**3GPP TSG RAN WG4 Meeting #98-e R4-2103518**

**Electronic Meeting, January 25th – February 5th, 2021**

**Agenda item: 7.1.6**

**Source: Nokia, Nokia Shanghai Bell**

**Title: WF on general test configurations for NR-U RRM performance requirements**

**Document for: Discussion and Decision**

# 1 Introduction

This document contains the agreements and discussions in RAN4#98-e in the email thread [98e][206] NR\_unlic\_RRM\_2 for the topics concerning general RRM performance test configurations. The summary containing the complete discussion on that topic is found on the document [2].

Background information: in RAN4#97-e meeting, NR-U RRM performance requirements we first discussed, with the agreements captured in the WF [1].

The following colour code is used to highlight the agreements in this meeting:

Agreements in the GTW session

Agreements in the 1st round

Agreements in the 2nd round

# 2 General configuration of the RRM tests

SCS for data and SSB

* Configure the same SCS for data and SSB.

Cell configuration SCS and channel bandwidth on carrier frequency with CCA

* RAN4 define NR-U RRM test cases with SCS=30kHz for both SSB and data transmission and 40 MHz bandwidth.

Applicability of NR FDD test configurations

* NR FDD test configurations do not apply to the configuration of NR-U cells, but may apply to the configuration of NR cells in NR-U test cases.

E-UTRA, NR and NR-U configurations

* Configuration for cells without CCA in NR-U test cases:
* NR cells without CCA:
  + NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
  + NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
  + NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
* LTE cells without CCA:
  + LTE FDD
  + LTE TDD

PRACH test configuration

* For handover and RRC re-establishment cases, RAN4 to assume PRACH configuration 1 and 2 as baseline for NR-U tests, as specified in Annex A.3.8.2 in TS 38.133.
* For the random access test case: RAN4 to discuss the PRACH configuration after the core requirements are defined.
* RAN4 to discuss defining a new test configuration with the new PRACH sequences introduced in NR Rel-16.

SSB test configuration and PBCH DMRS

* Number of SSB indexes per SS-burst :
  + Configure PBCH DMRS sequence index with = 1 with 1 SSB per slot and DRS transmission window 1 ms.
  + Configure PBCH DMRS sequence index with = 2 with 2 SSBs per slot and DRS transmission window 1 ms.
* SSB configuration table:
* 4 SSB configurations are defined
* Further details are discussed in CR R4-2103521 or its revisions.







RMCs for PDSCH

* Define new RMC for PDSCH for slots with RMSI under CCA
  + SCS=30kHz
  + Reuse the same configuration as RMC for PDSCH for slots with RMSI (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1, etc.).
* Still open
  + Proposal 3: Define new RMC for PDSCH for slots without RMSI under CCA
    - SCS=30kHz
    - Reusing SR.2.1 TDD (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2, etc.)

CORESET configuration

* Open options are:
  + Proposal 1: New RMSI COREST reference channel configurations shall be added for NR-U.
    - Option 1: Define new RMC for CORESET for RMSI scheduling under CCA to transmit Type0-PDCCH in the discovery burst.
      * SCS=30kHz
      * Refers to TS38.213 Table 13-4A Index 4 (i.e., 2 OFDM symbols, RB offset = 0).
      * Refers to TS38.213 Table 13-11 Index 0 (i.e., O=0, M=1)
    - Option 2: Other configuration to be proposed

RMC transmission burst

* For NR-U RRM tests, RMC is transmitted during the RMC transmission burst:
* The length of the RMC transmission burst in slots is defined as N. The RMC burst transmission format is determined according to the steps below:
  1. Select N randomly from a given set of the number of slots S1 = {[1,3,5,8]} with equal probability as the total length of RMC burst transmission format.
  2. A uniform random variable from 0 to 1 is generated. If the random variable is less than PCCA\_DL, a burst of N fully occupied slots is transmitted. Otherwise, the RMC transmission burst is muted and the muting duration is the same as the number N of slots for determined burst format.
* RMC transmission burst is scheduled outside DBT window.
* RAN4 discuss further the number of slots in S1.

TDD UL/DL configuration

* NR-U RRM tests does not configure tdd-UL-DL-ConfigurationCommon using RRC configuration. DL scheduling is configured by DCI 1\_1 slot by slot.

Existing configuration to be reused

* Considering the existing configuration from NR tests that might be reused, the following proposals FFS:
  + Proposal 1: Reuse the existing OCNG patterns in A.3.2.1 for NR-U RRM tests..
  + Proposal 2: Reuse the existing TCI state configuration in A.3.16.2 for NR-U RRM tests.
  + Proposal 3: Reuse the existing CSI-RS configurations in A.3.13.2 and A.3.17.1.2 for NR-U RRM tests. If necessary RAN4 define new CSI-RS configuration e.g. transmitted inside DBT window.

Antenna configurations

* Define new subclause for antenna configurations with unlicensed bands. For 4Rx UE, apply the same applicability rule as Rel-15 RRM test.

# 3 Spec structure and applicability rules

* The test configurations for dynamic channel access mode applies at least when:
* UE is capable of only dynamic channel access mode, and
* NW indicates dynamic channel occupancy.

FFS: for UE capable of semi-static access mode only or both semi-static and dynamic channel access modes

* The test configurations for semi-static access mode applies at least when:
* UE is capable of only semi-static channel access mode, and
* NW indicates semi-static channel occupancy.

FFS: for UE capable of dynamic access mode only or both dynamic and semi-static access modes

# References

1. R4-2017089, “WF on NR-U RRM performance,” Nokia, Nokia Shanghai Bell, RAN4#97-e.
2. R4-210xxxx, “Email discussion summary for [98e][206] NR\_unlic\_RRM\_2”, Nokia, Nokia Shanghai Bell, RAN4#98-e.