3GPP TSG-RAN WG2 #115 electronic R2-20xxxxx

e-Meeting, Aug16th– 27th 2021

Agenda Item: 5.4.3

Source: ZTE, Sanechips

Title: Summary of offline [AT115-e][017][NR15] UE Capabilties III (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT115-e][017][NR15] UE Capabilties III (ZTE)

Scope: Determine agreeable parts in a first phase, for agreeable parts agree on CRs. Treat R2-2107600, R2-2107601, R2-2106908, R2-2108346, R2-2106956, R2-2108038, R2-2108039, R2-2108718, R2-2108719, R2-2108749, R2-2108751,

Intended outcome: Report, agreed CRs if applicable

Deadline: Schedule 1

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| **Deadline:** Email discussions with Deadline ***Schedule 1***:  A **first round** with **Deadline for comments Thursday Aug 19 1200 UTC** to settle scope what is agreeable etc  A Final round with **Final deadline Thursday Aug 26 1200 UTC.** to settle details / agree CRs etc. |

**Contact form**

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| --- | --- |
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| Nokia | amaanat.ali@nokia.com |
| Qualcomm Incorporated | mkitazoe@qti.qualcomm.com |
| Lenovo | hchoi5@lenovo.com |
| Apple | naveen.palle@apple.com |
| Huawei, HiSilicon | [kuangyiru@huawei.com](mailto:kuangyiru@huawei.com) |
| Google | frankwu@google.com |

# 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.

### MIMO

[R2-2107600](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2107600.zip) Correction to the description of additionalActiveTCI-StatePDCCH Apple CR Rel-15 38.306 15.14.0 0612 - F NR\_newRAT-Core

[R2-2107601](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107601.zip) Correction to the description of additionalActiveTCI-StatePDCCH Apple CR Rel-16 38.306 16.5.0 0613 - A NR\_newRAT-Core

**Q1: Do companies agree with the intention/modification of the CRs above?**

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| **Company** | **Agree Intention**  **(Yes or No)** | **Agree Modifications**  **(Yes or No)** | **Comments** |
| Nokia | No |  | As we read it, if UE indicates n1, then it must support also this bit in R16. This CR would change that and mean UE only supports single TCI state in total. |
| Qualcomm Incorporated | Yes |  | The current text just says the UE capability parameter is applicable (as opposed to mandatory) when the UE indicates ‘n1’ in maxNumberActiveTCI-PerBWP. |
| Apple | Yes (Proponent) |  | To Nokia’s comments: the intention is the UE can include the Rel-15 capability ***additionalActiveTCI-StatePDCCH*** only if the UE supports *n1*. Otherwise the UE does not. So there is no mandatory aspect. We would like to check the reference to Rel-16 that Nokia mentioned. |
| Huawei, HiSilicon | Yes |  |  |
| Google | Yes |  |  |

### RI bit in EN-DC

[R2-2106908](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2106908.zip) Reply LS on RI bit width for Cat5 UE in EN-DC mode (R1-2106108; contact: Nokia) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2

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| RAN1 would like to thank RAN2 of the LS on RI bit width for Cat5 UE in EN-DC mode [[R1-2104161/R2-2104583](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_105-e/Docs/R1-2104161.zip)].  RAN1 would like to confirm the RAN2 interpretation that:  “*the RI bit width for a Cat5 UE is NOT affected by the number of MIMO layers it supports in EN-DC mode but only by the network configuration parameter maxLayersMIMO-r10, PBCH antenna ports and the UE category (without suffix), as in the legacy LTE*.” |

[R2-2108346](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108346.zip) Clarification to RI bit width for Cat5 in EN-DC Nokia, Nokia Shanghai Bell discussion Rel-15 NR\_newRAT-Core

