3GPP TSG-RAN WG2 Meeting #104 R2-18xxxxx

Spokane, USA, 12 – 16 November, 2018

Agenda Item: 10.x.x.x

Source: Qualcomm Incorporated

Title: Summary of email discussion [103bis#14][NR] Channel Bandwidth Signalling (Cell Accessibility)

Document for: Discussion, Decision

# Introduction

In RAN2#103bis meeting, it was discussed how the UE determines the cell is accessible.

[R2-1814227](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_103bis/Docs/R2-1814227.zip) Channel Bandwidth Signalling Qualcomm Incorporated

- Nokia thinks this list is only use to determine where the PRB grid applies, but the UE just uses the BW from the BWP information.

- Ericsson understand that this list was added by RAN4 to be used to determine the carrier bandwidth and the value can be same or different from the BW in the BWP.

- Huawei understand that RAN4 LS asked us to indicate the channel BW to the UE and should not be per SCS. The transmission BW is per SCS.

- Ericsson under the scs-SpecificCarrierList is only for the purpose of defining the channel BW.

Agreements

1: To add UE specific field configuring RAN4 defined channel bandwidth per subcarrier spacing in ServingCellConfig.

2: To specify that the UE considers the cell is accessible if the UE supports the:

- bandwidth signalled by pdcch-ConfigSIB1 in MIB

FFS the bandwidth of at least one SCS in the scs-SpecificCarrierList in SIB1

FFS bandwidth signalled by locationAndBandwidth in SIB1

3 If the cell is not accessible according to 2 above then the UE treats the cell as barred.

The discussion was motivated by the principle of NR that the operation bandwidth in connected mode is flexible and future extensible [1]. This would mean that it is not guaranteed all UEs support the operational bandwidth the serving cell may support.

This email discussion aims to conclude on the FFS points mentioned in the chairman’s meeting notes above.

# Possible solutions

The following two possible conditions for cell accessibility check were discussed.

**Accessibility check #1:** The UE considers the cell is accessible if the UE supports the bandwidth of at least one SCS in the *scs-SpecificCarrierList* in SIB1.

[Email discussion rapporteur’s remark] This may be beneficial for the network supporting the basic BWP configuration option #1 ([R2-1810943](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_AHs/2018_07_NR/Docs/R2-1810943.zip)). The network may configure additional BWP based on the UE capability later. It should be noted however, the network cannot configure additional BWP beyond the BWP of CORESET#0 in Msg4, because the network does not exactly know which BW and SCS pair the UE supports until it receives the UE capability.

**Accessibility check #2:** The UE considers the cell is accessible if the UE supports the bandwidth signalled by *locationAndBandwidth* in SIB1.

[Email discussion rapporteur’s remark] This looks beneficial for the network supporting the basic BWP configuration option #2 ([R2-1810943](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_AHs/2018_07_NR/Docs/R2-1810943.zip)). It was already agreed in RAN2#103bis that the UE applies the configured *locationAndBandwidth* upon the reception of Msg4.

# Discussion

* 1. Accessibility check #1

Companies are asked to provide their view.

|  |  |  |
| --- | --- | --- |
| Company | Support /  Not Support | Comment |
| Nokia, Nokia Shanghai Bell | Depends | We think this is not a sufficient condition: UE needs to support at least the SCS for initial BWP.  For example, suppose cell indicates SCS= 15/30 kHz in *scs-SpecificCarrierList* and initial BWP is using 15 kHz. If UE supports only 30 kHz, it would be allowed to access the cell based on this condition but could not complete initial access. |
| **Intel** | **Needs discussion** | **The CBW in terms of SCS is defined to satisfy the RAN4 requirement and we have an LS (R2-1816067) to see if there are further changes needed to this. But the information in this (the CBW in terms of SCS) is not necessarily accurate in terms of BWP deployment, meaning the actual BWPs the NW intends to use in this cell do not necessarily have the BWs as advertised here. In that sense, we think the UE can evaluate the support of SCS versions alone, and if the UE supports atleast one of them without consideration of the BW, the UE proceeds with reading other SIB1 params. Only if the UE does not support any of the SCS, the UE can consider this cell as not accessible (which is also unlikely, as most of the SCS are to be supported mandatorily by the UE).**  **We are not quite sure how to use this parameter otherwise. For carriers which are considered as forbidden by an UE (Forbidden PLMN) while the MIB indicates that SIB1 is valid, the UE does not have any assistance from the NW to inform the UE how wide this carrier is, and CBW can help here (as MIB does not inform the next valid SSB location), but we need to have an agreement in RAN2 (or involve RAN4?) that the CBW then just provides the complete channel BW of the carrier, in terms of SCS. In such a case, this parameter is not really useful for cell accessibility checks in terms of SCS+BW.** |

* 1. Accessibility check #2

Companies are asked to provide their view.

|  |  |  |
| --- | --- | --- |
| Company | Support /  Not Support | Comment |
| Nokia, Nokia Shanghai Bell | Support | We think this is the minimum condition required for UE to camp on the cell. UE needs to support the SIB1 configuration (especially the UL BWP) for completing initial access. |
| **Intel** | **Not support** | **To start with, for all idle mode operations, where the UE uses common search space (CSS) for paging/SI reception etc., RAN1 has already restricted that the CORESET#0 or common CORESET should be confined to CORESET#0 BW. So only when the UE is in connected mode ‘after initial access’ the NW can schedule PDSCH/PDCCH resources outside the CORESET#0 (and hence use the expanded SIB1 BW).**  **So it is still possible for the NW to get the UE capability to understand the BW the UE supports (for the SCS of initial BW), and then it’s a question of whether the NW has any BWPs that can satisfy the UE BW. So it is still possible for the UEs which do not support the SIB1 configured BW, to operate in the cell.**  **In addition, even though we require that the MIB defined CORESET#0 (max 96 PRBs) should be less than the UE minimum BW, and that UE has to mandatorily support certain BWs in non-CA mode (even ignoring the IOT bits for BW support), the SIB1 configured BWs allow higher values than 96 PRBs!**  **And in cases where the UE cannot support certain BWs in CA (while supporting in nonCA), the NW may have to reduce the BW of the PCell when configuring CA to the UE, and this might be lower BW than the BW of the initial BWP of SIB1.**  **Another concern we have is, if we agree in rel-15 that UEs bar cells where the SIB1 BW is not supported, if later on RAN4 introduces lower BW support for certain UEs (in later releases or rel-15 itself), we may have incompatibility problems if the NWs assume that all the UEs that RACH on the cell can support the SIB1 configured BW (and not through the UE capability).**  **On the other hand, we do understand that it the SIB1 had configured certain BW for initial BWP, that would likely be the minimum BW the NW intends to use for initial BWP, and so may not have other BWPs smaller than this. But in such a case, the NWs have to ensure that this BW is something all UEs should support ( which may include roaming UEs with IOT bit for capability). 96 PRBs would be a better choice, as all UEs are expected to support this BW, but in such a case SIB1 does not have to re-configure the BW anyway ☺..!**  **Since this is initial access, we have to be careful with backwards compatibility for any agreement we make.** |

* 1. Other solution / Additional comment

Companies are asked to provide other solution, if any.

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| --- | --- |
| Company | Comment |
|  |  |

# Conclusion

# Reference

[1] [R2-1813541](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_103bis/Docs/R2-1813541.zip) LS on RAN4 design on channel bandwidth (R4-1811905) RAN4