3GPP TSG-RAN WG2 #113 electronic R2-20xxxxx

e-Meeting, 25 January – 05 February 2021

Agenda Item: 5.4.3

Source: ZTE, Sanechips

Title: Summary of offline [AT113-e][010][NR15] UE Capabilities II (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT113-e][010][NR15] UE Capabilities II (ZTE)

Scope: Treat R2-2101559, R2-2101560, R2-2100064, R2-2101561, R2-2101913, R2-2101914, R2-2100961, R2-2100962,

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs.

Deadline: Schedule A

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| **Deadline:** Email discussions with Deadline ***Schedule A***:  A first round with **Deadline for comments Thursday Feb 28 1200 UTC** to settle scope what is agreeable etc  A Final round with **Final deadline Thursday Feb 4 1200 UTC.** to settle details / agree CRs etc. Additional check points etc if needed are defined by the Rapporteur. In case some parts of an email discussion need more time, doesn’t converge, need on-line treatment etc Rapporteur please contact chair. |

**Contact from companies**

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| --- | --- |
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| Nokia | amaanat.ali@nokia.com |
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# Discussion

## 2.1 Part 1: Intended to determine agreeable parts

Part 1 discussion is focusing on reaching conclusion whether the proposals/CRs can be agreed in principle, and Part 2 discussion would then focus on detailed changes for those agreeable contributions.

### Bandwidth

In the current spec, for the *supportedBandwidthDL/supportedBandwidthUL/channelBWs-DL/channelBWs-UL*, it was noted that when determine the channel bandwidth the network shall also validate the *supportedBandwidthCombinationSet.* Meanwhile the s*upportedBandwidthCombinationSetIntraENDC* has been added for intra-band (NG)EN-DC/NE-DC with additional inter-band CA to limit the bandwidth of the intra-band component.

In the below 2 CRs, the s*upportedBandwidthCombinationSetIntraENDC* was added to the Note part of the *supportedBandwidthDL/supportedBandwidthUL/channelBWs-DL/channelBWs-UL.*

[R2-2101559](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101559.zip) CR on the SupportedBandwidth/channelBWs-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.12.0 0515 - F NR\_newRAT-Core

[R2-2101560](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101560.zip) CR on the SupportedBandwidth/channelBWs-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0516 - A NR\_newRAT-Core

You may notice that the s*upportedBandwidthCombinationSetIntraENDC* was also discussed in another offline discussion [AT113-e][009][NR15], however it will not affect the general principle of this CR, it will only affect the wording highlighted in red as below*.*

*“ supportedBandwidthCombinationSetIntraENDC* (for intra-band (NG)EN-DC/NE-DC with additional inter-band CA component(s) of LTE and/or NR)”

Note: In this CR, the wording “(for intra-band (NG)EN-DC/NE-DC with additional inter-band CA component(s) of LTE and/or NR)” was added based on the current field description of *supportedBandwidthCombinationSetIntraENDC,* which can be further revised based on the offline discussion result [AT113-e][009][NR15] if necessary.

**Q1: Do companies generally agree with the intention and modification of the CRs above?** (Maybe with some correction for the wording of “for intra-band (NG)EN-DC/NE-DC with additional inter-band CA component(s) of LTE and/or NR” based on another offline discussion result [AT113-e][009][NR15])

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| --- | --- | --- | --- |
| **Company** | **Agree Intention**  **(Yes or No)** | **Agree Modifications**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated | Yes | Yes |  |
| Huawei, HiSilicon | Yes | No | We understand the intention, but we’d like to first confirm the usage of BCS in [009] before changing more parts relevant to this.  [ZTE] As explained above, the [009] may have some impact on the field description of *supportedBandwidthCombinationSetIntraENDC”.*  *However, the supportedBandwidthCombinationSetIntraENDC itself should be taken into the consideration when determine the bandwidth.*  *To make progress, we think the CR can be generally agreed in phase 1, then determine whether some revision was needed based on [009] in the phase 2.* |
| ZTE | Yes | *Yes (maybe with some correction based on [009])* | *As explained above, we think the CR can be generally agreed in phase 1, then determine whether some revision was needed based on result of [009] in phase 2.*  *Another solution is that don’t add any clarification to the supportedBandwidthCombinationSetIntraENDC in this CR if companies have concern on it.*  *“ supportedBandwidthCombinationSetIntraENDC* |
| Ericsson | Yes | No | The intention is ok. But the note just needs to clarify what fields are used to validate the UE supported BW. In which particular context they are used is already clarified in each corresponding field description. Hence, it is sufficient to say:  NOTE: To determine whether the UE supports a channel bandwidth of 90 MHz the network may ignore this capability for and validate instead the *channelBW-90mhz* and the *supportedBandwidthCombiantionSet*. For serving cells with other channel bandwidths the network validates the *channelBWs-UL*, the *supportedBandwidthUL*, and any of the fields *supportedBandwidthCombinationSet*, *supportedBandwidthCombinationSetIntraENDC* or *asymmetricBandwidthCombinationSet* ~~and~~ *~~supportedBandwidthUL~~*. |
| MediaTek | Yes | Maybe should wait | This is also related the definition of intra-band (NG)EN-DC/NE-DC with additional inter-band CA that we have to wait RAN4 reply. |
| OPPO | NO | NO | Since the detail definition of “intra-band (NG)EN-DC/NE-DC with additional inter-band CA component(s) of LTE and/or NR” is still under discussion, we’d better not to expand the usage of this term in other place. Plus “the supportedBandwidthCombinationSet” is not purely for NR DC/CA So good to wait for the conclusion of [009] before concluding on the CR here. |
| Nokia | Yes | Yes | Agree with ZTE that maybe it's best not to overload the description with details of intra-band EN-DC BCS. |

