3GPP TSG-RAN WG2 Meeting #117 Electronic R2-220xxxx

Online, 21 February – 03 March 2022

**Agenda item: 8.24.1**

**Source: Nokia (Rapporteur)**

**Title: Offline [AT117-e][059][NR17] FR2 CA BW Classes and CBM (Nokia)**

**WID/SID: NR\_RF\_FR2\_req\_enh2-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT117-e][059][NR17] FR2 CA BW Classes and CBM (Nokia)

 Scope: Treat R2-2202377, R2-2202904, R2-2203122, R2-2203024, R2-2202905, R2-2202389, R2-2202390, R2-2202910, R2-2202911, R2-2202912, R2-2202913, R2-2203493, R2-2203494, R2-2202365, R2-2202366. Ph1 Determine agreeable parts and converge on discussion points if any, Ph2 agree CRs and Reply LS out.

 Intended outcome: Report, Agreed CRs (CRs with certain early impl. character need to be separate CRs), Approved LS out

 Deadline: Schedule 1

RF FR2 - CA BW Classes and CBM

Offline

* [AT117-e][059][NR17] FR2 CA BW Classes and CBM (Nokia)

 Scope: Treat R2-2202377, R2-2202904, R2-2203122, R2-2203024, R2-2202905, R2-2202389, R2-2202390, R2-2202910, R2-2202911, R2-2202912, R2-2202913, R2-2203493, R2-2203494, R2-2202365, R2-2202366. Ph1 Determine agreeable parts and converge on discussion points if any, Ph2 agree CRs and Reply LS out.

 Intended outcome: Report, Agreed CRs (CRs with certain early impl. character need to be separate CRs), Approved LS out

 Deadline: Schedule 1

**Topic 1: FR2 CA BW Classes**

[1] R2-2202377 Reply LS on release independence aspects of newly introduced FR2 CA BW Classes and CBM/IBM UE capability Nokia, Nokia Shanghai Bell LS out Rel-17 NR\_RF\_FR2\_req\_enh2-Core R2-2200843 To:RAN4

[2] R2-2202904 Consideration on the FR2 CA bandwidth classes ZTE Corporation, Sanechips discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core

[3] R2-2203122 Introduction of new FR2 CA bandwidth classes Xiaomi Communications discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core R2-2201385

[4] R2-2203024 Discussion on FR2 new bandwidth class Huawei, HiSilicon discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core

[6] R2-2202389 Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell CR Rel-17 38.331 16.7.0 2867 1 B NR\_RF\_FR2\_req\_enh2-Core R2-2200839

[7] R2-2202390 Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell CR Rel-17 38.306 16.7.0 0678 - B NR\_RF\_FR2\_req\_enh2-Core

[8] R2-2202910 CR on the FR2 CA bandwidth classes-38331 ZTE Corporation, Sanechips CR Rel-17 38.331 16.7.0 2915 - B NR\_RF\_FR2\_req\_enh2-Core

[9] R2-2202911 CR on the FR2 CA bandwidth classes-38306 ZTE Corporation, Sanechips CR Rel-17 38.306 16.7.0 0689 - B NR\_RF\_FR2\_req\_enh2-Core

[12] R2-2203493 Introduction of new FR2 CA bandwidth classes Huawei, HiSilicon draftCR Rel-17 38.331 16.7.0 B NR\_RF\_FR2\_req\_enh2-Core

[13] R2-2203494 Introduction of new FR2 CA bandwidth classes Huawei, HiSilicon draftCR Rel-17 38.306 16.7.0 B NR\_RF\_FR2\_req\_enh2-Core

**Topic 2: CBM/IBM reporting**

[5] R2-2202905 Consideration on the CBM/IBM reporting ZTE Corporation, Sanechips discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core

[10] R2-2202912 CR on the CBM/IBM reporting-38331 ZTE Corporation, Sanechips CR Rel-17 38.331 16.7.0 2916 - B NR\_RF\_FR2\_req\_enh2-Core

