3GPP TSG-RAN WG2 Meeting #109-e R2-200xxxx

Online, 24 February-6 March 2020

Agenda: 5.4.3

Source: MediaTek Inc.

Title: Summary of discussion [AT109e][077][NR15] Cap Discussion II (MediaTek)

Document for: Discussion, Decision

# 1 Introduction

This document is derived from offline discussion [AT109e][008] on Rel-15 proposals related to UE capability. Document R2-2000684 was deemed broadly agreeable but may need some polishing of wording, while document R2-2000425 was discussed with inconclusive results and sent for further discussion:

**[AT109e][077][NR15] Cap Discussion II (Mediatek)**

Scope: R2-2000684: Agree to have this CR, can polish the wording, R2-2000425, Different interpretations on current behaviour. continue discussion, make revisions.

Intended outcome: Agreed CR (if CR not agreeable now for 0425, then a statement clarifying current behaviour to be captured in Chair notes).

Deadline: Mar 3

# 2 Discussion

## 2.1 Comments from [AT109e][008]

The following comments were received on R2-2000684:

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| --- | --- |
| **Company** | **Views** |
| Nokia | Disagree, it is clear to us that the common fields must be used. |
| Intel | We think the CR is ok. |
| NTT DOCOMO | We also think that the CR is o.k to agree, since the intended behaviour becomes clearer. |
| Qualcomm Incorporated | Support the CR. |
| Huawei | Agree, the logic is similar as in EN-DC. |
| MediaTek | This is our CR. In response to Nokia, I guess there may be some misunderstanding. Yes, it is clear that common field must be used but we are not clarifying this part. We try to clarity that the SRB capability could also be included in NR DC IE  UE-NR-Capability -> nrdc-Parameters -> *generalParametersNRDC*  The current wording saying that --“The UE shall only set the bit in UE-MRDC-Capability -> generalParametersMRDC“. This prevent UE from including SRB capability in NR-DC IE, which is not intended behavior. Hope that this is more clear. |
| ZTE | We are ok with the CR. |
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The following comments were received on R2-2000425:

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| **Company** | **Views** |
| Nokia | Disagree. This is not correct as we think the BCs should not even be filled in. |
| Intel | We think there is scope for mis-alignment and are ok to see other company views, esp considering that this changes the procedural text of how UE prepares capability. |
| NTT DOCOMO | Agree on the proposed change. When NR-DC/NE-DC capable UE compiles a list of “candidate band combinations“, according to the procedure text, the UE included NR-DC/NE-DC band combinations. So, if capabilityRequestFilterCommon is not present, UE needs to remove them. So, we think that the CR is needed. |
| Qualcomm Incorporated | The issue raised by the CR is valid. Support the CR. |
| Huawei | Agree. |
| MediaTek | This is our CR. Without this change, we understand that the UE will incorrectly populate the NR-DC/NE-DC band combinations that should be excluded when the capabilityRequestFilterCommon is not present. |
| ZTE | Agree |
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## 2.2 Continuing discussion on R2-2000684

We understand that the expressed concern for this CR was to clarify that “the common fields must be used”, i.e. the concerned bits need to be set in *generalParametersMRDC* as indicated in the current spec. However, the intention of the CR is to clarify that these capabilities are also valid to set in *generalParametersNRDC*, and the current wording prevents this. Thus the following changes were proposed in 38.306 section 4.2.2:

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| ***splitSRB-WithOneUL-Path***  Indicates whether the UE supports UL transmission via MCG path and DL reception via either MCG path or SCG path, as specified for the split SRB in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability. (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*) | UE | No | No | No |
| ***splitDRB-withUL-Both-MCG-SCG***  Indicates whether the UE supports UL transmission via both MCG path and SCG path for the split DRB as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability. (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*) | UE | Yes | No | No |
| ***srb3***  Indicates whether the UE supports direct SRB between the SN and the UE as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability. (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*) This field is not applied to NE-DC. | UE | Yes | No | No |

From the conclusions of discussion [AT109e][008], it seems that the intended behaviour described by the CR is correct. We would like to solicit company views on potential improvements to the wording to capture the intended behaviour.

**Q1:** Companies are invited to suggest improvements or alternatives to the wording of the proposed changes from R2-2000684.

