 449Rel-16 Cat-F | Qualcomm: we need more time to analyze to check, at least defer to 2nd round. We need to investigate the filtering options. Same comment applies to discussion R4-2100798.  |
| Skyworks: we recognize the reality of the issue, we would need to crosscheck what other implementations performance may result into. At least square brackets would be useful but we will try to provide feedback in round 2  |
| Apple: we would like more time to check |
| R4-2102207TS 38.307 CR 0055Rel-15 Cat-F | Ericsson: overlaps with R4-2101989 (proposes to remove the duplex modes) |
| ZTE: We think the duplex mode is important information for band combination release independence due to there are no release independence information in the WID. Actually the duplex modes for the band combination in each release 38.307 spec are aligned with the each release 38.101 specs. |
| Qualcomm: we are fine with this change. CHTTL: We support this change.Nokia: There is alternative proposal from Huawei to remove duplex-mode information in R4-2101989 which would reduce maintenance need. Decision is needed whether to keep duplex mode information or not.NTT DOCOMO, INC.:We are OK with the clarification on the meaning of duplex mode, but in response to this clarification, could you add “FDD and TDD” in the following table?* Table 5.2.2-1: NR interband CA within FR1
	+ Line of “DL”
		- NOTE: The corresponding band combinations have been introduced in Rel-15 specification such as n3-n77.
* Table 8.1.2.3-1: EN-DC interband configurations including FR1 and FR2
	+ Line of “DL FR1”
	+ Line of “UL FR1”

NOTE: The corresponding band combinations have been introduced in Rel-15 specification such as DL/UL 1\_n77-n257.And we wonder it would be better to specify the definition of duplex mode in general section instead of putting NOTEs in every table.Apple: we support the proposal to clarify the meaning of duplex mode in the configuration tables; whether this is done in notes or a general description is fine for us |
| R4-2102208TS 38.307 CR 0056Rel-16 Cat-A |  |
|  |
| R4-2102209TS 38.307 CR 0057Rel-17 Cat-A |  |
|  |
| R4-2102408TS 38.101-1 CR 0689Rel-16 Cat-F | Ericsson: agreed. |
| Apple: we support this correction |
| R4-2102409TS 38.101-1 CR 0690Rel-17 Cat-A |  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: Reply LS to RAN2 on P-Max for FR2

RAN4 has received a LS from RAN4 on p-NR-FR2, a UE-specific P-Max on a cell group in FR2. RAN4 has not agreed upon inclusion of a UE-specific P-Max in the configured maximum output power in the Rel-16 specification.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2102044 | Ericsson | Title: LS reply to RAN2 on power control for NR-DC |
| R4-2102711 | vivo | Title: Discussion and reply LS on p-NR-FR2**Observation 1**: RAN1 defined p-NR-FR1 and p-NR-FR2 for a certain frequency range as maximum power for uplink power control in MR-DC. P-NR-FR1 is defined for FR1 in EN-DC/NE-DC/NR-DC, while p-NR-FR2 is only defined for FR2 in NR-DC. **Observation 2**: RAN4 use p-NR-FR1 in EN-DC/NE-DC/NR-DC in the calculation of configured transmitted power, while did not use p-NR-FR2.**Observation 3:** For FR2, the configured transmitted power is indirectly restricted using Pumax and PTmax, and no place to use p-NR-FR2.**Observation 4**: For FR2, there is currently no definition and requirements for NR-DC.**Observation 5**: p-NR-FR2 is similar to p-UE-FR2 in that EIRP and TRP control feasibility problem persists.**Proposal**: Not using p-NR-FR2 at least in Rel-16, based on similar reason to p-UE-FR2, and also no NR-DC requirements in Rel-16 RAN4.  |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 2-1: Reply LS to RAN2**

* Proposals
	+ Option 1: Reply in accordance with R4-2102044
	+ Option 2: Reply in accordance with R4-2102711
	+ Option 3: other (specify what)
* Recommended WF
	+ Choose one of these two available drafts (possibly modified) for a reply this meeting, RAN4 has not agreed to include a UE-specific P-Max for Rel-16.

### Sub-topic 2-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 2-2: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1: Sub topic 2-2:….Others: |
| OPPO | **Issue 2-1: Reply LS to RAN2**Option 2. |
| Ericsson | **Issue 2-1:**Option 1, the same intent as Option 2 but answers both questions, |
| ZTE | Same answers for both option 1&2. slight prefer to Option 2. |
| vivo | **Issue 2-1:**Option 2. Option2 is different from option 1 in that the 2nd question was not really answered, because the pre-condition of question 2 “If no concern, …” was not satisfied, since RAN4’s question on the question 1 is negative which is also aligned with another candidate LS. In another word, RAN4 should just answer the first question and question 2 is not appropriate to be answered, RAN2 can make adjustment by their own based on RAN4’s feedback on question 1. |
| MTK | Support Option 2But also suggest to mention to RAN2 that question is no longer needed to be discussed in order to avoid any different/strange interpretation in RAN2. |
| NTT DOCOMO, INC. | Prefer to use option 1 as baseline.Option 1 seems to describe the current situation more clearly.But, since there is a concern on the sentence of “RAN4 confirms the description of p-NR-FR2 provided by RAN2, but”, we are OK to remove this part from R4-2102044.And, in our understanding, for the answer to Q1, “no” should be added. “Hence there is **“no”** action upon reception of *p-NR-FR2* by a UE compliant with Rel-16.” |
| Apple | We prefer option 2 and the associated simplicity of the response, since RAN4 has not defined any requirements associated with this signaling in Rel-16 |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: Single-uplink operation

RAN4 has received an LS from RAN on single-uplink only (SUO) operation in RP-202622 with the following action.