[11] R2-2202913 CR on the CBM/IBM reporting-38306 ZTE Corporation, Sanechips CR Rel-17 38.306 16.7.0 0690 - B NR\_RF\_FR2\_req\_enh2-Core

[14] R2-2202365 Introduction of CBM capability Nokia, Nokia Shanghai Bell CR Rel-17 38.331 16.7.0 2868 1 B NR\_RF\_FR2\_req\_enh2-Core R2-2200840

[15] R2-2202366 Introduction of CBM capability Nokia, Nokia Shanghai Bell CR Rel-17 38.306 16.7.0 0668 1 B NR\_RF\_FR2\_req\_enh2-Core R2-2200841

# 2 Contact Points

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

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| --- | --- | --- |
| Company | Name | Email Address |
| Nokia (Rapporteur) | Amaanat Ali | amaanat.ali@nokia.com |
| Huawei, HiSilicon | Tong Sha | shatong3@hisilicon.com |
| Qualcomm Incorporated | Masato Kitazoe | mkitazoe@qti.qualcomm.com |
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# 3 Discussion

The rapporteur proposes to continue the discussion from the previous meeting. To summarize the way forward from last meeting.

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| [R2-2201928](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116bis-e%5CDocs%5CR2-2201928.zip) Offline 037 on FR2 CA BW class Nokia* [037] Noted, reflected below
* [037] Continue discussion for solution options for introducing the extended bandwidth class for FR2 CA bandwidth class in FBG2 (early implementation target as Rel-15)
* [037] FFS if RAN2 aims to harmonize solution to also include  “dual bandwidth class across FBG” which is under discussion in RAN4
* [037] Introduce CBM-only capability from Rel-17 (allowing early implementation from Rel-16) and dummify CBM enumeration from Rel-16 capability
* [037] FFS if IBM/CBM capability apply to DL and/or UL
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**Topic 1: FR2 CA BW Classes**

First some views from different companies:

Listing the proposals from [2]

**Proposal 1: Take solution direction 2 that a UE reports one of the new bandwidth classes and also reports the older one for a BC as baseline.**

**Proposal 2: The similar method to R/S/T/U reporting can be adopted for the “dual bandwidth class across FBG”.**

**Proposal 3: Do not extend the Aggregatedbandwidth (maxBandwidthRequestedDL/UL), the network can set the maxBandwidthRequestedDL/UL as absent and meanwhile limit the maxCarriersRequestedDL/ maxCarriersRequestedUL to achieve the similar result.**

Listing the proposals from [3]

**Proposal 1: When the UE indicates a new bandwidth class (i.e. R, S, T, U), the UE shall also indicate bandwidth class F.**

**Proposal 2: The indication of the new bandwidth classes (i.e. R, S, T, U) is via new capability signalling of *ca-BandwidthClassDL-NR-v17xy/ ca-BandwidthClassUL-NR-v17xy*.**

**Proposal 3: The indication of the new bandwidth classes (i.e. R, S, T, U) is allowed for early implementation from Rel-15.**

Listing the proposals from [4]

**Proposal 1: To ensure backward compatibility, it is suggested to consider select one of the solution below:**

**Solution 1: Introduce separate capability signalling to indicate support of new bandwidth classes (e.g. R, S, T, U).**

**Solution 2: Introduce a capability filter from the network side indicating new introduced bandwidth classes.**

**Proposal 2: Considering the future compatibility and signalling overhead, it is recommended to adopt solution 1.**

From a check of also the CRs on the FR2 CA BW topic, there is clear consensus that the introduction of these new BW classes should take into account that the new UEs supporting these changes must also be able to signal the legacy BW class for those networks that may not be upgraded. This implies the following:

* UE reports one of the new bandwidth classes and also reports the older one for a BC as baseline i.e. UE indicates a new bandwidth class (i.e. R, S, T, U), the UE shall also indicate bandwidth class F.
* Introduce separate capability signalling to indicate support of new bandwidth classes (e.g. R, S, T, U) via Rel-17 specific extension using capability signalling of *ca-BandwidthClassDL-NR-v17xy/ ca-BandwidthClassUL-NR-v17xy*

**Question 1: Do companies agree to the following principle: “*A UE that indicates a new bandwidth class (i.e. R, S, T, U), the UE shall also indicate bandwidth class F”* or more generically *“UE reports one of the new bandwidth classes and also reports the older one for a BC as baseline”***

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| Answers to Question 1 |
| Company | Yes/No | Technical Arguments |
| Nokia | Yes | Yes, to avoid the regression issue that the legacy network will not be able to understand the new bandwidth classes and may not be able to configure the UE and that results in reconfiguration failure it is good to have the principle agreed. |
| Huawei, HiSilicon | Yes | We understand the non-backward compatibility should be considered when introduction of new FR2 CA bandwidth classes. The solution above can avoid repeated BC reporting. |
| Qualcomm Incorporated | Yes | It should be clarified that the UE shall include at least as many FeatureSetDownlinkPerCC in a feature set according to the new ca-BandwidthClassDL-r17. See ZTE document in R2-2202904. |
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**Summary 1**: TBD.

**Proposal 1**: TBD.

On the need to update the Aggregated bandwidth capability filter, company in [2] proposes not to update the filter as the number of CC’s range is sufficient for the network to elicit the UE to report the new bandwidth classes. Company in [4] lists it as possible solution option but does not recommend to update so essentially aligned to Proposal 3 in [2]. Rapporteur proposes to check within the companies if there is a network vendor that would rely on the aggregated bandwidth capability filter only for asking UE to report one of the new bandwidth classes.

**Question 2: From a network perspective is it sufficient to just use the maxCarriersRequestedDL/ maxCarriersRequestedUL to enable UE to report the new bandwidth class (i.e. no further updates to Aggregatedbandwidth (maxBandwidthRequestedDL/UL))?**

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| Answers to Question 2 |
| Company | Yes/No | Technical Arguments |
| Nokia | Tend to No | * We would also prefer that the network has the option of using the ***Aggregatedbandwidth*** part of the filter as this is one possible network implementation and we would propose not to rule this out.
	+ So we request RAN2 to update the maximum bandwidth in accordance to the RAN4 table so as to support the new bandwidth classes.
* From a specification impact perspective this is not intensive change, so we request RAN2 to do it
 |
| Huawei, HiSilicon | No | We agree with Nokia that AggregatedBandwidth filter should be extended to support the new bandwidth classes, and how to use the filter is up to network.  |
| Qualcomm Incorporated | No strong view | maxCarriersRequestedDL/UL has the benefit that it is comprehensible by legacy UE. Extension of Aggregatedbandwidth is not visible to legacy UEs. So we assume the network indicates both legacy and new field. It should be clear how the network populates legacy field and new field, and how the UE supporting both should handle the case, e.g. ignore the legacy field if new field is signalled. |
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**Summary 2**: TBD.

**Proposal 2**: TBD.

**Topic 2: CBM/IBM reporting**

There was single FFS from last meeting.

* FFS if IBM/CBM capability apply to DL and/or UL

Based on the contributions in [5] and the rapporteur company’s understanding as well there seems to be no need to distinguish DL from UL and also CRs in [10], [11] and [14], [15] implement the decision from the last meeting.

* Introduce CBM-only capability from Rel-17 (allowing early implementation from Rel-16) and dummify CBM enumeration from Rel-16 capability

**Question 3**: Do companies agree that for IBM/CBM capability there is no need to distinguish DL from UL?

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| Answers to Question 3 |
| Company | Yes/No | Technical Arguments |
| Qualcomm Incorporated | Yes |  |
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**Summary 3**: TBD.

**Proposal 3**: TBD.

# 4 Conclusion

TBD.