**3GPP TSG-RAN4 Meeting #98bis-e *R4-21xxx***

**Electronic Meeting, 12 April – 20 April** **2021**

**Source:** Ericsson

**Title:** Evaluation of IrregularBW Approaches Against SI Objectives

**Agenda item:** 9.2

**Document for:** Approval

# 1. Summary of Evaluation

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| SI Objective (RP-210706 Clause 4) | Overlapping CA  (R4-2106486) | Combined UE CBW  (R4-2107040) | Overlapping UE CBW  (R4-2106689)  (R4-2104887) | Blanking Approach  (R4-2104587) |
| 1. Identify operator licensed channel bandwidths in FR1 that do not align with existing NR channel bandwidths.    1. Only licensed spectrum wider than 5 MHz to be considered in this SID.    2. Spectrum block of 33MHz in n28 require further investigation since there is dual duplexer assumption (2x30MHz) for this band. At RAN4 #98e it was decided to eliminate spectrum block of 33 MHz for n28. | N/A | N/A | N/A | N/A |
| 1. Evaluate the potential use of larger channel bandwidths than operator licensed bandwidth, including the impacts on regulatory emission requirements/UE output power implications and UE ACS/blocking impacts depending on the guard band and the SCS. | N/A | N/A | N/A | -A “Fall back” mode to the small regular BW can be used and handled by NW implementation for scenarios where near-far effect has potential problems.  -Tx (BS/UE) SEM needs definition for irregularBW  -Equal UL/DL SU |
| 1. Study the use of overlapping UE channel bandwidths (from both UE and network perspective) to cover operator’s license spectrum for both UL and DL, and if new gNB channel bandwidths are needed.   NOTE: For all considered solutions, new (dedicated) channel filters (e.g. non-integer-multiples of 5MHz) are not considered for the UE and not prioritized for the gNB. | -BS define irregularBW  -Significant implementation effort, especially for UL (may have regulatory issues)  -DL only ?  -new gNB CBW? | - adopt 5/10MHz existing requirements for each overlapping carrier  -DL only  -new gNB CBW? | -DL/UL of UE smallerCHBW only  -gNB define irregularBW for regulatory requirements | N/A |
| 1. Identify operator licensed bandwidths that are not compatible with the use of techniques like overlapping UE channel bandwidths. Every proposed method shall be summarized with respect to whether all considered spectrum scenarios are supported or whether there are specific limitations. Some limitations for a specific method shall not disqualify such method if there is a trade-off between flexibility and implementation challenges. | BS IrregularBW SU >= 90%  UE smallerCHBW SU >=90%  [if DL only as stated above] | BS IrregularBW SU >=90%  UE smallerCHBW SU >=90%  [since DL only as stated above] | UE smallerCHBW SU >= 90 %  BS IrregularCHBW SU>= 90% | UE smallerCHBW SU >= 90 %  BS IrregularCHBW SU >= 90% |
| 1. Study the complexity and efficiency of adding new channel bandwidths vs. using other including testing aspects. | -coordination /configuration of UE CHBW for SSBs (dependent on IrregularBW size)  -UE testing for irregularBW is needed | -One carrier from BB perspective (single FFT is possible), and two carriers from RF perspective  -RF capability of non-continuous intra-band CA is needed, an optional UE capability  -requires configuration of wider dedicated BWP compared to carrier BW | -BB coordination for SSB overlap between UE CHBW #1 and UE CHBW #2 | -WiderCHBW alignment and its allocated BWP depending on the irregular CHBW position in the band needs to be determined  (ref: R4-2107253) |
| 1. Generic solution(s) should be intended as much as possible, with priority should be given to approaches that avoid the introduction of new channel BWs on the UE side. Proprietary solutions if proven relevant should not be precluded. Spectrally efficient methods providing a fine channel bandwidth granularity as well as low to moderate guard band width and signalling overhead should be preferred | - CHBW for SSBs (dependent on IrregularBW size) hence not generic  -restrictions on BWP configuration and SSB? | -yes applies for all licensed spectrum wider than 5 MHz | -some additional implimentation efforts needed to TDM SSB for irregularBW > 10 MHz | -yes applies for all licensed spectrum wider than 5 MHz |
| 1. Impact on RAN1 and RAN2 should be considered and minimized | -TBD | -RAN1 change for BWP cannot be configured outside the grid configured in SIB1 in clause 12 of [5, TS 38.213 | -no change | -UE capability signalling |
| 1. For any considered solution, UEs not supporting such solution (both legacy and new UEs) should be able to use the next lower supported channel bandwidth in the UL and DL without implications. | -solution requires new UEs? | -solution requires new UEs | -legacy or new UEs | -legacy or new UEs |
| 1. Impact (if any) on RAN4 requirements should be identified for the preferred solutions. | -Define CA combinations in additions to NR BWs  -Define CA combinations for irregularBW + regularBW combinations | -gNB irregularBW | -BS irregularBW | -BS irregularBW  -UE TX SEM |