3GPP TSG-RAN WG2 Meeting #113 Electronic R2-2102166

 25 January – 05 February 2021

**Agenda item: 5.4.3**

**Source: Nokia**

**Title: Summary of [Post113-e][009][NR15] EN-DC BCS (Nokia)**

**WID/SID: NR\_newRAT-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

**Short Email discussion with the end objective to have CRs for RP, based on the R4 LS.**

* [Post113-e][009][NR15] EN-DC BCS (Nokia)

 Scope: Take into account R4 LS in [R2-2102403](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2102403.zip). Identify related R2 issues and the R2 related solutions, if applicable. If found possible / useful, develop R2 CRs for RP. Use tdocs provided to R2 113-e if/when useful. Can also determine whether there is a need for a LS asking more questions.

 Intended outcome: Report and Agreed CRs.

 **Deadline: Short for RP**

[R2-2102403](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_113-e%5CDocs%5CR2-2102403.zip) Reply LS to RP-202935 on BCS reporting and support for intra-band EN-DC band combinations RAN4 LSin

**Noted**

DISCUSSION

- Nokia think we need CRs to March RP

- Nokia expect no new capability, would like to confirm. QC agrees no new UE cap parameter Intel as well. Apple agrees,

- TMO US think there is combinations that may require a new capability.

- Apple think there is a misunderstanding and that R4 is still discussion BCS0 and think requirement that BCS0 need to be mandatory reported is a misunderstanding. Nokia think that BCS might not always need be reported, but under certain conditions reporting is needed.

- Chair: Not sure we will succeed. CRs should be useful and should have good Q. IF we find that we need to ask R4, this email discussion can also decide to have an LS out (but only if needed). In any case, let us attempt.

A further update in [R4-2103401](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98_e/Inbox/R4-2103401.zip) (on top of [R2-2102403](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/Inbox/R2-2102403.zip)) has been agreed in RAN4.

**Update:**

RAN4 has looked at both options and decided on option 2, that reporting the BCS should be optional and if the UE does not report a BCS for an intra-band EN-DC combination the default of support for BCS0 can be assumed. RAN4 has agreed a CR for 38.101-3 [R4-2103402, attached] which says:

The EN-DC configurations and bandwidth combination sets in Table 5.3B.1.2-1 also apply to higher order EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink. If no BCS is reported in the UE capabilities for an intra-band combination the default is that the UE supports BCS0.

The same text was also added for Table 5.3B.1.3-1.

**End of update**

# 2 **Discussion**

**Topic 1: BCS reporting and support for intra-band EN-DC band combinations**

Based on the LS, the following aspects impact RAN2 specifications.

**Aspect 1:** Based on answer to Question A.1, a BCS is not required to be signalled by the UE for higher order band combinations for intra-band EN-DC (as defined in 38.101-3, section 5.3B.1), if the UE doesn’t support the intra-band UL configurations DC\_66A\_n66A or DC\_71A\_n71A respectively.

* BCS reporting is optional
* BCS, if signalled, must be taken into account by network

**Aspect 2:** If a UE supports a combination that has an intra-band EN-DC component and the UE does not report an intra-band EN-DC BCS, the network may assume either a default BCS or default bandwidth combination capabilities (which of these holds is still under discussion in RAN4 and RAN2 will be subsequently informed of the decision).

**Aspect 3:** If the UE does not support UL on the intra-band EN-DC part of a band combination, then the combination is defined as a downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC.

**Aspect 4:** For the band combination in Aspect 3 clarified as downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC, signalling of BCS is optional as mentioned already in Aspect 1.

