**3GPP TSG-RAN WG4 Meeting#98-bis-e *R4-2105713***

**E-meeting, Apr 12th – Apr 20th, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** | , Ericsson | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | Introduction of DL & UL CCA model for NR-U. | | | | | | | | |
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| ***Summary of change:*** | | Introduction of DL & UL CCA model to be applied  Based upon R4-2106580 and R4-2106850 CRs; changes vs R4-2106580 have change marks as ”mergeEdits” | | | | | | | | |
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| ***Consequences if not approved:*** | | CCA model will not limit the number of LBT failures and could lead to impredictable behavior in RRM tests. | | | | | | | | |
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| ***Clauses affected:*** | | A.3.20 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

### <Start of Change 1>

## A.3.20 CCA model

### A.3.20.1 Introduction

The CCA model is used in some RRM test cases with at least one cell on a carrier frequency with CCA. The intention with the CCA model is to emulate in the test equipment the behaviour of a gNB or UE which performs channel measurement to check that the channel is clear prior to performing one or more downlink or uplink transmissions.

### A.3.20.2 CCA model for operation on a carrier frequency with CCA in FR1

#### A.3.20.2.1 DL CCA model

Prior to each DBT window, the test equipment shall determine whether the CCA attempt is successful (i.e., the corresponding signals have to be transmitted), based on probability PCCA\_DL of successful CCA configured in the corresponding test case.

If the CCA attempt is successful for a transmission, then the test equipment shall transmit also other remaining transmissions, according to the configuration, within the same DBT window.

If the CCA attempt is not successful for a transmission within the DBT window, the test equipment shall determine whether the CCA attempt is successful for the next configured transmission, based on probability PCCA\_DL.

The probability can be different in different time intervals Ti during a test case. One probability value (per TRP) applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA\_DL per time interval Ti where i≥1, and the multiple time intervals (when i>1) do not overlap (e.g., PCCA\_DL=1.0 in T1 and PCCA\_DL=0.75 in T2).*.*

For semi-static channel access configuration, a single value PCCA\_DL is used to configure the probability of CCA success in different time intervals Ti during a test realization.

For dynamic channel access configuration, PCCA\_DL\_1 and PCCA\_DL\_2 are used to configure the probability of CCA success on the first and second SSB candidate positions, respectively, in different time intervals Ti during a test realization.

Prior to each discovery burst transmission window within a time interval Ti of the test, the test equipment shall:

1 - Generate a uniform random variable *p1* from the range [0, 1] for the first candidate position.

2 - Transmit the discovery burst based on *p1* in the first candidate position: if *p1* ≤ PCCA\_DL, the discovery burst is transmitted at first candidate SSB location; otherwise the discovery burst is muted.

3 - If two candidate SSB positions are modelled for a given SSB index in the test cases and CCA failed (*p1* > PCCA\_DL) for the first candidate SSB position, then:

a - Generate a uniform random variable *p2* from the range [0, 1] for the second candidate SSB position.

b - Transmit the discovery burst based on *p2* in the second candidate position: if *p2* ≤ PCCA\_DL2, the discovery burst is transmitted at the second candidate SSB location; otherwise the discovery burst is muted.

The above steps are repeated for each discovery burst transmission window in each time interval Ti of the test.

In many test cases, the requirement under a test depends on the number of configured SSB transmissions which are not available during the test due to CCA failure, so the test equipment shall track how many such signal occasions are not transmitted in DL during the test period.

*Editor’s note: FFS how to treat the case where the number of SSB occasions that are not transmitted in DL exceeds Lmax.*

#### A.3.20.2.2 UL CCA model

For UL CCA, the modelling approach is based on probability PCCA\_UL of successful CCA. Probability PCCA\_UL is configured in the corresponding test case, based on a set SCCA\_UL of possible values including 75% as a typical value, 0% to model consistent UL CCA failures, and 100% to model no UL CCA failures.

Consistent UL CCA failures are modelled by configuring a low value for PCCA\_UL, e.g., PCCA\_UL = 0%.

In the same time interval Ti during the same test case, PCCA\_UL can be different from PCCA\_DL.

The probability can be different in different time intervals Ti during a test case. One probability value applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA\_UL per time interval Ti where I ≥ 1, and the multiple time intervals (when I > 1) do not overlap (e.g., PCCA\_UL = 1.0 in T1 and PCCA\_UL = 0.75 in T2).

TCCA ms prior to each UL transmission burst in the test, the test equipment (TE) shall generate a uniform random variable p from the range [0, 1]. If p<PCCA\_UL, the TE transmits an [OCNG noise pattern] with an energy level [X] within the UE BW scheduled/configured for the UL transmission for at-least TCCA ms. TCCA is the channel sensing period depending on CCA category for the next UL transmission. The TE shall count the number of UL CCA failures. For each UL CCA failure generated by the model, the TE shall monitor the corresponding UL resource for the desired UL signal, and based on when and/or whether the TE received the desired UL signal, it deems the test case to pass or fail.

*Editor’s note: Energy level X is FFS and is higher than the LBT detection threshold.*

*Editor’s note:* *applicability of OCNG noise pattern is FFS.*

In many cases, the requirement under a test depends on the number of configured signal occasions which are not available during the test, so the test equipment shall track how many such signal occasions are not transmitted in UL during the test period.

<End of Change 1>