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| **Company** | **Comment** |
| Qualcomm Incorporated | Suport the suggested changes above. |
| Samsung | We are fine for this CR. |
| CATT | We are also fine for this CR. |
| DOCOMO | Agree |
| Ericsson | We are ok with this CR. |
| Huawei | We are ok with this CR. |

## 2.3 Continuing discussion on R2-2000425

There seem to be some differences of understanding about the currently specified behaviour. The requirements on generation of the list of “candidate band combinations” are as follows:

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| The UE shall:  1> compile a list of "candidate band combinations" only consisting of bands included in *frequencyBandListFilter*, and prioritized in the order of *frequencyBandListFilter* (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on), where for each band in the band combination, the parameters of the band do not exceed *maxBandwidthRequestedDL*, *maxBandwidthRequestedUL*, *maxCarriersRequestedDL*, *maxCarriersRequestedUL*, *ca-BandwidthClassDL-EUTRA* or *ca-BandwidthClassUL-EUTRA*, whichever are received;  1> for each band combination included in the list of "candidate band combinations":  2> if the network (E-UTRA) included the *eutra-nr-only* field, or  2> if the requested *rat-Type* is *eutra*:  3> remove the NR-only band combination from the list of "candidate band combinations";  NOTE 4: The (E-UTRA) network may request capabilities for *nr* but indicate with the *eutra-nr-only* flag that the UE shall not include any NR band combinations in the *UE-NR-Capability*. In this case the procedural text above removes all NR-only band combinations from the candidate list and thereby also avoids inclusion of corresponding feature set combinations and feature sets below.  2> if it is regarded as a fallback band combination with the same capabilities of another band combination included in the list of "candidate band combinations":  3> remove the band combination from the list of "candidate band combinations";  1> if *capabilityRequestFilterCommon* is received:  2> remove band combinations from the list of "candidate band combinations" in accordance with the given filter criteria in *capabilityRequestFilterCommon*; |

If *capabilityRequestFilterCommon* is not received, there is no procedural guidance to remove NE-DC or NR-DC band combinations, which will result in including the corresponding feature set combinations when the list of “candidate feature set combinations” is generated.

On the other hand, the clear intention from the description of the *includeNE-DC* and *includeNR-DC* fields is that the corresponding support indications and feature set combinations should be included only if the fields are present. The premise of the CR is that this intention is not met by the procedural text.

**Q2:** Do companies consider that the current procedural text results in including the NE-DC/NR-DC information when *capabilityRequestFilterCommon* is absent?

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| **Company** | **Yes/No** | **Comment** |
| Qualcomm Incorporated | Yes | The source of the confusion is that the *capabilityRequestFilterCommon* (*UE-CapabilityRequestFilterCommon*), includes negative and positive commands.  UE-CapabilityRequestFilterCommon ::= SEQUENCE {  mrdc-Request SEQUENCE {  omitEN-DC ENUMERATED {true} OPTIONAL, -- Need N  includeNR-DC ENUMERATED {true} OPTIONAL, -- Need N  includeNE-DC ENUMERATED {true} OPTIONAL -- Need N  } OPTIONAL, -- Need N  ...  }  And the procedure text says "**remove** band combinations...according to..... *capabilityRequestFilterCommon*“.  So if the *capabilityRequestFilterCommon* is not included, our understanding is that the UE does the opposite of those commands.   * Include EN-DC * Omit NR-DC * Omit NE-DC   This ensures backward compatibility to the network that does not support NR-DC or NE-DC. |
| Samsung | Yes | We initial object for this chages but now understand the issues. We also think this this is valid issue to be solved. |
| CATT | Yes | We think the case is valid. |
| DOCOMO | Yes | Qualcomm anallysis and understanding are quite logical and make sense. |
| Ericsson | Yes | First procedural lines to generate candidate band combination list has no distinction in terms of MR-DC option so NE-DC/NR-DC band combinations may be present in the list, at that point, if supported by the UE. |
| Huawei | Yes |  |

The proposed CR adds a condition to remove NR-DC and NE-DC combinations from the list of “candidate band combinations” if *capabilityRequestFilterCommon* is absent.

**Q3:** If the answer to Q2 was yes, is the removal of the affected band combinations as proposed in R2-2000425 an appropriate solution? If not, what is a preferable alternative?

