**3GPP TSG RAN WG4 Meeting #116-bis R4-2514845**

**Prague, CZ 13th – 17th Oct. 2025**

**Agenda Item:** 7.4.3.2

**Source:** Ericsson

**Title:** Simulation assumptions for(e)RedCap UE enhancement Study

**Document for:** Approval

# Introduction

In September's Plenary, NR RRM Phase 6 got approved with the following objective:

|  |
| --- |
| **4.1 Objective of SI or Core part WI or Testing part WI*** Specify the following requirements for (e)RedCap UEs [RAN4]
	+ Relaxed RLM/BFD RRM requirements
		- Use R17 RLM/BFD relaxation for legacy UE as a baseline
	+ Support of less than 5 MHz channel bandwidth (15 PRB transmission bandwidth configuration and 12 PRB SSB)
		- RF requirements, considering example bands: n100, n106, n26, n28 and n85
		- RRM requirements including relaxed RLM/BFD RRM requirements
		- Note 1: Use R18 3 MHz requirements for non-RedCap UE as a baseline
	+ Note 2: Consider both 1Rx and 2Rx (e)RedCap UEs and HD-FDD
* For intra-band co-located contiguous CA, specify necessary RRM requirements to support data scheduling on SCell prior to UE transmitting valid CSI report (to be started in Q4 2026) [RAN4]
 |

According to the Objectives, RAN4 should extend support of less than 5 MHz CBW for RedCap. This contribution lists the simulation parameters for a 1 Rx RedCap UE case, studying the 1 Rx impact on RedCap performance for less than 5 MHz.

# Simulation Assumptions for 1 RX RedCap Less than 5 MHz

**Table 1: Simulation Assumptions for SSB index reading and MIB reading Evaluation for RedCap UE with less than 5 MHz**

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Value |
| * Number of PRBs for PBCH
 |   | 12 PRBs |
| * Carrier frequency
 | MHz | * 900
 |
| * Subcarrier spacing
 | kHz | * 15
 |
| * Number of Tx antennas
 |  | * 1
* 2
 |
| * Number of Rx antennas
 | - | * 1
 |
| * DMRS
 | -  | * PBCH DMRS
 |
| * Other assumptions
 |   | * Tx BW and SSB puncturing are known at the Rx side
 |
| * CP Length
 | - | * Normal
 |
| * Number of transmitted SS block within a SS burst set period (K)
 | - | * 1
 |
| * SS burst set periodicity
 | ms | * 20
 |
| * Frequency Offset relative to UE frequency reference
 | Hz | * 0
 |
| * PBCH symbols within the SS block
 |  | * PSS-PBCH-SSS-PBCH
 |
| * Data and Control Power offset with respect to PSS and SSS
 | dB | * Baseline 0
 |
| * PBCH power offset with respect to PBCH-DMRS
 | dB | * 0
 |
| * PBCH-DMRS power offset with respect to PSS and SSS
 | dB | * 0
 |
| * PSS and SSS sequences
 | - | * No changes expected
 |
| * PBCH-DMRS sequences
 | - | * No changes expected
 |
| * PBCH-DMRS RE positions within the PBCH resource
 | - | * No changes expected except for puncturing impact
 |
| * PBCH Channel coding
 |   | * No changes expected to actual Channel coding
* (Polar code with 512 length and 24bit CRC)
 |
| * PBCH Modulation
 | - | * QPSK
 |
| * PBCH Payload (including the CRC)
 | bits | * 56bit (CRC 24bit)
 |
| * PBCH SNR
 | dB | * -10 : 0 dB, with 1 dB spacing
 |
| * Propagation Condition / Channel models
 |  | * For 3 km/h UE speed
* TDL-C 300ns
* Additional scenarios can be considered
 |
| * Detection Method
 | *
 | * Baseline: One-shot detection (i.e. no combination for different PBCHs),
* Interested companies can also bring Soft Combining results (Optional)
 |
| * Metrics
 | *
 | * See Below
 |
| * NOTE: The companies are encouraged to state channel model parameters together with the results; the parameters are to be further discussed and aligned.
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# Performance Metrics

The proposed simulation assumptions are used to derive the SSB index reading and MIB reading performance for 1 Rx RedCap UE with less than 5 MHz.

Case 1: The number of MIB readings required for 99% to successfully decode the MIB

Case 2: The number of SS-blocks required for 99% to successfully decode the PBCH SSB Index

# References

1. RP-252955, WID: NR Radio Resource Management (RRM) Phase 6, Apple
2. R4-2306400, WF on simulation assumptions for NR\_FR1\_lessthan\_5MHz\_BW