**3GPP TSG-RAN WG4 Meeting #116 R4-2511454**

**Bangaluru, India, August 25 - 29,** **2025**

**Agenda item:** 7.24.1

**Source:** Moderator (Huawei)

**Title:** Topic summary for [116][308] NR\_LPWUS

**Document for:** Information

# Introduction

This contribution summarizes the documents that are submitted to agenda 7.24.4 for RAN4#116 and it concentrates on the following aspect.

* Topic #1: On BS RF requirements for LP-WUS/WUR

# Topic #1: On the BS RF requirement for LP-WUS

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2509192 | Nokia | ***Proposal 1: There is no need to specify the EVM requirement for LP-WUS/LP-SS.******Proposal 2: There is no need to test the EVM requirement for LP-WUS/LP-SS even if it is specified.*** ***Proposal 3: There is no restriction of LP-WUS operation with higher order modulation.*** |
| R4-2509382 | CATT | ***Observation 1: Two different methods have been used for selecting EVM values, one from system level performance perspective for a low order modulation scheme, the other from link level performance perspective for a high order modulation scheme.******Observation 2: The two methods cannot be directly used for determining EVM requirement for LP-WUS due to non-applicability of throughput as the performance metric.******Proposal 1: RAN4 to decide whether or not to introduce EVM requirement for LP-WUS based on system level instead of link level simulations.******Proposal 2: RAN4 to consider a new method to determine EVM value for LP-WUS by modifying the system-level performance based method and checking CDF loss at the required SNR for different arbitrary EVM values.******Proposal 3: RAN4 to determine EVM value for LP-WUS at 1% CDF loss at the required SNR compared with the case of 0% EVM.******Proposal 4: RAN4 to set EVM requirement as 28.5% for LP-WUS.******Proposal 5: No restriction of LP-WUS operation, this is BS implementation issue.*** |
| R4-2509383 | CATT | **draftCR to TS 38.141-1 on declaration of support for LP-WUS** |
| R4-2509384 | CATT | **draftCR to TS 38.141-2 on declaration of support for LP-WUS** |
| R4-2510135 | CMCC | ***Proposal 1: No restriction of LP-WUS operation.*** |
| R4-2510399 | ZTE | ***Observation 1: Frequency-domain EVM on LP-WUS has minor impact on the receiving MDR.******Proposal 1: It is proposed not to define EVM requirements for LP-WUS, but BS still needs to satisfy the NR EVM requirements on each NR carrier for different modulation schemes on PDSCH if the BS supports LP-WUS operation.******Proposal 2: Support Option 2: No restriction of LP-WUS operation.*** |
| R4-2510414 | Qualcomm | **draftCR to TS 38.104 on introduction of LP-WUS FR2-1 BS RF considerations***Change #1**Change #2**Change #3**Change #4**Change #5**Change #6* |
| R4-2511000 | Huawei, HiSilicon | ***Proposal 1: No need to define EVM requirements for LP-WUS.******Observation: LP-WUS could introduce noticeable EVM degradation in certain cases for 256QAM.******Proposal 2: It is proposed to restrict in-band LP-WUS operation to cases where the NR signal employs a maximum modulation order of 64QAM. This limitation should be explicitly specified to ensure robust system performance.*** |
| R4-2511004 | Huawei, HiSilicon | **draft CR to TS 38.104 on clarification of transmitted signal quality for LP-WUS operation** |
| R4-2511005 | Huawei, HiSilicon | **draft CR to TS 38.141-1 on clarification of transmitted signal quality for LP-WUS operation** |
| R4-2511006 | Huawei, HiSilicon | **draft CR to TS 38.141-2 on clarification of transmitted signal quality for LP-WUS operation** |
| R4-2511425 | Ericsson | **CR to 38.104 for transmit signal quality of LP-WUS***Change #1**Change #2* |
| R4-2511426 | Ericsson | ***Observation 1 WID objective mandates the BS new requirement subject to the declaration and use the legacy NR requirement as baseline.******Proposal-1: 17.5% EVM requirement for LP-WUS.******Proposal-2: The OOK4 signal quality test can be dependent on the 64QAM EVM test.******Proposal-3: No restriction on the LP-WUS operation.*** |

## Open issues summary

### Sub-topic 1-1 Remaining issues for LP-WUS

**Issue 1-1: Whether/How to define EVM requirements for LP-WUS**

* Options
	+ Option 1: No EVM requirement specified for LP-WUS.
	+ Option 2: Specify EVM requirement for LP-WUS.
		- Option 2-1: Set it as 28.5% for LP-WUS, which is based on SLS by evaluating SNR loss under different EVM values.
		- Option 2-2: Set it as 17.5% for LP-WUS, which is the EVM requirement for NR OFDM signal with QPSK modulation order.
* Recommended WF
	+ TBA

**Issue 1-2: Whether/how to test EVM requirements for LP-WUS**

* Options
	+ Option 1: No EVM test for LP-WUS/LP-SS.
		- Option 1a: The BS still needs to satisfy the NR EVM requirements on each NR carrier for different modulation schemes on PDSCH if the BS supports LP-WUS.
	+ Option 2: The OOK4 signal quality test can be dependent on the 64QAM EVM test.
* Recommended WF
	+ Pending on the outcome of Issue 1-1.

**Issue 1-3: Whether to introduce restriction for LP-WUS operation with higher order modulation**

* Proposals
	+ Proposal 1: No restriction of LP-WUS operation with higher modulation order. (Nokia, CATT, CMCC, ZTE, Ericsson)
	+ Proposal 2: Restrict in-band LP-WUS operation to cases where the NR signal employs a maximum modulation order of 64QAM. This limitation should be explicitly specified to ensure robust system performance. (Huawei)
* Recommended WF
	+ Check if RAN4 can agree on no restriction of LP-WUS operation with higher modulation order in this meeting.

**Issue 1-4: Submitted TP**

* TPs
	+ R4-2511426 TP to TR38.774: BS RF requirement overview for LP-WUS. (Ericsson)
* Recommended WF
	+ Proponent is encouraged to check companies’ view regarding the TP.

**Issue 1-5: Submitted draft CR**

* Draft CRs
	+ TS 38.104
		- R4-2510414 Draft CR to TS 38.104 on introduction of LP-WUS FR2-1 BS RF considerations. (Qualcomm)
		- R4-2511004 Draft CR to TS 38.104 on clarification of transmitted signal quality for LP-WUS operation. (Huawei)
		- R4-2507087 CR to 38.104 for transmit signal quality of LP-WUS. (Ericsson)
	+ TS 38.141-1/2
		- R4-2509383 Draft CR to TS 38.141-1 on declaration of support for LP-WUS. (CATT)
		- R4-2509384 Draft CR to TS 38.141-2 on declaration of support for LP-WUS. (CATT)
		- R4-2511005 Draft CR to TS 38.141-1 on clarification of transmitted signal quality for LP-WUS operation. (Huawei)
		- R4-2511006 Draft CR to TS 38.141-2 on clarification of transmitted signal quality for LP-WUS operation. (Huawei)
* Recommended WF
	+ Proponent is encouraged to check companies’ view regarding the draft CR.