### 2.1.2 SUO for intra-band EN-DC

On this topic, we would like to discuss some detail issues first then collect companies’ views on which CRs can be taken as baseline.

[R2-2100064](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100064.zip) LS on single UL operation (RP-202932; contact: Huawei) RAN LS in Rel-15 NR\_newRAT-Core To:RAN2, RAN4

[R2-2101561](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101561.zip) Clarification on the SingleUL-Transmission ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core

[R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip) Clarfication on single uplink operation capability report (LS Contact) Huawei, HiSilicon CR Rel-15 38.306 15.12.0 0524 - F NR\_newRAT-Core

[R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip) Clarfication on single uplink operation capability report (LS Contact) Huawei, HiSilicon CR Rel-16 38.306 16.3.0 0525 - A NR\_newRAT-Core

[R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip) Handling of single UL for intra-band EN-DC band combinations Nokia, Nokia Shanghai Bell CR Rel-15 38.306 15.12.0 0497 - F NR\_newRAT-Core

[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip) Handling of single UL for intra-band EN-DC band combinations Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.3.0 0498 - A NR\_newRAT-Core

According to above papers, as clarified in [R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip)/[R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip)/[R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip),it is mandatory to report this field for BCs where only single switched UL transmission is allowed as defined in TS 38.101-3 [4]. (In [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip), it said the UE shall include this field for band combinations for which only single UL transmission is specified in TS 38.101-3 [4] if the UE supports UL on the carriers where only single UL is specified.)

**Q2: Do companies generally agree that “it is mandatory to report *singleUL-Transmission***

**field for BCs where only single switched UL transmission is allowed as defined in TS 38.101-3 [4]”**

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| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Huawei, HiSilicon | Yes | Proponent |
| ZTE | Yes |  |
| Ericsson | No | Actually singleUL-Transmission is an incapability bit. So we prefer to not mandate an incapability. Our understanding is that RAN4 is also working on some clarification in their specifications, we think this may be sufficient. |
| MediaTek | Yes, but | We are okay to follow RP guideline. However, we would like to clarify first how to differentiate case 1 and case 2. There is only single *singleUL-Transmission* parameter per BC (See also our comment in Q4).  Case 1: the UE reports *DC\_****2A****\_7A\_66A\_****n66A*** (i.e. UL allowed in 2A and n66A), *singleUL-Transmission* is not required to be reported  Case 2: the UE reports *DC\_2A\_7A\_****66A****\_****n66A*** (i.e. UL allowed in 66A and n66A), *singleUL-Transmission* is required to be reported |
| OPPO | Yes |  |
| Nokia | Yes |  |

Furthermore, as noted/discussed in the [R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip)/[R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip)/[R2-2101561](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101561.zip), for the legacy problematic UE (the UE that only supports single UL transmission for a BC, but doesn’t report *singleUL-Transmission* for that BC), the network ignore the BC or ignore the single UL transmission requirement in the BC.

**Q3: Do companies generally agree that “**For UE with earlier version, if *singleUL-Transmission* field is not included in a BC where only single switched UL transmission is allowed, the network may ignore the BC”?