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| **Observation 1:** RAN1 LS reply indicates the RAN2 understanding was correct and a Cat5 UE shall use 2-bit RI bit width in EN-DC by default even if it's not capable of 4-layer spatial multiplexing in EN-DC.  **Proposal 1:** Capture a NOTE in the field description of *fourLayerTM3-TM4-r15* in (Rel-16) 36.306 about the RI bit width for Cat5 UEs as per below..  *NOTE 1: Cat5 UE supporting only 2-layer spatial multiplexing for EN-DC will still determine the RI bit width according TS36.212 [22], which means it may still use 2-bit RI bit width despite not supporting more than 2-layer spatial multiplexing.* |

**Q2: Do companies agree to capture the above NOTE 1 in the field description of *fourLayerTM3-TM4-r15* in (Rel-16) 36.306 about the RI bit width for Cat5 UEs?**

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| **Company** | **Yes or No** | **Comments** |
| Nokia | Yes | Proponent, we would like to clarify this to avoid the IODT issue. |
| Qualcomm Incorporated | Yes |  |
| Apple | Yes |  |
| Huawei, HiSilicon | Yes but | OK to clarify it based on RAN1 LS, but not sure why not just using the confirmed wording in the RAN1 LS. |
| Google | Yes |  |

### Intra-band and Inter-band UE capability

[R2-2106956](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2106956.zip) Reply LS on the Intra-band and Inter-band (NG)EN-DC/NE-DC Capabilities (R4-2107907; contact: ZTE) RAN4 LS in Rel-15 NR\_newRAT-Core To:RAN2 Cc:RAN1

Moved from 5.1

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| **Question 1**: For which (NG)EN-DC/NE-DC BC types the above capabilities *(ul-TimingAlignmentEUTRA-NR/ pa-PhaseDiscontinuityImpacts /dualPA-Architecture/ /simultaneousRxTxInterBandENDC /asyncIntraBandENDC )* are applicable?  **Answer**: From RAN4 perspective,   * *dualPA-Architecture* is applicable to (NG)EN-DC/NE-DC BC Type 1, Type 2 and Type 5, * *simultaneousRxTxInterBandENDC* is applicable to (NG)EN-DC/NE-DC BC Type 2, Type 3 and Type 4, * *asyncIntraBandENDC* is applicable to (NG)EN-DC/NE-DC BC Type 1, Type 2, Type 3 and Type 5.   **Question 2**: If the capability *ul-TimingAlignmentEUTRA-NR/ pa-PhaseDiscontinuityImpacts /dualPA-Architecture/ asyncIntraBandENDC* are applicable to the (NG)EN-DC/NE-DC BC Type 1/2/3, whether they are used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part?  **Answer:** Yes, *dualPA-Architecture/ asyncIntraBandENDC* are used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part. |

[R2-2108038](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108038.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.14.0 0517 3 F NR\_newRAT-Core R2-2105182

[R2-2108039](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108039.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.5.0 0518 3 A NR\_newRAT-Core R2-2105183

About this topic, in the previous meeting, RAN2 sent an LS (R2-2104550) to RAN1/4 to ask 2 questions as below:

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| Question 1: For which (NG)EN-DC/NE-DC BC types the above capabilities (*ul-TimingAlignmentEUTRA-NR/* *pa-PhaseDiscontinuityImpacts /dualPA-Architecture/ /simultaneousRxTxInterBandENDC /asyncIntraBandENDC )* are applicable?  Question 2: If the capability *ul-TimingAlignmentEUTRA-NR/* *pa-PhaseDiscontinuityImpacts /ul-dualPA-Architecture/ asyncIntraBandENDC* are applicable to the (NG)EN-DC/NE-DC BC Type 1/2/3, whether they are used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part? |

RAN4 has sent the reply LS as above, however, we haven’t got the reply LS from RAN1 even RAN1 has made the below agreement in the last meeting.

