**3GPP TSG RAN meeting #97-e RP-22xxxx**

**Electronic Meeting, September 12-16, 2022**

## Status Report to TSG

**Agenda item:** 9.5.1.6

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| --- | --- |
| **WI / SI Name** | Perf. part: Support of reduced capability NR devices |
| included in this status report | Study Item: No | Core part: No | Performance part:Yes | Testing part:No |
| **Acronym** | NR\_redcap-Perf |
| **Unique ID** | 900262 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | [RP-220966](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_95e/Docs/RP-220966.zip) |
| **Target Completion Date****(indicate if changed)** | Study Item:  | Core part:  | Performance part: 12/2022 | Testing part:  |
| **Overall Completion level** | Study Item:  | Core part:  | Performance Part: 75% | Testing part:  |

**Source:**

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| --- | --- |
| **Leading WG** | RAN1 |
| **Rapporteur** | **Name** | Johan BERGMAN |
| **Company** | Ericsson |
| **Email** | johan.bergman@ericsson.com |

## 1 Work plan related evaluation

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| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

## 2.4 RAN4

#### 2.4.1 Agreements

##### 2.4.1.1 RAN4#104-e

236 contributions were submitted to this meeting (for details see agenda item 9.18 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/TDoc_List_Meeting_RAN4%23104-e.xlsx))

RAN4 carried out the following offline email discussions:

* [104-e][223] NR\_redcap\_RRM\_1
	+ Summarized in [R4-2214317](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2214317.zip)
* [104-e][224] NR\_redcap\_RRM\_2
	+ Summarized in [R4-2214274](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2214274.zip)
* [104-e][328] NR\_RedCap\_Demod
	+ Summarized in [R4-2214275](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2214275.zip)

RAN4 made the following agreements related to **RRM performance requirements**:

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| Testing principle was agreed.Test configurations (e.g. new SSB, SMTC configurations) for RedCap test cases was agreed.The workplan, including updated test cases and work split was agreed in [R4-2213411](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2213411.zip).Following the agreed workplan, part 1 test cases were agreed at RAN4#104-e except few which were postponed to RAN4#104-bis-e. Applicability of cell specific RSRP offset was agreed in [R4-2214484](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2214484.zip), and agreement was informed to RAN2. The exact value of offset will be discussed future meeting.Potential test cases for SDT were identified as follows:* + 1. - For 1 Rx. RedCap UEs in FR1, consider the test case with offsetRSRP if test case associated with sdt-RSRP-Threshold and cg-SDT-RSRP-ThresholdSSB is introduced in Rel-17 SDT test.
		2. - For 1 Rx. RedCap UEs in FR1, consider the test case with offsetRSRPChange,CG-SDT under different RSRP change set-up if TA-validation for CG-SDT is introduced in Rel-17 SDT test.
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RAN4 made the following agreements related to **UE demodulation performance requirements** ([R4-2214394](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/R4-2214394.zip)).

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| * Introduce UE demodulation and CSI reporting requirements for 2Rx RedCap UE supporting HD-FDD in FDD bands as well as 1Rx UE
	+ The requirements with HD-FDD are the same as the corresponding (full-duplex) FDD requirements.
		- Interested companies can evaluate if the same requirements can be applied for both 2Rx HD-FDD and 2Rx FD-FDD.
* Section names for RedCap UE demodulation and CSI reporting requirements
	+ If new section is added for RedCap performance requirements, put ‘for RedCap’ (not ‘for RedCap UE’) for the section name
* Applicable FR2 bands for RedCap UE
	+ In FR2 bands, specify RedCap UE demodulation and CSI reporting requirements for FR2-1 only
* Define 256QAM demodulation requirements for 1Rx RedCap UE in FR1
	+ Set MCS20
* CQI feedback scheduling pattern in static/fading condition (periodic CSI reporting) for both FD-FDD and HD-FDD
* Configure the following parameters for CQI feedback scheduling pattern in static/fading condition (periodic CSI reporting) for both FD-FDD and HD-FDD:
	+ CSI-RS periodicity and offset: 10/1
	+ CSI-Report periodicity and offset: 10/9
	+ CQI/RI/PMI delay: [14ms]
	+ Interested companies are encouraged to evaluate the performance difference between CQI delay 14ms and 10ms in RAN4#104-bis-e. If significant performance degradation is observed compared with CQI delay 10ms, RAN4 will revisit the CQI/RI/PMI delay
		- If CQI delay 10ms is applied, consider CSI periodicity and offset is set to 10/5.
* Lower test points for CQI reporting test in fading condition for 2Rx (FR1 FDD and TDD)
	+ Set SNR=6/7dB for lower test points for CQI reporting test in fading condition for 2Rx
* Static channel matrix used for 1Rx UE and SNR test point offset for CQI reporting tests
	+ Interested companies are encouraged to evaluate the options for the static channel matrix and SNR test point offset.
		- Option 1: Set the static channel matrix in the frequency domain as $H\_{1RX}=\left[\begin{matrix}1&j\end{matrix}\right]$. Set SNR test point X=[0]dB lower than 2Rx test case.
		- Option 2: Keep the previous agreement on the static channel matrix in the frequency domain, that is,$H\_{1RX}=\left[\begin{matrix}1&1\end{matrix}\right]$. Set SNR test point X=3dB lower than 2Rx test case.
* Mapping of CQI index to information bit payload
	+ For RedCap CSI reporting test using CQI table 1, apply the configuration in R4-2214394 for mapping of CQI index to information bit payload
		- FR1
			* Reuse value 0 for the overhead parameter for TBS determination
			* Set 52RB for 10MHz/15kHz and 51RB for 20MHz/30kHz
		- FR2
			* Reuse existing test for CQI reporting under static condition in clause 8.2.2.2.1 and corresponding CSI RMC for RedCap UE in FR2-1
* PMI feedback scheduling pattern (aperiodic CSI reporting) for both FD-FDD and HD-FDD
	+ Configure the following parameters for PMI reporting tests for both FD-FDD and HD-FDD:
		- CSI request: 1 in slots i, where mod(i, 5) = 1, otherwise it is equal to 0.
			* Reuse the FRC from Rel-15 PMI test (R.PDSCH 1-6.1 FDD)
		- Aperiodic Report Slot Offset: 3 slots
		- CQI/RI/PMI delay: 6ms
* Define RI reporting requirements for RedCap 2Rx UEs
	+ Apply Test 2 only
	+ Replace fading CQI test for 2 Rx UE (high SNR point) by RI test case (Test 2)
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#### 2.4.2 Remaining Open issues

UE demodulation requirements:

* Alignment of simulation results for UE demodulation requirements.

RRM performance requirements:

* Following the agreed work plan, part 2 test cases need to be discussed and agreed.
* Remaining test cases of part 1 (those which were postponed) need to be discussed and agreed.

## 4. References

RAN4#104-e

236 contributions (for details see agenda item 9.18 in [Tdoc list](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Docs/TDoc_List_Meeting_RAN4%23104-e.xlsx))