**3GPP TSG-RAN WG4 Meeting # 108bis R4-2317366**

Xiamen, China, Oct 09 – Oct 13, 2023

**Agenda item:** 5.20.5

**Source:** Moderator (vivo)

**Title:** WF on RRM aspects for NR LPWUS

**Document for:** Approval

### Sub-topic 1-1 General view on RAN1 studies on serving cell RSRP/RSRQ measurement offloading

**Issue 1-1-1: Views on RAN1 outcome**

RAN4 confirm that the evaluation methodology by RAN1 in TR38.869 for serving cell RSRP/RSRQ measurement offloading to LP-WUR at IDLE/INACTIVE mode is reasonable for SI phase.

* The evaluation methodology refers to the consideration of side condition, number of samples and accuracy.
	+ In addition, in RAN4, RF impairment margin is considered.
* Note 1: The detailed parameters for the RAN4 requirements can be further discussed in the WI phase.
* Note 2: The exact values for each aspect (i.e., side condition, number of samples and accuracy) for RAN4 requirements can be further discussed and decided in the WI phase.
* Note 3: In RAN4 understanding, RAN1 has closed the SI.

For Issue 1-2-1/2/3/4:

* Option 1: not further discussion in SI phase.
* Option 2: further discuss in RAN4 SI phase and the conclusion of these issues are to be made in WI phase.

The wording for the TP can be further discussed.

### Sub-topic 1-2 Methodology on serving cell RSRP/RSRQ measurement offloading review

**Issue 1-2-1: Noise figure impact**

* Proposals
	+ P1: From RAN4 point of view, the SNR target X should be adjusted by considering the practical NF of a LP-WUR receiver. Assuming the NF gap ∆ is ∆ = NF (LP-WUR) – NF (MR), then the new SNR target X adjusted after considering the NF of LP-WUR is X = X - ∆. (vivo)
	+ P2: The side condition for LP-WUR RRM measurement can be relaxed if the noise figure of LP-WUR increase compare with the main receiver (xiaomi)
	+ P4: Noise figure of LP-WUR is at least [3] dB worse than 1 Rx RedCap receiver, e.g. the LP-SS results are evaluated at X dB SNR corresponds to X+[3] dB SNR level when measuring using the legacy receiver (MR) (Ericsson).

*Recommendations:*

*Agreement: RAN4 understands the determination of SNR target X of LP-WUR should consider at least the NF difference between LP-WUR and MR.*

**Issue 1-2-2: SNR target X for serving cell measurement offloading**

* Proposals
	+ P1: From RAN4 point of view, since only the serving cell measurement is performed by LP-WUR. The SNR target X can be further relaxed. If a is the difference of the operating point for serving cell offloading minus the normal operating point like -6 dB, after relaxation the final SNR target X seen by LP-WUR is X = X + a, where the exact value of a to be determined in the WI phase. (vivo)
	+ P2: If the design target is to have comparable cell coverage as SSB, the target SNR can be set at ≥-6dB in CONNECTED mode and ≥-4dB in IDLE mode; otherwise, the target SNR can be higher. (MTK)
	+ P3: LP-WUR based RRM should have similar coverage level as LP-WUS, which is smaller than RRM based on MR and SSB. The SNR target for LP-WUR based RRM (without considering impact of larger noise figure) should be higher than -6dB or -4dB for RRM based on MR and SSB. (Huawei)

*Recommendations:*

*Agreement: RAN4 understands the determination of SNR target X of LP-WUR should consider at least the applicable coverage conditions of LP-WUR.*

**Issue 1-2-3: Accuracy**

* Proposals
	+ P1: The accuracy requirement defined in section 10.1.2B/10.1.7B of TS38.133 for RSRP/RSRQ can be used as the base for serving cell measurement offloading to LP-WUR study. (vivo xiaomi)
	+ P2: In RAN4’s view, a desired accuracy of +/-4.5 to +/-6db can be targeted for the LP-SS/SS based measurements by the LP-WUR. Note that the exact accuracy levels shall be specified during the WI phase. (QC)
	+ P3: The 1 Rx RedCap measurement accuracy requirements are used as reference for the study of LP-WUR measurements. (Ericsson)

*Recommendations:*

**Issue 1-2-4: RF calibration margin**

*Recommendations: refer to agree in issue 1-1-1*

### Sub-topic 1-3 Suggestions for WI phase aspects

**Issue 1-3-1: Suggestion for issues to be considered at WI phase**

* Proposals
	+ P1: During RAN4 Rel-19 WI phase, RAN4 can further discuss/evaluate the following: (Samsung Apple vivo QC)
		- Further relaxation on the RSRP accuracy target due to simplified functionality performed by LP-WUR based measurement.
		- a study phase is needed in R19 WI for RAN4 to evaluate the RRM performance based on:
		- Different SNR side condition,
		- Different samples/symbols for both LP-SS and SSS
		- Measurement accuracy and measurement delay
		- Coverage
		- A criterion to design the RRM requirement, e.g., assume the LP-WUR based RRM have the equivalent accuracy performance as legacy case, or assume the LP-WUR based RRM have the equivalent side condition of SNR as legacy case.
		- The exact relaxations and offloading mechanism

*Recommendations:*