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| Agreement:  Regarding questions mentioned in RAN2 LS R1-2104162/R2-2104550,   * UE feature 6-24 (ul-TimingAlignmentEUTRA-NR) is applicable to Type 1 and Type 2 (NG)EN-DC BC types. * UE feature 6-23 (pa-PhaseDiscontinuityImpacts) is applicable to Type 1 and Type 2 (NG)EN-DC/NE-DC BC types. * Both 6-24 (ul-TimingAlignmentEUTRA-NR) and 6-23 (pa-PhaseDiscontinuityImpacts) are used to indicate the restriction to the intra-band (NG)EN-DC/NE-DC BC part. * RAN1 further discusses whether 6-24 (ul-TimingAlignmentEUTRA-NR) and 6-23 (pa-PhaseDiscontinuityImpacts) can be applicable to Type 5 (NG)EN-DC/NE-DC BC type by taking RAN4 discussion outcome into account. |

To accelerate the discussion, we’d like to collect the companies views on the modifications to the RAN4 related features first, including *dualPA-Architecture/ /simultaneousRxTxInterBandENDC /asyncIntraBandENDC.* For the RAN1 feature *(ul-TimingAlignmentEUTRA-NR/pa-PhaseDiscontinuityImpacts*), we can wait for the RAN1’s reply LS.

**Q3: Do companies agree that the modifications to the *dualPA-Architecture/ /simultaneousRxTxInterBandENDC /asyncIntraBandENDC* in the** [**R2-2108038**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108038.zip)**/**[**R2-2108039**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108038.zip) **are aligned with RAN4’s Reply LS** [**R2-2106956**](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2106956.zip)**?**

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| **Company** | **Yes or No** | **Comments** |
| Nokia | Yes | We did not check this in detail but the changes seem aligned to the response in the LS. |
| Qualcomm Incorporated | Yes, but | We are still waiting for RAN1 input for ul-TimingAlignmentEUTRA-NR and pa-PhaseDiscontinuityImpacts, but we have the same understanding as proposed in the CRs. |
| Apple | Yes, but | Same view as Qualcomm, and maybe we can wait until the RAN1 part is concluded? |
| Huawei, HiSilicon |  | Same view as Qualcomm, prefer to first wait for RAN1 reply then proceed the CR. |
| Google |  | Same view as Qualcomm |

### IMS Capability

[R2-2108718](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108718.zip) Clarification on IMS video over split bearer in (NG)EN-DC Google Inc. CR Rel-15 36.306 15.10.0 1811 1 F NR\_newRAT-Core R2-2105188

[R2-2108719](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108719.zip) Clarification on IMS video over split bearer in (NG)EN-DC Google Inc. CR Rel-16 36.306 16.5.0 1812 1 A NR\_newRAT-Core R2-2105189

**Q4: Do companies agree with the intention/modification of the CRs above?**

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| **Company** | **Agree Intention**  **(Yes or No)** | **Agree Modifications**  **(Yes or No)** | **Comments** |
| Nokia | No |  | The discussion is not in RAN2. |
| Qualcomm Incorporated | Yes |  | Makes sense to apply the same handling as IMS voice. |
| Lenovo | No |  | The specified note is about IMS voice, so it looks odd to mention IMS video. In general, we wonder about the reason for change as it seems a pure UE implementation problem:  As far we understood the scenario is that the UE indicates to NW that it supports split bearer (by indicating drb-TypeSplit-r12) and (NG)EN-DC (by indicating en-DC-r15 and ng-EN-DC-r15). But only for IMS video the UE doesn’t want to support split bearer. So question to proponent is what kind of extra implementation burden do they have for IMS video in case of split bearer? |
| Apple | No |  | We don’t think there is a real problem to be fixed here. |
| Huawei, HiSilicon | No |  | Same view as Apple. |
| Google | Yes |  | Proponent. The note for IMS voice is to simplify the UE implementation and IOT effort. In the real word, only IMS voice and IMS video use DRBs mapped to RLC UM and all data calls in EN-DC are over and SCG bearer or SCG split bearer mapped to RLC AM.  With the changes in our CRs, the UE does not need to implement and test the reordering function for DRBs mapped to RLC UM in LTE PDCP. Without the changes, the network is allowed to configure split bearer for an IMS video call and the UE may receive IMS video packets via SCG leg, which requires the UE to implement and test the reordering function in LTE PDCP. |

