3GPP TSG-RAN WG2 #112 electronic R2-200xxxx

Electronic Meeting, Nov 2-13, 2020

Agenda Item: 5.4.3

Source: Ericsson

Title: Summary of offline 011 Rel-15 UE caps I

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT112-e][011][NR15] UE caps I (Ericsson)

Treat R2-2010512, R2-2010513, R2-2010238, R2-2009630, R2-2010567, R2-2010568, R2-2010539, R2-2010538, R2-2010517 - R2-2010520, R2-2010084

 Intended outcome: Intermediate: Determine agreeable parts. Final: For agreeable parts, agreed CRs.

 Deadline: Intermediate deadline(s) by Rapporteur, Final: Discussion stop at Wed Nov 11, 1200 UTC

# 2 Discussion

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| Company | Delegate contact |

|  |  |
| --- | --- |
| Ericsson (Lian) | lian.araujo@ericsson.com |
| Ericsson (Mattias) | mattias.a.bergstrom@ericsson.com |
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|  |  |

## 2.1 Part 1: Intended to determine agreeable parts

The proposals listed in this subsection 2.1 are merely extracted from discussion TDocs to facilitate the discussion and follow the numbering of the corresponding TDoc from which they were extracted (i.e. they do not represent actual proposals from this TDoc, which should be listed in subsection 2.2).

### 2.1.1 Band list for redirection and measurement configuration

In [1], the following proposals are made:

**Proposal 1: Ran2 to discuss whether the UE can report the single CC capability for the band that included in the*supportedBandListNR* but outside of the *frequencyBandListFilter.***

**Proposal 2: If the reporting on the Bands outside of the *frequencyBandListFilter* is not allowed by the legacy gNB, this optimization can be introduced from the Rel-16.**

**Q1 Do companies agree to introduce the functionalitly described in Proposal 1 above? If yes, please clarify if this should be introduced for both Rel-15 and Rel-16 or only for Rel-16 (Proposal 2). Companies are also invited to provide their views on the CRs related to this discussion, which are provided in [2] and [3]**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | No | This is non-backward compatible change, and we should stick to the current principle, i.e. the network should be including the NR SA bands in the UE capability filter. We should not change the behaviour for release-16 as well because the network does not even know the UE release at the time it puts together the UE capability filter. |
| Ericsson  | No | Agree with Qualcomm. |
| Apple | No | Agree with Qualcomm and Ericsson. NW should be able to provide the NR SA bands as well. We already have priority in the NW requested filter and these can be of lower priority. |
| MediaTek | No | For Rel-15, it is clear NBC change and not accetable to us.For Rel-16, we don’t see the need to have the CR either. We don’t understand why NW want to handover to band but does not want to set the *frequencyBandListFilter* to include that band. It also preferable to have same behavior as in Rel-15. |
| Intel | No | Our view is that for the redirection case, it should align with the handover i.e. the network should include the bands that it wants to perform redirection in the frequencyBandListFilter. If it does not, it means that the network has no interest of using those bands for redirection. For measurement, network can use supportedBandList |
| Nokia | No | Indeed this is quite NBC to network implementation and changes fundamental principles. One cannot expect the filter to be bypassed. |
| Huawei, HiSilicon | No | It is an NBC change. Besides, for the NR band that can only be configured as SCG in EN-DC, there is no single CC capability, such NR band can only be included in a MR-DC band combination. |
| ZTE | Yes | We want to make sure that at least the single carrier capability was reported for each UE supported band, which would be better for the mobility management from network side. Anyway we can compromise and respect to other companies’ view |
| CATT | No | Agree with much of the concerns from companies.  |
| OPPO | No |  |

If the proposals above cannot be agreed, [1] further discusses other ways forward, which seem to be in line with the proposals discussed in [4], hence the proposals in the latter TDoc are captured below:

**Proposal 1: The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a redirection target band.**

**Proposal 2: The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a measurement object.**

**Q2 Do companies agree with the Proposal 1 and 2 above? If yes: please clarify whether you agree with both proposals, only Proposal 1, or only Proposal 2. Companies are also invited to provide their views on the CRs related to this discussion, which are provided in [5] and [6].**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | P1: NoP2: Yes | P1: If a band is not included in supportedBandCombinationList of RF-Parameters and is included in supportedBandCombinationList of RF-ParametersMRDC , it means that the UE supports the NR band only in EN-DC setting. It is not clear what the network expects the UE to do when the UE is redirected to such band. We think the UE behaviour is unspecified in this case. |
| Ericsson | P1: Yes, see comment.P2: Yes | P1:The UE shall accept the Release-message. The UE will not trigger some error.In case the UE is directed to a frequency which the UE cannot support a PCell on, the UE will not go there. This is like when the system information points the UE to a frequency which the UE does not support to have a PCell on. The UE will accept the system information, but will not go there.Of course there is no guarantee to the network that, in this situation, the UE will end up on the indicated frequency, but again, the UE will accept the release-message. |
| Apple | P1:noP2: Ok | Same views as Qualcomm on the redirection for EN-DC only support. |
| MediaTek | Yes | We are ok with with both proposal 1 and proposal 2 in R2-2010238. The CR from [5] and [6] is also fine. However, we don’t really know while CR from [5] and [6] is linked to P1 and P2. It seems not directly related.  |
| Intel | Yes only to Proposal 2 | As explained above, for redirection, network should use the supportedBandCombinationList and not supportedBandListNR. Hence we do not think Proposal 1 aligned with this. |
| Nokia | P1:Yes, butP2:Yes | For P1 we are more aligned to what Qualcomm said. If the band is not a NR SA capable band (but only for EN-DC) then the redirection to it will be useless. Of course, network can signal this to the UE as signalling allows it but then it means that the UE behavior is unpredictable.For P2: YesThe CRs in [5] and [6] are not required as they are non-essential correction and not even related to this discussion. |
| Huawei, HiSilicon (Proponent) | P1: YesP2: Yes | For Proposal 1, as some bands supported by UE may not be reported to the NW due to message size limitation, NW can still try to configure such bands as redirection target. If the UE is not able to camp on such bands, the UE anyway can perform cell re-selection. |
| ZTE | P1: YesP2: Yes | Share the same view as Huawei |
| CATT | Yes for P1 and P2 | We believes these are scenarios for which configuration ‎freedom can be left to the network. ‎After redirection network can acquire ue capabiltiy again, and as pointed out by some even if ue does not support a band it can reselect elsewhere.  |
| OPPO | P1:NoP2: yes with question | If network redirect a band which UE doesn’t support, it is not clear what UE will do and we don’t want to introduce such uncertainty. For P2, any spec impct? Current spec an already can do it. |

### 2.1.2 Feature sets and fallback concept

The CRs in [7],[8],[9] and [10] intend to remove the contradiction between 38.331 and 38.306 regarding Featurese Set per CC description by removing from 38.331 the description of the restrictions and rules for FSpUCC/FSpDCC and instead capturing these only in 38.306.

**Q3 Do companies agree with the intention of the CRs above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes (Proponent) |  |
| Apple | Ok |  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| Nokia | Yes | Proponent |
| Huawei, HiSilicon | Yes but | Agree with the intention. However, we think the field description in 38.331 can be kept as it is, since it is more related to the signalling structure, and remove the contradiction sentences in 38.306. |
| ZTE | Yes |  |
| CATT | Yes, but | The changes to 306 seems fine. But why do we need that deletion from 331? |
| OPPO | Yes |  |

The CRs in [11] and [12] intend to correct the definition of fallback per CC feature set, where there are parameters that are part of the fallback per CC feature set but are not captured in the current definition.

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

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes (Proponent) |  |
| Apple | No | While we agree with the MCS part, there are other parameters that were (getting) added through R16 and so generalization is dangerous. We prefer to add MCS explicitly if needed, as this was the agreement in Rel-15 for fallback. |
| MediaTek | Yes |  |
| Intel | No | Our understanding is that supportedModulationOrderDL in FSPC is used to calculate the max data rate. However the network can use modulation order higher than this based on pdsch-256QAM-FR1 or pdsch-256QAM-FR2. See below from TS38.306:***supportedModulationOrderDL***Indicates the maximum supported modulation order to be applied for downlink in the carrier in the max data rate calculation as defined in 4.1.2. If included, the network may use a modulation order on this serving cell which is higher than the value indicated in this field as long as UE supports the modulation of higher value for downlink. If not included:-             for FR1, the network uses the modulation order signalled in *pdsch-256QAM-FR1*.-             for FR2, the network uses the modulation order signalled per band i.e. *pdsch-256QAM-FR2* if signalled. If not signalled in a given band, the network shall use the modulation order 64QAM.In all the cases, it shall be ensured that the data rate does not exceed the max data rate (*DataRate*) and max data rate per CC (*DataRateCC*) according to TS 38.214 [12]. |
| Nokia | Yes | Proponent |
| Huawei, HiSilicon |  | Agree with Intel that supportedModulationOrderDL in FSPC is used to calculate the max data rate, rather than the real uased modulation order for scheduling, so the correction for Rel-15 is not necessary.But for Rel-16, as more parameters are introduced, generally we think the same logic for fallback per CC feature set can be applied, then some extensions may be needed. Besides, we find that there is a IE *supportFDM-SchemeB-r16 ENUMERATED {supported}*, how to understand the fallback capabiltiy for such IE? |
| ZTE |  | We think the current wording is too general, if needed for the Rel16, the parameters can be explicitly indicated as other companies suggested. |
| CATT |  | Agree with Intel and Huawei that such genearl extension might not be accurate. Maybe we could check case by case when there is real issue observed.  |
| OPPO | Yes with question | Just wonder the wording numerology refer to SCS only or SCS&CP? |

### 2.1.3 Inter-node coordination

The discussion in [13] wants to confirm whether the UE capability coordination accounts for the behaviour captured in the proposal below:

**Proposal: RAN2 is requested to confirm that according to current standards MN can include a fallback BC not explicitly signalled within the UE MRDC capabilities (i.e. by setting bandCombinationIndex to a superset BC reported by the UE and by signalling value 0 for some bands indicated by allowedFeatureSetsList)**

**Q5 Do companies agree with the Proposal above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | The allowedFeatureSetsList cannot be used to preclude the use of specific bands in a band combination. If we look at the figure in R2-2009308, for instance, the allowedFeatureSetsList actually indicates a row of feature sets across the UE supported bands. Hence, this field can only indicate (for a given band combination) which rows the SN is allowed to take into consideration to generate the SCG configuration, but it cannot preclude a particular column in the Feature Set Combination of a band combination. It could be that the UE have reported fallback band combinations within a Feature Set Combination of a super-set band combination, i.e. some feature set downlinks are set as 0 in some of the rows. Hence, if the MN limits the allowedFeatureSetsList to those rows where feature set downlink ID 0s are present, it could be able to indicate a fallback band combination to the SN, but this would depend on what the UE reports and could not be enforced/guaranteed. |
| Nokia | No | Yes, agree with Ericsson. |
| Huawei, HiSilicon | No | The index in *allowedFeatureSetsList* identifies a position in the *FeatureSetCombination*, if the MN wants to indicate a fallback BC by signalling 0 for some bands, it requires the UE reports such FeatureSetCombination so the MN can refer to it. But the UE dose not report the fallback BC with same capability, so the MN may not be able to find the corresponding index in *FeatureSetCombination* to indicate a fallback BC. In addition, in EN-DC, the MN is invisible to the NR capability, the MN cannot restrict the NR capability (e.g. BW, MIMO) by signalling a specific FeatureSetDownlink/FeatureSetUplink. |
| ZTE |  | We share the same view as Ericsson, but we are not sure whether the [13] wants to express the same thing as Ericsson described.  |
| CATT | No | We agree with the comments from Huawei. As one entry of allowedFeatureSetsList ‎points to the feature set combination, there is no guarantee that unclear how value 0 can indicate exactly the intended FSC for fallback BC. The proposal esentially adds new requirmenet in forming FSC, which hasn’t been agreed.  |
| OPPO | No | We also think the field description of the allowedFeatureSetsList is clear that it only refers to subset of reported featureset combination. |

### 2.1.4 Summary of Part 1

According to the feedback for Q1, there is strong concern that the proposed change would be NBC, and no support was shown for the change (except for the proponent). Hence, it is proposed to not pursue this change, note the paper and not agree on the corresponding CRs.

1. Note the paper R2-2009630; the related CRs R2-2010567 and R2-2010568 are not agreed.

According to the feedback for Q2, all companies support the green highlighted proposal below from [4], while there are mixed views on the yellow highlighted proposal:

**Proposal 1: The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a redirection target band.**

**Proposal 2: The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a measurement object.**

We suggest to agree on the green highlighted proposal above and further discuss the yellow highlighted proposal in Part 2:

1. The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a measurement object.
2. Continue the discussion on whether the network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the supportedBandCombinationList of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a redirection target band.

It was also commented by 2 companies in Q2 that the CRs related to the proposal and observation above are not quite related to such discussion, 1 company within those 2 commented also that it would be fine with the CRs, while another company within those 2 commented that the CRs are not essential corrections. It would be good to get feedback from the other companies that also commented on Q2 on those aspects as well, thus it is proposed to further discuss whether the CRs should be agreed.

1. Continue the discussion on whether R2-2010512 and R2-2010513 should be agreed.

From the feedback to Q3, all companies seem to be fine with the intention of the CRs [7],[8],[9] and [10], but it was also commented that it would be sufficient to remove from 38.306 the parts that contradict 38.331 - it is thus proposed to pursue a CR to 38.306 only, taking into consideration this comment.

1. Revise R2-2010517 and R2-2010518 to remove the sentences that contradict 38.331 concerning feature sets per CC and do not agree on the CRs R2-2010519 and R2-2010520.