**ACTION:** RAN respectfully requests RAN2/RAN4 to check if any specification clarification is needed to ensure there is no inter-operability issue between the UE side and network side, considering the report of singleUL-Transmission as described in RP-202622.

Moreover, a potential signaling issue for band combinations with several parts allowing single-UL transmission has been identified, and discussions on a SUO capability for a roaming situation will be continued (from RAN4#97-e)

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101144 | MediaTek Inc. | Title: Discussion on the reply to LS on single UL operation**Observation 1: Current feature set reporting allows UE to indicate which pair(s) of CCs that UE can support UL transmission in a single band combination.****Observation 2: Single singleUL-Transmission but is not sufficient for UE to indicate dual UL in one UL CC pair and single UL in another CC pair in one band combination.****Proposal 1: In Rel-15, to indicate a different singleUL-Transmission capability for a particular UL pair in a high level band combination, UE may additionally report the corresponding fallback band combination with a different singleUL-Transmission capability.****Proposal 2: Reply LS to RAN2 with RAN4’s suggestions, but leave it to RAN2 on whether to resolve this issue in R15 or in later releases.** |
| R4-2101718 | Ericsson | Title: Correction to applicability of simultaneous RX/TX and single-UL transmissionCR to 38.101-3 (Rel-15)Reason for change (SUO part only):2. The applicability of single-switched uplink is unclear (LS to RAN4 from RAN in RP-202932).Summary of change (SUO part only)2. Clause 5.3B.1.3 and 5.5B.1 (general): The statement that “only single-switched UL is supported” (not the scope of 38.101-3) is replaced by statements that minimum requirements are only specified for single-switched UL and it is clarified that the UE may include the field singleUL-Transmission.Clause 5.5B, 6.2B.1.2 and 7.3B.2.2: the applicability specified in BCS band combination tables. Annex H: the applicability for the DC\_3-n3 configuration removed (specified in the band combination tables). |
| R4-2101820 | Huawei, HiSilicon | Title: Further discussion on RF requirements about Multi-RAT Dual-Connectivity**Proposal 1:** **There are some specific situation such as roaming in which UE could report “singleUL-Transmission”, which can bring benefits in business application.****Proposal 2:** **To introduce a new UE capability for specific ENDC band combinations in roaming situation. This capability can be reported to network with existing capability “singleUL-Transmission” together or separately.** **In this situation, the UE can report roaming indication to clarify the roaming status to the base station together or separately.** |
| R4-2102387 | Huawei, HiSilicon | Title: On SUO for intra-band EN-DC***Proposal: It is proposed to send LS to RAN2 asking some clarification in RAN2 spec that that for intra-band EN-DC combinations which support only single switched UL, the capability singleUL-Transmission must be reported.*** |

## Open issues summary

### Sub-topic 3-1 Clarification of SUO specification

*Sub-topic description: the action in RP-202622*

*Open issues and candidate options before e-meeting:*

**Issue 3-1-1: Clarification is needed to ensure there is no inter-operability issue between the UE side and network side (RAN LS in RP-202622)**

* Proposals
	+ Option 1: Clarification as proposed in R4-2101718 (specify the cases in which the UE includes the *single-UL Transmission*), no LS needed
	+ Option 2: Reply LS to RAN/RAN2 that for intra-band EN-DC combinations which support only single switched UL, the capability *single-UL Transmission* must be reported as proposed in R4-2102387, no change to RAN4 specifications
	+ Option 3: other (specify which)
* Recommended WF
	+ TBA

**Issue 3-1-2: Single UL allowed for several band pairs part of an indicated band combination**

* Proposals
	+ Option 1: LS to RAN2 with recommendations according to proposals in R4-2101144
	+ Option 2: LS to RAN2 describing the identified issue only
	+ Option 3: no need for any changes (no LS)
	+ Option 4: other (specify which)
* Recommended WF
	+ TBA