**Question 1: Do companies have a common understanding of the above listed aspects?**

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| Answers to Question 1 |
| Company | Yes/No | Comments |
| Apple | Yes with comments | For A1: we are not sure how to interpret ‘even’. It is clearer with removing 'even', where it means that UEs which do not support intra-band UL DC are not required to signal a BCS for intra-band EN-DC. A3: we were not very convinced on the meaning of a DL-only intra-band EN-DC (EN-DC as such requires UL on LTE and NR). It appears RAN4 understood that RAN2 thinks in terms of inter-band EN-DC, intra-band EN-DC and intra-band EN\_DC with inter-band components. And it’s the last one that had the potential to create ambiguities. In our view, RAN2 can follow RAN4’s definition of considering the last one as inter-band EN-DC with intra-band components (where the support of intra-band part is optional). And do we have to define this as inter-band and intra-band EN-DC with UL (instead of just considering this as inter-band EN-DC with intra-band optional component?). We would like to get other companies views.A2: If we consider that intra-band parts of inter-band EN-DC as optional, then it would be easier to close the ambiguities once RAN4 provides further feedback on signaling (using BCS0 etc..). We think it’s better to discuss A2 after RAN4 concludes.A4: Ok. |
| Intel | Yes | Agree with Apple on A1. Regarding A3, we are ok to follow RAN4 terminology “downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC”. We understand that the terminology we have been using is a bit ambiguous e.g. although we call one BC as inter-band CA BC, the UE may or may not support UL inter-band CA because we allow different downlink and uplink CA capability. Adding “downlink” and “uplink” in the context might be sufficient although it might cause additional question on the general terminologies of BC.  |
| Qualcomm Incorporated | Yes | A1: Agree with Apple.A2: Looks better to wait for RAN4 before RAN2 takes any action on this.A3: We see some risks that the new terminology “downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC” can cause additional confusion into the already confusing BCS definitions in 38.306.It looks sufficient from 38.306 perspective to just say it is mandatory for the UE to report BCS if the UE supports UL in both RATs in intra-EN-DC component and otherwise optional.A4: See above on the terminology issue. Fine with the optionality. |
| ZTE | Yes | A1: Agree with AppleA2: Agree to wait for RAN4’s conclusionA3: Seems there are 2 options:Option 1: Introduce the new terminology “downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC” for the case that only DL intra-band EN-DC was supportedOption 2: No new terminology , and distinguish the 2 cases with the wording of “intra-band (NG)EN-DC/NE-DC combination supporting both DL and UL intra-band EN-DC’ and “intra-band (NG)EN-DC/NE-DC combination without supporting UL”We think the option 2 has less spec impact, so slightly prefer option 2.A4: OK |
| T-Mobile USA | No | A1: In the LS the use of DC\_66A\_n66A and DC\_71A\_n71A are used to illustrate a point . Need to replace “even if the UE doesn’t support the intra-band UL configurations DC\_66A\_n66A or DC\_71A\_n71A respectively.” With” irregardless of the UL EN-DC configurations supported by the UE” A1: RAN4 needs to define how the network uses the BCS if it is reported, this is a special case were the BCS can be DL only depending on the UL configuration. RAN2 needs to reference 38.101-3 to define any restrictions on the use of the BCS by the network. A2: With IE SupportedBandwidthCombinationSetIntraENDC as an optional IE the default configuration must be determined before CR’s are approved. As far as RAN2 goes the text for SupportedBandwidthCombinationSetIntraENDC should reference 38.101-3 for the default behaviour. A2 (con’t): T-Mobile has UE’s that don’t support all the channel BW’s and thus we need to define a default BCS, however that BCS may vary by band. This is easily handled in RAN4 specifications. A3: AgreedA4: Agreed |
| OPPO |  | For A1, same view as AppleFor A2, we understand it holds under the condition of: not only “supports a combination that has an intra-band EN-DC component and the UE does not report an intra-band EN-DC BCS”, but also the UE support the DL part of the intra-band EN-DC component but not support the UL part of the intra-band EN-DC component, i.e., limit to the specific case here. And agree we can wait for RAN4For A3, we are somehow in the middle, i.e., although RAN4 statement / terminology is a bit too restrictive so not very generalized, but at least state explicitly in the terminology on DL and UL capability can clarify this in a larger extent, so tend to go to the direction somehow like suggested by ZTE. |
| MediaTek | Yes with comment | A1 – AgreedA2 – With the updated LS, now RAN4 agreed to have default value BCS0 and is captured in RAN4 SPEC.A3 – Similar view as QC, we prefer not to have new terminology. A4 – We could discuss how to clarify this in 38.306 |
| Huawei, HiSilicon | Yes with comments | A1 – Agree.A2 – With the updated LS, we understand RAN4’s agreement is to assume BCS0 is the default value for intra-band part downlink configuration, and the UL configuration is not supported.A3 – We share the similar understanding as QC and MTK.A4 – We want to confirm the understanding that optional reporting of BCS means even if the UE does not support the UL configuration for intra-band ENDC part, the UE can still report the BCS value which applies to downlink only; and if the UE supports the UL configuration for intra-band ENDC part, the reported BCS value applies to both uplink and downlink. If this is the case, we agree A4. |
| Ericsson | Yes with comments | A1 – AgreeA2 – RAN4 update clarified that BCS#0 is assumed by nw, in case no BCS is signalled by UE.A3/A4: We agree with others that we should avoid introducing new concepts that may lead to confusion.We understand the following general principles apply:1. When the UE advertises a BC allowing to configure at least one EUTRA serving cell and at least one NR serving cell in the same band, the bandwidth combinations for these serving cells are also restricted by BCS in 38.103 table 5.3B.1.2-1/ table 5.3B.1.2-1.
2. If the UE does not include the supportedBandwidthCombinationSetIntraENDC in this band combination, the network assumes UE supports BCS#0 in 38.101 table 5.3B.1.2-1/table 5.3B.1.3-1 for the BC.
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| CATT | Yes with comments | A1 – agreeA2 – R4 has decision already. A3/4 – Agree with comments above that new concept not needed to solve this issue.  |
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**Summary 1**: Companies seem to have common understanding of the RAN4 incoming LS and that a default BCS must be assumed.