[R2-2108749](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108749.zip) Clarification on IMS video over split bearer in NR-DC and NE-DC Google Inc. CR Rel-15 38.306 15.14.0 0581 1 F NR\_newRAT-Core R2-2105190

[R2-2108751](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108751.zip) Clarification on IMS video over split bearer in NR-DC and NE-DC Google Inc. CR Rel-16 38.306 16.5.0 0582 1 A NR\_newRAT-Core R2-2105191

**Q5: Do companies agree with the intention/modification of the CRs above?**

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| **Company** | **Agree Intention**  **(Yes or No)** | **Agree Modifications**  **(Yes or No)** | **Comments** |
| Nokia | No |  | The discussion is not in RAN2. |
| Qualcomm Incorporated | Yes |  | Makes sense to apply the same handling as IMS voice. |
| Lenovo | No |  | Same comments as for Q4. Proponent to clarify the scenario (the UE supports split bearer and NR-DC and NE-DC?) and the extra implementation burden for IMS video in case of split bearer. |
| Apple | No |  | We don’t think there is a real problem to be fixed here. |
| Huawei, HiSilicon | No |  | Same view as Apple. |
| Google | Yes |  | Proponent |

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

- To be updated after discussion on part 1 -

# 3 Conclusion

# 4 References

1. [R2-2107600](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2107600.zip) Correction to the description of additionalActiveTCI-StatePDCCH Apple CR Rel-15 38.306 15.14.0 0612 - F NR\_newRAT-Core
2. [R2-2107601](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107601.zip) Correction to the description of additionalActiveTCI-StatePDCCH Apple CR Rel-16 38.306 16.5.0 0613 - A NR\_newRAT-Core
3. [R2-2106908](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2106908.zip) Reply LS on RI bit width for Cat5 UE in EN-DC mode (R1-2106108; contact: Nokia) RAN1 LS in Rel-15 NR\_newRAT-Core To:RAN2
4. [R2-2108346](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108346.zip) Clarification to RI bit width for Cat5 in EN-DC Nokia, Nokia Shanghai Bell discussion Rel-15 NR\_newRAT-Core
5. [R2-2106956](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2106956.zip) Reply LS on the Intra-band and Inter-band (NG)EN-DC/NE-DC Capabilities (R4-2107907; contact: ZTE) RAN4 LS in Rel-15 NR\_newRAT-Core To:RAN2 Cc:RAN1
6. [R2-2108038](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108038.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.14.0 0517 3 F NR\_newRAT-Core R2-2105182
7. [R2-2108039](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108039.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.5.0 0518 3 A NR\_newRAT-Core R2-2105183
8. [R2-2108718](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108718.zip) Clarification on IMS video over split bearer in (NG)EN-DC Google Inc. CR Rel-15 36.306 15.10.0 1811 1 F NR\_newRAT-Core R2-2105188
9. [R2-2108719](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108719.zip) Clarification on IMS video over split bearer in (NG)EN-DC Google Inc. CR Rel-16 36.306 16.5.0 1812 1 A NR\_newRAT-Core R2-2105189
10. [R2-2108749](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108749.zip) Clarification on IMS video over split bearer in NR-DC and NE-DC Google Inc. CR Rel-15 38.306 15.14.0 0581 1 F NR\_newRAT-Core R2-2105190
11. [R2-2108751](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108751.zip) Clarification on IMS video over split bearer in NR-DC and NE-DC Google Inc. CR Rel-16 38.306 16.5.0 0582 1 A NR\_newRAT-Core R2-2105191
12. [R2-210](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2108_R2_115-e/Docs/R2-2108751.zip)4550 LS on the Intra-band and Inter-band (NG)EN-DC/NE-DC Capabilities To: RAN4/RAN1 Rel15 NR\_newRAT-Core