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| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated |  | (Not sure how we can respond by Yes or No to the question above.)  It looks unsafe to just ignore the single UL transmission limitation that the UE may have. Safest approach would be to consider such band combination is invalid.  [Rapporteur] We had a littler modification to the question, hope that can avoid the confusion. |
| Huawei, HiSilicon |  | We understand Q3 is a bit confusing. The original change was to ignore the BC, or the part of the BC which requires the single UL transmission. We did not propose to ignore the single UL requirement. So basically we have same understanding as QC.  [Rapporteur] We had a littler modification to the question, hope that can avoid the confusion. |
| ZTE | Yes | Note: With rapporteur hat on, we also had a little modification to the question itself to avoid the confusion that mentioned by Qulcomm and Huawei.. |
| Ericsson |  | We think we do not need to spend much time on this case, which would be more an error case, but either of the option in Q3 could happen, i.e. “ignore the BC or consider that this UE supports dual UL, since it did not report the incapability bit”. Especially the latter option is basically how any other UE capability parameter would work i.e. the network can know what the UE supports based on what the UE reported. |
| MediaTek |  | Network to use dual UL operation in a BC that only supports single UL is not desired. Assuming that the BC is not supported could work. (But still seems not a good solution though) |
| OPPO | YES |  |
| Nokia |  | This would be a non-compliant UE as per 3GPP specification so it's up to network how to handle those.  Whether to Okay to have this captured that network can ignore such BC if UE did not report the capability when reporting independently such a BC can be discussed - what should be clear is that such UE is not specification compliant, which should also be captured if we capture some guideline for the networks. |

**Q3-a: If say yes to the Q2, do companies generally agree to add a related note (e.g. Note in the** [R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip)/[R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip)) **to the field description of *singleUL-Transmission?***

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| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Huawei, HiSilicon | Yes | Proponent |
| ZTE | Yes |  |
| Ericsson | No | See comments in Q3, we think this is not essential to clarify. |
| MediaTek | No | Do not configure this BC is up to NW implementation. Seems no need to have this NOTE. |
| OPPO | No | In case UE is mandated to report, then network’s behaviour is also clear and spec normally doesn’t capture network’s interpretation |
| Nokia | Partly Yes | For the CR text, we prefer the wording in R2-2100961/692 as clearer alternative.  Okay to capture a note in addition but more correct wording would be to align with TS38.101-3, which defines that “Only single switched UL is supported.” |

The third question is for the field description of *tdm-Pattern*, as clarified in the [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip), *“When RAN2 discussed the Rel-15 SUO, the support of TDM pattern was coupled to the SUO capability since it was necessary for UE to support such operation. However, there was still the option for network to not use the TDM pattern but rely on scheduling to resolve the single UL operation. Therefore, for these new cases where single UL is required, it seems not necessary to require UE to always support the TDM pattern”*, some modification was also added for the *tdm-Pattern in* [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip)*.*

**Q3: Do companies generally agree with the modification for the *tdm-Pattern* in the** [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip) **?**

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| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated | No | Change to singleUL-Transmission is sufficient because the inclusion of tdm-Pattern is already conditioned on singleUL-Transmission. Also, UE “allowing” something via UE capability signalling is also a bit strange. |
| Huawei, HiSilicon | No | We agree that tdm-Pattern is not the capability which directly associates with the RAN4 defined band combinations where single UL is required.  The tdm-Pattern is conditionally mandatory when the UEs do not support dynamic power sharing, or support single UL transmission. So no further discussion is needed here, the conditions when mandating the tdm-Pattern is already captured well in the current field description. |
| ZTE | FFS | We understand the intention, but the main modification is for the “other case”, we don’t think it’s necessary to add this clarification. Anyway we can follow the majorities’ view on it. |
| Ericsson |  | As we do not see a need for a modification in the *singleUL-Transmission* field description, there would also be no need for a change in *tdm-Pattern*. |
| MediaTek | No | Change on *tdm-Pattern* is not necessary. |
| OPPO |  | no strong opinion but would like to understand why there is difference between this case and other existing case. |
| Nokia | Yes | Proponent - however, if companies think we should stick to Rel-15 capability coupling, we would like to understand how network should handle UEs which do NOT indicate the *tdm-Pattern-r15* capability: Are those UEs also not specification compliant (which means it's up to network how to handle them and like with previous question, network can just ignore those band combinations)? Also, we would like to make it clear that just like with Rel-15, it is up to network whether to apply Case 1 (i.e. LTE TDM pattern configuration) or Case 2 (i.e. no TDM pattern, network ensures by scheduling only single UL is used) behaviour is followed (i.e. UE cannot request the network to utilize TDM pattern for BCs that require single UL). |

The forth question is about the BC reporting, as clarified in the [R2-2101561](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101561.zip), the BCs that have different *singleUL-Transmission* capabilities shall be reported in different BCs.