Based on the above the RAN2 specification changes are proposed as follows to align with RAN4 decision.

| ***supportedBandwidthCombinationSetIntraENDC***Defines the supported bandwidth combination for the band combination set as defined in the TS 38.101-3 [4]. For intra-band (NG)EN-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band (NG)EN-DC component. For intra-band NE-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band NE-DC component. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. * It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination supporting the intra-band UL part as defined in TS 38.101-3 [4] with additional inter-band NR/LTE CA component.
* It is optional if the band combination is an intra-band (NG)EN-DC/NE-DC combination without supporting the intra-band UL part as defined in TS 38.101-3 [4]. Such a band combination is considered inter-band in the DL and the intra-band (NG)EN-DC/NE-DC part of the band combination is considered inter-band EN-DC in the UL.
 | BC | No | N/A | N/A |
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**Question 2: Do companies think the above text proposal for TS 38.306 correctly reflects the RAN4 provided understanding?**

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| Answers to Question 2 |
| Company | Yes/No | Comments to the text proposal above. |
| Apple | No, but we are open to discuss | In our view this field should be optional altogether. Only UEs which support (atleast) the DL intra-band EN-DC, as part of a larger inter-band EN-DC should signal this. Obviously, UEs which also support UL intra-band EN-DC as part of larger inter-band EN-DC would have to signal the BCS as well. In combination with the BCS signalling as well as the featureSetUL/DL, the NW would know the combination of capabilities the UE should support. This implies that the UE would have to report the same DC combination twice in some cases, but that would be a side effect of such signaling.But we understand that this can changed based on the RAN4 feedback on A2 above. |
| Intel |  Need to some update | Although it is not essential, the spec description would be good to be complete. In that sense, not only “supporting the intra-band UL part” but also “DL part” should be included. *- It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination supporting both DL and UL intra-band EN-DC part as defined in TS 38.101-3 [4] with additional inter-band NR/LTE CA component.*In the first sentence, shouldn’t we use RAN4 recommended term or any term RAN2 will agree? *It is optional if the band combination is downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC as defined in TS 38.101-3 [4].*The second sentence in the last bullet point looks redundant.  |
| Qualcomm Incorporated |  | Suggestions below. Again, we do not see the introduction of the new terminology is essential from 38.306 perspective.* It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination supporting UL and DL in the intra-band (NG)EN-DC/NE-DC part as defined in TS 38.101-3 [4] with additional inter-band NR/LTE CA component.
* It is optional if the band combination is an intra-band (NG)EN-DC/NE-DC combination without supporting UL in all bands of the intra-band (NG)EN-DC/NE-DC part as defined in TS 38.101-3 [4].
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| ZTE |  | We are ok with the wording of Qualcomm. |
| T-Mobile USA | No | With RAN4 defining a default value in A:2 SupportedBandwidthCombinationSetIntraENDC is optional. The bullets at the bottom of the text aren’t necessary. However text needs to be added stating “If this field isn’t present refer to 38.101-3 for the default configuration or BCS value” |
| OPPO |  | same view as Intel and QC that the last sentence is not needed, and the clarification on the first sentence for the 2nd bullet can refer to our answer to Q1. |
| MediaTek | No | With the updated LS, now this capability has a default value BCS0. In this case, there is no much need to mandate UE reporting at some cases. We would suggest to simply remove the last sentence on mandatory reporting part and change the M column from “CY” to “No”. There is no need to specify default BCS0 value because RAN4 already specified in their SPEC.***supportedBandwidthCombinationSetIntraENDC***Defines the supported bandwidth combination for the band combination set as defined in the TS 38.101-3 [4]. For intra-band (NG)EN-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band (NG)EN-DC component. For intra-band NE-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band NE-DC component. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. ~~It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination with additional inter-band NR/LTE CA component.~~ |
| Huawei, HiSilicon | See comments | We understand the default value should be reflected clearly in RAN2 specification to avoid any inter-operability issue anymore. Thus we added one more sentence based on QC’s version.* It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination supporting UL and DL in the intra-band (NG)EN-DC/NE-DC part as defined in TS 38.101-3 [4] with additional inter-band NR/LTE CA component.
* It is optional if the band combination is an intra-band (NG)EN-DC/NE-DC combination without supporting UL in all bands of the intra-band (NG)EN-DC/NE-DC part as defined in TS 38.101-3 [4]. If not reported, BCS0 is the default value for downlink of the intra-band (NG)EN-DC/NE-DC.
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| Ericsson | See Comments | We propose to update field description as follows. There seems no need to distinguish between between mandatory and optional for UE to include the field.***supportedBandwidthCombinationSetIntraENDC***Defines the supported bandwidth combination set for a band combination that allows configuration of at least one EUTRA serving cell and at least one NR serving cell in the same band, as defined in the TS 38.101-3 [4], table 5.3B.1.2-1 and table 5.3B.1.2-1:. * For intra-band (NG)EN-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band (NG)EN-DC component.
* For intra-band NE-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band NE-DC component.

If the field not included for such band combination, the network assumes UE supports BCS#0 as defined in TS 38.101 table 5.3B.1.2-1 and table 5.3B.1.3-1.Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on.  |
| CATT | See comments | We tend to think HW’s version is clearer.  |
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**Summary 2**: There are two schools of thought here. One camp of companies’ think that the capability must be fully optional and as such if the capability is not reported then the default BCS assumption holds. Other camp thinks the optionality only refers to the case for the case where the UL is not supported for both the bands in the intra-band EN-DC part (but mandatory for the nominal case).

**Proposal 1**: RAN2 to down select between Option 1 or Option 2

Option 1: *supportedBandwidthCombinationSetIntraENDC* is conditionally optional i.e. only optional if the band combination is an intra-band (NG)EN-DC/NE-DC combination without supporting UL in all bands of the intra-band (NG)EN-DC/NE-DC.

Option 2: *supportedBandwidthCombinationSetIntraENDC* is fully optional.

According to the RAN4 LS *“If the UE does not support UL on the intra-band EN-DC part of a band combination, then the combination is downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC. But the UE is allowed to optionally report intra-band EN-DC BCS as answered in Question A. This may not fit into the current RAN2 signalling framework, therefore we would like RAN2 to consider it and provide feedback with RAN2 views.”*

**Question 3: Do companies understand that there is no new capability implied by the statement above? To be more clear, that the current RAN2 signalling framework allows a UE to signal the BCS of a band combination which is of this type “downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC”?**

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| Answers to Question 3 |
| Company | Yes/No | Comments |
| Apple | RAN2 signalling allows this. No new capability field needs to be added | But we are not sure about the statement “*This may not fit into the current RAN2 signalling framework, therefore we would like RAN2 to consider it and provide feedback with RAN2 views”*While we can provide details on how RAN2 concluded with signalling, we think there is no ambiguity that requires feedback to RAN4 as such (and anyway RAN4 has to comeback for A2).We think based on our reasoning provided for Q2 above, the current signalling can take care of this, if we remove the mandatory requirement (and we think this can be done without any NBC…unless we missed something). We invite company views on this. |
| Intel | Yes | We guess that RAN4’s intention is this RAN4 feedback is not aligned with the current field description that the UE mandatorily report BCS. We agree with Apple that we can still use current signaling and just need to clarify in the field description.  |
| Qualcomm Incorporated | Yes | But RAN2 specifications works without introducing “**downlink inter-band and intra-band EN-DC with uplink inter-band EN-DC**”. |
| ZTE | Yes | The signalling is ok, just need to give some clarification to the field description. |
| T-Mobile USA | No | RAN2 signalling doesn’t allow the UE to signal a different BCS values when the UE supports both intraband contiguous and intra-band non-contiguous ENDC in IE intraBandENDC-Support. The current UE capability structure only supports a single BCS value which works if the UE only supports either intraband contiguous or intraband non-contiguous. A new capability field needs to be added to differentiate between different BCS values for contiguous and non-contiguous intraband EN-DC |
| OPPO | Yes | Same view as Intel. |
| MediaTek | Yes | We think current signalling is sufficient. Do not prefer new signalling especially in Rel-15. |
| Huawei, HiSilicon | Yes with comments | We think for the current discussed issue, no new capability is required. Clarification discussed above is already sufficient. Regarding T-Mobile’s comment, this seems another question which was not discussed before. We need to check with RAN4 whether such cases exist, and how to handle it. So far we are not in favour of adding new capability. |
| Ericsson | Yes | We think existing signalling framework is sufficient.To the TMO comment: Can’t the UE just offer two BCs with the same intra-band LTE and NR BandParameters but possibly with different BCS-IDs.This field may then be set differently in the two BCs:intraBandENDC-Support ENUMERATED {non-contiguous, both} OPTIONAL,***intraBandENDC-Support***Indicates whether the UE supports intra-band (NG)EN-DC with only non-contiguous spectrum, or with both contiguous and non-contiguous spectrum for the (NG)EN-DC combination as specified in TS 38.101-3 [4].If the UE does not include this field for an intra-band (NG)EN-DC combination the UE only supports the contiguous spectrum for the intra-band (NG)EN-DC combination.In one of the BCs it may be absent, indicating that the UE supports only “contiguous”.And in the other BC it may be present and set to “non-contiguous”.=> No new signalling needed. |
| CATT | Yes |  |
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**Summary 3**: All companies agree that there is no new capability required to be introduced on top of *supportedBandwidthCombinationSetIntraENDC* and the intent is only to clarify the existing capability with the default BCS assumption made in RAN4. For the current issue, there is no new capability required apart from what already exists i.e. *supportedBandwidthCombinationSetIntraENDC*.

**Question 4: Any other aspects that companies think are relevant for the discussion**

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| Answers to Question 4 |
| Company | Yes/No | Comments |
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**Summary 4**: TBD.

**Proposal 4**: TBD.

**Question 5: Which option is preferable to the companies? Option 1 or Option 2?**

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| Answers to Question 5 |
| Company | Option 1 or Option 2 | Comments |
| Nokia, Nokia Shanghai Bell | Both are functionally equivalent (tend to prefer Option 1 slightly more than Option 2) – Option 1 | No strong opinion here, would like to understand more from the companies if they have different views. |
| Ericsson | Option 2 | No reason to have this extra complexity of Option 1. |
| Intel | Option 1 | Both options are not equivalent from our understanding. Option 2 is not clear whether it is mandatory or optional to signal intra-band BCS for intra-band EN-DC supporting both UL and DL part because BCS0 is used for only DL part. We understand that it is still mandatory to signal BCS for intra-band EN-DC supporting both UL and DL part.  |
| MediaTek | Option 2 | There is no much benefit to have conditional mandatory while there is already default value (that UE shall mandatory support) for this capability. Also considering that the description of conditional mandatory is complicate, we prefer to have simple define as option 2. BTW, the wording suggested by Ericsson in Q2 is also fine for us. |
| CATT | Option 1 | We tend to think O1 is more aligned with the existing spec and we just clarify the problematic case. O2 goes even further which requires consensus to change. We suggest to check if HW’s suggested wording in Q2 would be sufficient to close this discussion? |
| Huawei, HiSilicon | Option 1 | We understand when making the change, the important thing is to avoid any misunderstanding in the future, which would result in inter-operability risks. In this case we prefer Option 1 which is clearer. |
| OPPO | Option-1 |  |
| Qualcomm | Option 1 | Based on reflector input |
| Apple | Option 1 | Based on reflector input |
| Vivo | Option 1 | Based on reflector input |
| ZTE, Sanechips | Option 1 | Option 1 is more aligned with RAN4's intention |
| Samsung | Option 1 | UE will anyway report BCS for such band and default BCS0 should be DL part only in such band without supporting UL part. |
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**Summary 5**: 2 companies support Option 2 with the understanding that the full optionality allows the network to assume a BCS0 in any case for the UEs on the field. 6 companies think Option 1 clarifies the DL part of BCS0 is the default that the network assumes. In other cases, the UE must report the mandatory BCS that it is expected to report as per the definition of the existing capability. Companies supporting Option 2 think it might be safer but companies supporting Option 1 think the added safety brings in additional confusion to have the default value in such a case would lead to the misunderstanding that the UE still supports UL configuration but in fact it does not. It is hence argued to keep the cases separate (as Option 1 does) to ensure that the interoperability aspects remain fully clear. Given the support of Option 1 (9) versus Option 2 (2) and given the understanding that Option 1 clarifies the default BCS assumption to be made by the network for the EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink, rapporteur proposes Option 1.

**Proposal 5**: Option 1 is selected for finalizing the CRs (i.e. *supportedBandwidthCombinationSetIntraENDC* description clarifies the default BCS to be assumed by the network for the EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink).

# 4 Conclusion

2 companies support Option 2 with the understanding that the full optionality allows the network to assume a BCS0 in any case for the UEs on the field. 6 companies think Option 1 clarifies the DL part of BCS0 is the default that the network assumes. In other cases, the UE must report the mandatory BCS that it is expected to report as per the definition of the existing capability. Companies supporting Option 2 think it might be safer but companies supporting Option 1 think the added safety brings in additional confusion to have the default value in such a case would lead to the misunderstanding that the UE still supports UL configuration but in fact it does not. It is hence argued to keep the cases separate (as Option 1 does) to ensure that the interoperability aspects remain fully clear.

There remained one company (TMO) who does not support neither Option 1 nor Option 2 as the use-case of contiguous vs non-contiguous intra-band EN-DC. Their fundamental concern is that RAN2 modifies the definition of supportedBandwidthCombinationSetIntraENDC and has to modify the definition shortly thereafter to fix the case when UE’s report “Both” IE intraBandENDC-Support. This then requires the rollout of two UE software updates to UE’s in our network. However, companies have indicated their view that this discussion is linked to the current discussion but technically a separate topic as it is understood that RAN4 is still discussing this. From rapporteur perspective, it would be indeed easier to solve all the issues at once but given the time on hand, RAN2 would benefit from solving problems step by step. The other aspect that is worrisome is that the RAN2 specifications will be out of sync with RAN4 if no CR can be agreed for the ongoing topic and the task assigned by RAN plenary cannot be completed.

**Option 1:** Intel, CATT, Huawei, Nokia, Vivo, Oppo, Qualcomm, Apple, ZTE, Samsung

**Option 2:** Ericsson, MTK

Given the support of Option 1 (9) versus Option 2 (2) and given the understanding that Option 1 clarifies the default BCS assumption to be made by the network for the EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink, rapporteur proposes Option 1.

**Proposal: Option 1 is selected for finalizing the CRs (i.e. *supportedBandwidthCombinationSetIntraENDC* description clarifies the default BCS to be assumed by the network for the EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink).**