On Q4, some mixed feedback was received on: how to interpret some parameters in feature set per CC as fallback; whether the change is needed for Rel-15; and also how this should be captured for Rel-16 – those details need further discussion in Part 2.

1. To continue discussing: whether there is any parameter in feature set per CC that may be unclear regarding the definition of fallback of feature set per CC (for both Rel-15 and Rel-16); how to capture any identified parameters into the definition of fallback of feature set per CC.

From the companies that provided input to Q5, there was no support to the interpretation of UE capability coordination suggested in [13], hence the paper can be noted.

1. Note the paper R2-2010084.

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

- To be updated after discussion on part 1 -

# 3 Conclusion

In the previous sections we made the following observations:

[Observation 1 Continue the discussion on whether the network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the supportedBandCombinationList of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a redirection target band.](#_Toc55485168)

[Observation 2 Continue the discussion on whether R2-2010512 and R2-2010513 should be agreed.](#_Toc55485169)

[Observation 3 To continue discussing: whether there is any parameter in feature set per CC that may be unclear regarding the definition of fallback of feature set per CC (for both Rel-15 and Rel-16); how to capture any identified parameters into the definition of fallback of feature set per CC.](#_Toc55485170)

Based on the discussion in the previous sections we propose the following:

[Proposal 1 Note the paper R2-2009630; the related CRs R2-2010567 and R2-2010568 are not agreed.](#_Toc55485171)

[Proposal 2 The network can configure the band that included in *supportedBandListNR* (no matter if such band is included in the *supportedBandCombinationList* of the *RF-Parameters* and/or *RF-ParametersMRDC*) as a measurement object.](#_Toc55485172)

[Proposal 3 Revise R2-2010517 and R2-2010518 to remove the sentences that contradict 38.331 concerning feature sets per CC and do not agree on the CRs R2-2010519 and R2-2010520.](#_Toc55485173)

[Proposal 4 Note the paper R2-2010084.](#_Toc55485174)

# 4 References

1. [R2-2009630](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2009630.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2009630.zip) Further Consideration on the non-CA BC Capability Reporting, ZTE Corporation, Sanechips, RAN2 #112-e, 2-13 November 2020

1. [R2-2010567](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010567.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010567.zip) CR on the non-CA BC Capability Reporting, ZTE Corporation, Sanechips, RAN2 #112-e, 2-13 November 2020

1. [R2-2010568](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010568.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010568.zip) CR on the non-CA BC Capability Reporting, ZTE Corporation, Sanechips, RAN2 #112-e, 2-13 November 2020

1. [R2-2010238](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010238.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010238.zip) Discussion on band for redirection and measurement configuration Huawei, HiSilicon, Ericsson, RAN2 #112-e, 2-13 November 2020

1. [R2-2010512](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010512.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010512.zip) Clarified meaning of band combinations, Ericsson, Huawei, HiSilicon, RAN2 #112-e, 2-13 November 2020

1. [R2-2010513](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010513.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010513.zip) Clarified meaning of band combinations, Ericsson, Huawei, HiSilicon, RAN2 #112-e, 2-13 November 2020

1. [R2-2010517](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010517.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010517.zip) Removing contradiction on number of FSpUCC and FSpDCC, Ericsson, Nokia, Nokia Shanghai-Bell, RAN2 #112-e, 2-13 November 2020 NR\_newRAT-Core

1. [R2-2010518](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010518.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010518.zip) Removing contradiction on number of FSpUCC and FSpDCC Ericsson, Nokia, Nokia Shanghai-Bell, RAN2 #112-e, 2-13 November 2020

1. [R2-2010519](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010519.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010519.zip) Removing contradiction on number of FSpUCC and FSpDCC Ericsson, Nokia, Nokia Shanghai-Bell, RAN2 #112-e, 2-13 November 2020

1. [R2-2010520](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010520.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010520.zip) Removing contradiction on number of FSpUCC and FSpDCC Ericsson, Nokia, Nokia Shanghai-Bell, RAN2 #112-e, 2-13 November 2020

1. [R2-2010539](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010539.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010539.zip) Definition of fallback per CC feature set, Ericsson, RAN2 #112-e, 2-13 November 2020

1. [R2-2010538](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010538.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010538.zip) Definition of fallback per CC feature set, Ericsson, RAN2 #112-e, 2-13 November 2020

1. [R2-2010084](file:///D%3A%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2%5C%5CTSGR2_112-e%5C%5CDocs%5C%5CR2-2010084.zip%22%20%5Co%20%22D%3ADocuments3GPPtsg_ranWG2TSGR2_112-eDocsR2-2010084.zip) Internode coordination for superset BCs reported by UE, Samsung Telecommunications, RAN2 #112-e, 2-13 November 2020