### Sub-topic 3-2 Single UL in a roaming scenario

*Open issues and candidate options before e-meeting:*

**Issue 3-2-1: UE capability for specific ENDC band combinations in roaming situation**

* Proposals
	+ Option 1: introduce a SUO capability for specific ENDC band combinations in roaming situation as proposed in R4-2101820 (*Correction by moderator*)
	+ Option 2: do not introduce a SUO capability for specific ENDC band combinations in a roaming situation
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1: Sub topic 2-2:….Others: |
| OPPO | **Issue 3-1-1: Clarification is needed to ensure there is no inter-operability issue between the UE side and network side (RAN LS in RP-202622)** Option 2, to make the same understanding among groups. |
| Ericsson | **Issue 3-1-1: Clarification is needed to ensure there is no inter-operability issue between the UE side and network side (RAN LS in RP-202622)** Option 1. SUO is an *incapability* that should not be mandated in the absence of RAN4 requirements for a band combination. The 38.306 specifies that “The UE may only include this field [*singleUL-Transmission*] for certain band combinations defined in TS 38.101-3 [4].” The 38.101-3 should specify when the UE may include (or when it includes) the *singleUL-Transmission.*No RAN2 changes needed.**Issue 3-1-2: Single UL allowed for several band pairs part of an indicated band combination**Option 2, describing the issue without proposing signalling changes.On the R4-2101144, we do not agree with the proposalProposal 1: In Rel-15, to indicate a different singleUL-Transmission capability for a particular UL pair in a high level band combination, UE may additionally report the corresponding fallback band combination with a different singleUL-Transmission capability.The capability of a top-level band combination should not be dependent on that of any included fallback combination, this would break the capability signalling.**Issue 3-2-1: UE capability for specific ENDC band combinations in roaming situation**Option 2. |
| Qualcomm  | Sub topic 3-1-1: Prefer option 1, SUO part of R4-2101718. Sub topic 3-1-2:  Tend to agree with the observations in R4-2101144.  The proposals look ok from RAN4 perspective, but would be good to get (informal) RAN2 feedback since fallback configurations are intended to be implicit. Sub topic 3-2-1:  Option 2.  The UE should support requirements in both the home network and roaming network.  |
| CHTTL | Issue 3-1-1Support Option 2. Option 1 introduces a huge change on the Rel.15 spec, and the change removes the extension support for dual uplink in the later release, which are not acceptable to us. And it seems the issue that raised in R4-2102387 is unsolved. |
| MTK | **Issue 3-1-1:** We think an LS is anyway needed to avoid RAN2 keep waiting for RAN4 input. Option 2 is preferred which seems to be an easier solution.**Issue 3-1-2:** Option 2 is preferred. The issue is that the singleUL-transmission capability is reported per band combination, but in a band combination, there could be multiple possible UL CC pairs, e..g, DC\_2A\_n66A, DC\_7A\_n66A, and DC\_66A\_n66A in DC\_2A-7A-66A\_n66A. Current signalling structure implies all UL CC pairs have to share the same capability. This may not be sufficient for the case that UE can support dual UL in one CC pair but single UL in another.Since this is a Rel-15 issue, we preferred to minimize the spec change as much as possible. The suggestion in R4-2101144 is to ask network to further check all corresponding fallback band combo (if reported) to identify the capability of each individual CC pair. We understand Ericsson’s concern that the network currently does not need to check all fallback combinations in order to determine the capability of the top-level band combination. Therefore, we prefer to inform RAN2 this issue. And RAN2 should be the correct WG to judge if the suggestion is feasible or not as well as whether and how to resolve it in Rel-15.For Rel-16, the easiest solution is to introduce a new capability in feature set. But we also prefer to leave it to RAN2 to decide. |
| Nokia | Issue 3-1-1: Option 2 UE is mandated to indicate the singleUL-Transmission for band combinations where single UL is the only specified operation mode. Otherwise, not required.Issue 3-1-2: Option 3 No need for any changes. In RAN2 we would like to keep Rel-15 approach and not to add new pairs signalling for marking such combinations. UE can signal fallback based on current principles. No need to change anything here.Issue 3-2-1 Option 2UE can identify it is roaming and report different capabilities. The home network does not need to know what the UE is reporting to a roaming network when it goes out, and the roaming network doesn’t care what the UE reported when it was in the home network. |
| Skyworks | Issue 3-2-1 Option 2, from the contribution provided, the roaming situation is too vague, roaming between continents is not the same thing than roaming within Europe so UE should meet requirements at home or in roaming situation. |
| NTT DOCOMO, INC. | **Issue 3-2-1:**Option 2: Basically, we want UEs to support dual UL for all band combination except for some problematic band combinations.Question for our understanding is: In our understanding, if UE supports a certain EN-DC band combination, for example, a band combination with low band + high band, then UE basically can support other low band + high band combinations, assuming that UE have PAs for low bands and high bands, respectively, and that RF component is designed to achieve sufficient isolation between low and high bands. So, we are not sure if it is beneficial that single UL operation is allowed in roaming case. |

### CRs/TPs comments collection

For R4-2101718, comments only on the SUO part.

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2101718TS 38.101-3 CR 0461Rel-15 Cat-F | CHTTL: this CR introduce a huge change on the Rel.15 spec. and the change remove the extension support for dual uplink in the later release, which will cause inconsistency to the later release. |
| Company B |
|  |
| R4-2101719TS 38.101-3 CR 0462Rel-16 Cat-A | CHTTL same comment above. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |