**3GPP TSG-RAN WG4 Meeting #112 R4-2413424**

**Maastricht, Netherlands, 19 August – 23 August 2024**

**Agenda item:** 5.28.3

**Source:** Moderator (Ericsson)

**Title:** Topic summary for [112][324] NR\_redcap\_enh\_demod

**Document for:** Information

# Introduction

This topic summary discusses the maintenance issues for CQI reporting in fading condition for eRedCap.

# Topic #1: Title

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2412549 | Ericsson | **Observation 1:** Throughput ratio of follow CQI and fixed median CQI is degraded due to the mismatch between CSI-RS BW and PDSCH BW.**Observation 2:** Throughput ratio of follow CQI and fixed median CQI is high enough compared with the Rel-17 RedCap CQI fading test, i.e., γ=1.05, even if CSI-RS BW is 24RB. **Proposal 1:** Apply the Rel-17 RedCap CQI reporting test in fading condition to Rel-18 eRedCap:* A CQI index not in the set {median CQI - 1, median CQI, median CQI + 1} shall be reported at least α% of the time, where α = 20%.
* Throughput ratio of follow CQI and fixed median CQI shall be ≥ γ, where γ = 1.05
* Average BLER with follow CQI shall be greater than or equal to 0.02.

**Proposal 2:** Set SNR=9/10dB and SNR=15/16dB for CQI reporting test in fading condition for FDD/HD-FDD/TDD with 1Rx, same as Rel-17 RedCap CQI reporting test in fading condition. **Proposal 3:** Set SNR=6/7dB for CQI reporting test in fading condition for FDD/HD-FDD/TDD with 2Rx, same as Rel-17 RedCap CQI reporting test in fading condition. |
| R4-2412757 | Huawei, HiSilicon | **Proposal 1:** RAN4 to define CQI requirements for eRedCap UE under fading channel. The test SNR and metric can be:* SNR=9/10dB and SNR=15/16dB for FDD/HD-FDD/TDD with 1Rx.
* SNR=6/7dB for FDD/HD-FDD/TDD with 2Rx.
* Requirements:
	+ A CQI index not in the set {median CQI - 1, median CQI, median CQI + 1} shall be reported at least α% of the time where α = 20%.
	+ Throughput ratio of follow CQI and fixed median CQI shall be ≥ γ, where γ = 1.05
	+ Average BLER with follow CQI shall be greater than or equal to 0.02.
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| R4-2413311 | Nokia, Nokia Shanghai Bell | **Observation 1:** Under static condition, the CQI metric > 90% is fulfilled in all cases. Thus, it is justified to specify CQI reporting requirements under static condition for eRedCap.**Observation 2:** Under fading condition, the CQI metric > alpha=20% is not fulfilled in all cases. Especially, for 1Rx UE it is not fulfilled for SNR values > 9 dB. Thereagainst, for 2Rx UE, the CQI metric is fulfilled.**Proposal 1:** RAN4 to remove CQI reporting requirements under fading condition for eRedCap, or to remove them at least for 1 Rx UE. |
| R4-2412550 | Ericsson | Simulation results summary |
| R4-2412551 | Ericsson, Huawei, HiSilicon | CR for 38.101-4: Correction of eRedCap demodulation and CSI reporting requirements |
| R4-2411394 | Apple | CR on PDSCH TDD Requirements for Enhanced Support of RedCap |

## Open issues summary

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| RAN4#111 concluded that RAN4#112 discusses whether the following Rel-17 RedCap CQI fading test is applicable for Rel-18 eRedCap UE or not:* SNR=9/10dB and SNR=15/16dB for FDD/HD-FDD/TDD with 1Rx.
* SNR=6/7dB for FDD/HD-FDD/TDD with 2Rx.
* Requirements:
	+ A CQI index not in the set {median CQI - 1, median CQI, median CQI + 1} shall be reported at least α% of the time where α = 20%.
	+ Throughput ratio of follow CQI and fixed median CQI shall be ≥ γ, where γ = 1.05
	+ Average BLER with follow CQI shall be greater than or equal to 0.02.
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### Sub-topic 1-1 CQI reporting tests in fading condition

**Issue 1-1-1: Whether to apply the CQI reporting tests in fading condition to eRedCap UEs.**

* Proposals
	+ Option 1 (Ericsson, Huawei): Define the CQI reporting requirements under fading condition for eRedCap.
	+ Option 2 (Nokia): RAN4 to remove CQI reporting requirements under fading condition for eRedCap, or to remove them at least for 1 Rx UE.
* Recommended WF
	+ Two companies propose to apply Rel-17 CQI fading tests to Rel-18 eRedCap. One company proposes not to define CQI test or only limit to 2Rx UE.
	+ Moderator recommends:
		- Define the CQI reporting requirements under fading condition for 2Rx eRedCap UE (FDD/HD-FDD/TDD).
		- Discuss further for 1Rx eRedCap UE.
		- Revise CR (R4-2412551) according to the conclusion.

# Recommendation for Tdocs

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| **T-doc number** | **Suggested status** | **Comments** |
| R4-2412549 | Noted |  |
| R4-2412757 | Noted |  |
| R4-2413311 | Noted |  |
| R4-2412550 | Withdrawn? | To be withdrawn if no new simulation results in this meeting. |
| R4-2412551 | Revised | Revise according to the online discussion.  |
| R4-2411394 |  | Collect comments. |