**3GPP T****SG-RAN WG2 Meeting #119-e R2-220xxxx**

**E-Meeting, Aug 17 – 29, 2022**

**Agenda item:**  **6.24.1**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report of [AT119-e][023][NR17] FR2 BW classes (Nokia)**

**Document for: Discussion and Decision**

# Introduction

This is the report of the following offline discussion covering the following:

FR2 BW Class

* [AT119-e][023][NR17] FR2 BW classes (Nokia)

 Scope: Treat [R2-2208510](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208510.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208510.zip), [R2-2208511](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208511.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208511.zip), [R2-2207974](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207974.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207974.zip), [R2-2207975](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207975.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207975.zip), [R2-2207973](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207973.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207973.zip),

 Determine agreeable parts. For the agreeable parts, agree CRs.

 Intended outcome: Report, Agreed CRs (if any), LS out (if applicable)

 Deadline: Schedule 1

[1] [R2-2208510](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208510.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208510.zip) Discussion on FR2 new bandwidth classes Huawei, HiSilicon discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core

[2] [R2-2208511](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208511.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208511.zip) Introduction of FR2 FBG5 CA BW classes Huawei, HiSilicon CR Rel-17 38.331 17.1.0 3432 - B NR\_RF\_FR2\_req\_enh2-Core

[3] [R2-2207974](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207974.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207974.zip) Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, Ericsson, ZTE Corporation, Sanechips, Qualcomm, Xiaomi Communications CR Rel-17 38.331 17.1.0 2867 4 B NR\_RF\_FR2\_req\_enh2-Core R2-2204851

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[4] [R2-2207975](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207975.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207975.zip) Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, Ericsson, ZTE Corporation, Sanechips, Qualcomm, Xiaomi Communications CR Rel-17 38.306 17.1.0 0678 3 B NR\_RF\_FR2\_req\_enh2-Core R2-2204850

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[5] [R2-2207973](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207973.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207973.zip) 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 R2-2204854 To:RAN4

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|  |  |
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#  Discussion

[1] [R2-2208510](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208510.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208510.zip) Discussion on FR2 new bandwidth classes Huawei, HiSilicon discussion Rel-17 NR\_RF\_FR2\_req\_enh2-Core

[2] [R2-2208511](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2208511.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2208511.zip) Introduction of FR2 FBG5 CA BW classes Huawei, HiSilicon CR Rel-17 38.331 17.1.0 3432 - B NR\_RF\_FR2\_req\_enh2-Core

[3] [R2-2207974](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207974.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207974.zip) Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, Ericsson, ZTE Corporation, Sanechips, Qualcomm, Xiaomi Communications CR Rel-17 38.331 17.1.0 2867 4 B NR\_RF\_FR2\_req\_enh2-Core R2-2204851

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[4] [R2-2207975](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_119-e%5C%5CDocs%5C%5CR2-2207975.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_119-eDocsR2-2207975.zip) Introduction of FR2 FBG2 CA BW classes Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, Ericsson, ZTE Corporation, Sanechips, Qualcomm, Xiaomi Communications CR Rel-17 38.306 17.1.0 0678 3 B NR\_RF\_FR2\_req\_enh2-Core R2-2204850

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In [1] and [2], there is a new turn to the events concerning the introduction of FR2 CA BW class. In 38.101-2 (17.6.0) in Table 5.3A.4-1: CA bandwidth classes, RAN4 has introduced CA BW class for R2-R12 under a new **FBG5** which supports a combination of 100 and 200 MHz component carriers supporting a total of 2400 MHz aggregated channel bandwidth. The proponent company argues that as the FBG is now unique i.e., the new CA bandwidth classes do not conflict with any other FBG (contrary to R, S, T and U which are added as part of FBG2).

**Proposal 1: There is no backward compatibility issue for directly introducing new FR2 FBG5 BW classes in the *CA-BandwidthClassNR* field.**

Given that R, S, T and U still remain in FBG2, the signaling discussed earlier in [3] and [4] still are relevant unless RAN4 decide to delete those CA bandwidth classes and only depend on the ones defined in FBG5.

**Proposal 2: RAN2 waits for further progress of RAN4 on FR2 BW classes R, S, T, U.**

**Question 1: Do companies agree that is no backward compatibility issue for network in introducing new FR2 FBG5 BW classes in the CA-BandwidthClassNR field?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| Nokia | Agree | Yes, a legacy gNB is not expected to parse FBG5 so there should be no issues. |
| OPPO | Agree |  |
| Samsung | Agree |  |
| MediaTek | Agree | For ASN.1 TP in CRs, new BWC naming may need to be revised:1. Lower case first letter
2. A suffix of the form “vXYZ”
 |
| Intel | Agree | including MediaTek revision of the TP  |
| Apple | Agree |  |
| ZTE | Agree |  |

**Question 2: RAN2 waits for further progress of RAN4 on FR2 BW classes R, S, T, U before deciding to discard the signalling designed in [3] and [4]**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| Nokia | Agree | Yes, let’s wait for RAN4… |
| OPPO | Agree |  |
| Samsung | Agree |  |
| MediaTek | Agree | Meanwhile we would like to feedback an issue on ASN.1 TP in this part:Same structure is shared by MR-DC use case, something like below is needed:BandParameters-v1720 ::= CHOICE { eutra SEQUENCE { ca-BandwidthClassDL-EUTRA-r17 CA-BandwidthClassEUTRA OPTIONAL, ca-BandwidthClassUL-EUTRA-r17 CA-BandwidthClassEUTRA OPTIONAL }, nr SEQUENCE { ca-BandwidthClassDL-NR-r17 CA-BandwidthClassNR-r17 OPTIONAL, ca-BandwidthClassUL-NR-r17 CA-BandwidthClassNR-r17 OPTIONAL }}In consideration of R, S, T, U are already in public RAN4 spec (TS 38.101-2 (h60)). One ASN.1 style question: Would we intend to put newly-introduced BWCs altogether in the new field or we are fine to see FBG2 BWCs and FBG5 BWSs are in different fields, one is legacy another one is new field? |
| Intel | Agree | We have the same understanding that BW classes R S T U within FBG2 are already in R4 spec. However, we are told that due to some overlap between FBG2 and 5, RAN4 is also discussing the removal of R,S,T,U from FBG2. Hence we may need to wait to see whether this is resolved in RAN4. |
| Apple | Agree to wait. |  |
| ZTE | Agree to wait |  |

# Conclusion

**To be added later.**

# Annex

Table 5.3A.4-1: CA bandwidth classes

|  |  |  |  |
| --- | --- | --- | --- |
| NR CA bandwidth class | Aggregated channel bandwidth | Number of contiguous CC | Fallback group |
| A | BWChannel ≤ 400 MHz | 1 | 1,2,3,4,5 |
| B | 400 MHz < BWChannel\_CA ≤ 800 MHz | 2 | 1 |
| C | 800 MHz < BWChannel\_CA ≤ 1200 MHz | 3 |  |
| D | 200 MHz < BWChannel\_CA ≤ 400 MHz | 2 | 2 |
| E | 400 MHz < BWChannel\_CA ≤ 600 MHz | 3 |  |
| F | 600 MHz < BWChannel\_CA ≤ 800 MHz | 4 |  |
| R | 800 MHz < BWChannel\_CA ≤ 1000 MHz | 5 |  |
| S | 1000 MHz < BWChannel\_CA ≤ 1200 MHz | 6 |  |
| T | 1200 MHz < BWChannel\_CA ≤ 1400 MHz | 7 |  |
| U | 1400 MHz < BWChannel\_CA ≤ 1600 MHz | 8 |  |
| G | 100 MHz < BWChannel\_CA ≤ 200 MHz | 2 | 3 |
| H | 200 MHz < BWChannel\_CA ≤ 300 MHz | 3 |  |
| I | 300 MHz < BWChannel\_CA ≤ 400 MHz | 4 |  |
| J | 400 MHz < BWChannel\_CA ≤ 500 MHz | 5 |  |
| K | 500 MHz < BWChannel\_CA ≤ 600 MHz | 6 |  |
| L | 600 MHz < BWChannel\_CA ≤ 700 MHz | 7 |  |
| M | 700 MHz < BWChannel\_CA ≤ 800 MHz | 8 |  |
| O | 100 MHz ≤ BWChannel\_CA ≤ 200 MHz | 2 | 4 |
| P | 150 MHz ≤ BWChannel\_CA ≤ 300 MHz | 3 |  |
| Q | 200 MHz ≤ BWChannel\_CA ≤ 400 MHz | 4 |  |
| R2 | 200 MHz ≤ BWChannel\_CA ≤ 400 MHz | 2 | 5 |
| R3 | 300 MHz ≤ BWChannel\_CA ≤ 600 MHz | 3 |  |
| R4 | 400 MHz ≤ BWChannel\_CA ≤ 800 MHz | 4 |  |
| R5 | 500 MHz ≤ BWChannel\_CA ≤ 1000 MHz | 5 |  |
| R6 | 600 MHz ≤ BWChannel\_CA ≤ 1200 MHz | 6 |  |
| R7 | 700 MHz ≤ BWChannel\_CA ≤ 1400 MHz | 7 |  |
| R8 | 800 MHz ≤ BWChannel\_CA ≤ 1600 MHz | 8 |  |
| R9 | 900 MHz ≤ BWChannel\_CA ≤ 1800 MHz | 9 |  |
| R10 | 1000 MHz ≤ BWChannel\_CA ≤ 2000 MHz | 10 |  |
| R11 | 1100 MHz ≤ BWChannel\_CA ≤ 2200 MHz | 11 |  |
| R12 | 1200 MHz ≤ BWChannel\_CA ≤ 2400 MHz | 12 |  |
| NOTE 1: Maximum supported component carrier bandwidths for fallback groups 1, 2, 3, 4 and 5 are 400 MHz, 200 MHz, 100 MHz, 100 MHz and 200 MHz respectively except for CA bandwidth class A. For CA bandwidth classes of fallback group 5, requirements apply for non-interlaced 100 MHz and 200 MHz channel bandwidths (each CA bandwidth class consisting of up to two contiguous sub-blocks each with component carriers of a single channel bandwidth).NOTE 2: It is mandatory for a UE to be able to fallback to lower order CA bandwidth class configuration within a fallback group. It is not mandatory for a UE to be able to fallback to lower order CA bandwidth class configuration that belong to a different fallback group.NOTE 3: In this release of the specification, the minimum requirements for intra-band contiguous CA configurations apply for aggregated channel bandwidths up to 1600 MHz (this note is not relevant for UE capability parsing by the network). |