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| **Observation 1: The BCs that with different UL band component shall not be reported in a super BC if the corresponding super BC are not defined in RAN4.**  **Proposal 1: The BCs that have different *singleUL-Transmission* capabilities shall be reported in different BCs.** |

**Q4: Do companies generally agree that “the BCs that have different *singleUL-Transmission* capabilities shall be reported in different BCs”?**

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| **Company** | **Agree?**  **(Yes or No)** | **Comments** |
| Qualcomm Incorporated | Yes | We understand this is for band combinations where single UL and simultaneous transmissions are supported. |
| Huawei, HiSilicon | Yes | We understand existing mechanism already supports so and no specification change is required? |
| ZTE | Yes | It’s just a clarification, no spec change is needed. |
| Ericsson |  | We agree the UE may report a fallback band combination for which it supports additional functionality compared to its corresponding superset band combination. But this is more a generic statement and there seems to be nothing to clarify particularly for *singleUL-Transmission*. |
| MediaTek | No | We actually would like to clarify first on the following 2 cases from RP  Case 1: the UE reports *DC\_****2A****\_7A\_66A\_****n66A*** (i.e. UL allowed in 2A and n66A), *singleUL-Transmission* is not required to be reported  Case 2: the UE reports *DC\_2A\_7A\_****66A****\_****n66A*** (i.e. UL allowed in 66A and n66A), *singleUL-Transmission* is required to be reported  Note that this is not fallback band. Case 1 and Case 2 have exact the same band entry but have different support on UL bands. Is the current procedure text request UE to report Case 1 and Case 2 in different band entry? |
| OPPO | Yes | I guess the question is “**the BCs that have different *singleUL-Transmission* capabilities shall be reported as different BCs**” |
| Nokia | Yes | This question basically asks if single UL is considered in fallback BC relation: We think so, and this is aligned to how RAN2 capabilities are already defined, so no spec change is really needed. |

Based on the above questions, we want to collect companies’ views on which CRs can be chosen as the baseline CR.

Option 1: [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)/[R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip)

Option 2: [R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip)/[R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip)

**Q5: Which CRs can be chosen as the baseline CR?**

**Option 1:** [**R2-2100961**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip)**/**[**R2-2100962**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip)

**Option 2:** [**R2-2101913**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip)**/**[**R2-2101914**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip)

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| --- | --- | --- |
| **Company** | **Option?**  **(1or 2)** | **Comments** |
| Qualcomm Incorporated | 2 |  |
| Huawei, HiSilicon | 2 | As the LS contact we are volunteer to continue updating the potential agreeable CRs. Of course the further updates are dependent on the above feedback from companies. |
| ZTE | 2 |  |
| Ericsson |  | See comments to Q2 and Q3, we actually do not see a need to capture anything in RAN2 specifications. |
| MediaTek | 2 | But the NOTE could be removed. |
| Nokia | Don’t care | We are okay to work with the LS contact company to have a set of agreeable CRs but prefer the wording in our CR as the Huawei CR has typos and the text is not clear in all cases. |

## 2.2 Part 2: Intended to progress discussion on agreeable parts

- To be updated after discussion on part 1 -

# 3 Conclusion

- To be updated after discussion on part 1 -

# 4 References

1. [R2-2101559](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101559.zip) CR on the SupportedBandwidth/channelBWs-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.12.0 0515 - F NR\_newRAT-Core
2. [R2-2101560](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101560.zip) CR on the SupportedBandwidth/channelBWs-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0516 - A NR\_newRAT-Core
3. [R2-2100064](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100064.zip) LS on single UL operation (RP-202932; contact: Huawei) RAN LS in Rel-15 NR\_newRAT-Core To:RAN2, RAN4
4. [R2-2101561](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101561.zip) Clarification on the SingleUL-Transmission ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core
5. [R2-2101913](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101913.zip) Clarfication on single uplink operation capability report (LS Contact) Huawei, HiSilicon CR Rel-15 38.306 15.12.0 0524 - F NR\_newRAT-Core
6. [R2-2101914](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2101914.zip) Clarfication on single uplink operation capability report (LS Contact) Huawei, HiSilicon CR Rel-16 38.306 16.3.0 0525 - A NR\_newRAT-Core
7. [R2-2100961](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100961.zip) Handling of single UL for intra-band EN-DC band combinations Nokia, Nokia Shanghai Bell CR Rel-15 38.306 15.12.0 0497 - F NR\_newRAT-Core
8. [R2-2100962](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2101_R2_113e/Docs/R2-2100962.zip) Handling of single UL for intra-band EN-DC band combinations Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.3.0 0498 - A NR\_newRAT-Core