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| **Company** | **Yes/No** | **Comment** |
| Qualcomm Incorporated | Yes |  |
| Samsung | Yes but have Alternative | we have suggestion for minor editing.  Could remove preceding if and just change to:  ~~1> if~~ *~~capabilityRequestFilterCommon~~* ~~is received:~~  2> remove band combinations from the list of "candidate band combinations" in accordance with absence of or given filter criteria in *capabilityRequestFilterCommon*;  NOTE: if the *capabilityRequestFilterCommon* is not included, UE removes band combinations from the list of "candidate band combinations" in opposite way with given filter criteria in *capabilityRequestFilterCommon.*  If companies think that above change is not enough to solve the issue, we are fine for the original CR.  After checking with Ericsson’s text below, we think Ericsson’s change is more general way and preferred. One concern is that the UE operation is slightly different between two options:   1. Option 1 (Original):  * UE compile a list of candidate band combination for all MR-DC if UE support MR-DC. * UE may include NE-DC only BCs at this point. * After checking whether UE received capabilityRequestFilterCommon or not, UE removes the BCs in accordance with absence/presence of this message (according to the filter criteria. * UE may remove NE-DC only BCs from the candidate band combinations if capabilityRequestFilterCommon doesn't include includeNE-DC; or UE doesn't receive capabilityRequestFilterCommon message at all.  1. Option 2 (Ericsson):  * UE compile a list of candidate band combination considering for filtering criteria in capabilityRequestFilterCommon. * UE may include NE-DC only BCs if capabilityRequestFilterCommon includes includeNE-DC; * Else if capabilityRequestFilterCommon doesn't include includeNE-DC UE will not include these BCs in the candidate bandcombinations. * Removes fallback BCs according to the procedure.   This procedure itself have no impact on the NW i.e. only UE internal procedure, so changing the UE operation seems not critical for UE-NW. We agree that Ericsson’s proposal is more clear and future proof way, but need to confrim from UE vendors. It may be interpreted as NBC for UE operation i.e. UE needs to be updated accordingly. |
| CATT | Yes | We prefer to have a clear description of this behavior in the spec as changes by this CR. |
| DOCOMO | Yes | But we are also o.k with Ericsson proposal via reflector to add the condition when compiling the candidate list. |
| Ericsson | No | We would prefer to have it in a more generic/future proof way, as below:  1> compile a list of "candidate band combinations" according to *capabilityRequestFilterCommon* (if included), and only consisting of bands included in *frequencyBandListFilter*, and prioritized in the order of *frequencyBandListFilter* (i.e. first include band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on), where for each band in the band combination, the parameters of the band do not exceed *maxBandwidthRequestedDL*, *maxBandwidthRequestedUL*, *maxCarriersRequestedDL*, *maxCarriersRequestedUL*, *ca-BandwidthClassDL-EUTRA* or *ca-BandwidthClassUL-EUTRA*, whichever are received;  1> for each band combination included in the list of "candidate band combinations":  2> if the network (E-UTRA) included the *eutra-nr-only* field, or  2> if the requested *rat-Type* is *eutra*:  3> remove the NR-only band combination from the list of "candidate band combinations";  NOTE 4: The (E-UTRA) network may request capabilities for *nr* but indicate with the *eutra-nr-only* flag that the UE shall not include any NR band combinations in the *UE-NR-Capability*. In this case the procedural text above removes all NR-only band combinations from the candidate list and thereby also avoids inclusion of corresponding feature set combinations and feature sets below.  2> if it is regarded as a fallback band combination with the same capabilities of another band combination included in the list of "candidate band combinations":  3> remove the band combination from the list of "candidate band combinations";  ~~1> if~~ *~~capabilityRequestFilterCommon~~* ~~is received:~~  ~~2> remove band combinations from the list of "candidate band combinations" in accordance with the given filter criteria in~~ *~~capabilityRequestFilterCommon~~*~~;~~  We would also be fine with something in line with Samsung suggestion, with a slight modification to facilitate the reading:  Could remove preceding if and just change to:  ~~1> if~~ *~~capabilityRequestFilterCommon~~* ~~is received:~~  2> remove band combinations from the list of "candidate band combinations" in accordance with absence/presence of *capabilityRequestFilterCommon*; |
| Huawei | Yes | The texts provided by MediaTek, Ericsson and Samsung are ok, we slightly prefer Ericsson’s original proposal, using a more generic/future proof way. |

# 3 Conclusion

[To be populated]