**Proposal 2: R2-2102166 for the report of the email discussion.**

**Proposal 3: CRs in R2-2102167: 38.306 Rel-15 CR#0536 and R2-2102168: 38.306 Rel-16 CR#0537**

# Annex A – Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Nokia | Amaanat (Rapporteur) | amaanat.ali@nokia.com |
| Apple | Naveen Palle | naveen.palle@apple.com |
| Qualcomm Incorporated | Masato Kitazoe | mkitazoe@qti.qualcomm.com |
| ZTE | Wenting Li | li.wenting@zte.com.cn |
| T-Mobile USA | John Humbert | John.humbert2@T-Mobile.com |
| OPPO | Qianxi Lu | qianxi.lu@oppo.com |
| MediaTek | Felix Tsai | chun-fan.tsai@mediatek.com |
| Huawei, HiSilicon | Yang Zhao | zhaoyang@huawei.com |
| Ericsson | Håkan Palm | hakan.l.palm@ericsson.com |
| Intel | Youn Heo | Youn.hyoung.heo@intel.com |
|  |  |  |
|  |  |  |
|  |  |  |

# Annex B – Continue from [AT113-e][009][NR15] UE Capabilites EN-DC BCS (Nokia)

### 5.4.3 UE capabilities and Capability Coordination

* [AT113-e][009][NR15] UE Capabilites EN-DC BCS (Nokia)

Wait: Do not start email discussion until LS from R4 is available,

 Scope: Treat Incoming LS from R4. [R2-2100065](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100065.zip), [R2-2100949](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100949.zip), [R2-2101664](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101664.zip), [R2-2100388](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100388.zip), [R2-2100481](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100481.zip), [R2-2101562](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101562.zip), [R2-2101563](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101563.zip), [R2-2101564](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101564.zip), [R2-2101565](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101565.zip),

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

 Intended outcome: Report and Agreed CRs.

 Deadline: Schedule A

EN-DC BCS

R2 Treatment: Wait for R4 progress, If R4 LS becomes available, treat by email (Rapporteur to kick off email discussion) take into account RP LS, R4 LS and input tdocs: conclude whether any change to R2 TS is needed, 2: if needed

Moved from 5.1:

[R2-2100065](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100065.zip) LS on BCS reporting and support for intra-band EN-DC band combinations (RP-202935; contact: Nokia) RAN LS in Rel-15 NR\_newRAT-Core To:RAN2, RAN4

[R2-2100949](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100949.zip) Clarifying BCS for inter-band EN-DC band combination with intra-band EN-DC components Nokia, Nokia Shanghai Bell discussion Rel-15 NR\_newRAT-Core

[R2-2101664](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101664.zip) Discussion on BCS for intra-band EN-DC BC with inter-band component Huawei, HiSilicon discussion Rel-15 NR\_newRAT-Core

[R2-2100388](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100388.zip) Clarification on BCS reporting and support for intra-band EN-DC band combinations Intel Corporation discussion Rel-15 NR\_newRAT-Core

[R2-2100481](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100481.zip) BCS reporting for intra-band EN-DC band combination Qualcomm Incorporated discussion Rel-15 NR\_newRAT-Core

[R2-2101562](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101562.zip) Clarification on the Intra-band and Inter-band EN-DC Capabilities ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core

[R2-2101563](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101563.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.12.0 0517 - F NR\_newRAT-Core

[R2-2101564](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101564.zip) CR on the Intra-band and Inter-band EN-DC Capabilities - R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0518 - A NR\_newRAT-Core

[R2-2101565](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101565.zip) Draft LS on the Intra-band and Inter-band EN-DC Capabilities ZTE Corporation, Sanechips LS out Rel-15 NR\_newRAT-Core To:RAN4/RAN1

* [AT113-e][009][NR15] UE Capabilites EN-DC BCS (Nokia)

Wait: Do not start email discussion until LS from R4 is available,

 Scope: Treat Incoming LS from R4. [R2-2100065](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100065.zip), [R2-2100949](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100949.zip), [R2-2101664](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101664.zip), [R2-2100388](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100388.zip), [R2-2100481](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2100481.zip), [R2-2101562](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101562.zip), [R2-2101563](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101563.zip), [R2-2101564](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101564.zip), [R2-2101565](file:///D%3A/Documents/3GPP/tsg_ran/WG2/TSGR2_113-e/Docs/R2-2101565.zip),

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

 Intended outcome: Report and Agreed CRs.

 Deadline: Schedule A

RAN4 has discussed and sent LS to RAN2 in [R2-2102403](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/LSin/R2-2102403.zip) ([R4-2102149](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98_e/Inbox/R4-2102149.zip))