**3GPP TSG RAN Meeting #94-e RP-212955**

**Electronic Meeting, December 06 – 17, 2021**

**Source: Ericsson**

**Title: WID on Power Class 1.5 CA with xNR DL and 2NR UL bands (x= 2, 3, 4)**

**Document for: Approval**

**Agenda Item: 9.1**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: Power Class 1.5 for NR CA with xDL and 2UL (1FDD+1TDD NR) bands; (x= 2, 3, 4)

## Acronym: NRCA\_PC1.5\_R17\_xDL\_2UL

## Unique identifier: xxxxxx *{A number to be provided by MCC at the plenary}*

NOTE: For new WIs/SIs leave the Unique identifier empty or you can make a proposal for an Acronym.

 If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI.

 Please tick (X) the applicable box(es) in the table below:

|  |  |
| --- | --- |
| **This WID includes a Core part** | **X** |
| **This WID includes a Performance part** | **X** |

## 1 Impacts *{ For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study.}*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  | X |  |  |  |
| **No** | X |  | X | X |  |
| **Don't know** |  |  |  |  |  |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a … *{Tick one box. "***Feature** */* **Building Block** */ Work Task" form a hierarchical structure. E.g. no Building Block can be proposed without a corresponding parent Feature. The full structure of all existing Work Items is shown in the 3GPP Work Plan in* *ftp://ftp.3gpp.org/Information/WORK\_PLAN* *}*

|  |  |
| --- | --- |
| X | Feature |
|  | Building Block |
|  | *Work Task* |
|  | Study Item |

### 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| NRCA\_PC1.5\_R17\_xDL\_2UL | RAN4 | xxxxxx | PC1.5 Rel-17 NR inter-band CA of xDL and 2UL (1FDD+1TDD) bands (x= 2, 3, 4)  |

## 3 Justification

This Work Item will focus on power class 1.5 (PC1.5) CA band combinations with 29dBm maximum output power, in which configurations for x NR bands DL and 2 (1FDD+1TDD) NR bands UL will be defined under this WI, where

* The downlink x is 2, 3 or 4 NR bands
* The uplink is 2 NR bands
* One of NR uplink bands is a TDD band and one is a FDD band

## 4 Objective

### 4.1 Objective of SI or Core part WI or Testing part WI

* PC1.5 NR CA band combinations introduced by this WI will be introduced starting with REL-17.
* Specify the band-combination specific RF requirements for all listed NR CA combinations for
	+ 2 different bands DL with 2 (1FDD+1TDD NR) bands UL, or
	+ 3 different bands DL with 2 (1FDD+1TDD NR) bands UL, or
	+ 4 different bands DL with 2 (1FDD +1TDD NR) bands UL.
* including at least
	+ Applicable frequencies
	+ Applicable bandwidths and bandwidth sets
* Analyze combinations that have self-desensitization due to following reasons:
	+ TX Harmonic overlap of receive band
	+ TX signal overlap of receiver harmonic frequency
	+ TX frequency being in close proximity of one of the receive bands
	+ Any other identified reasons
* For the combination where self-desensitization exists, specify at least needed
	+ Reference sensitivity excerptions
	+ UL RB restrictions for REFSENS test
* Add conformance testing in RAN5 specifications (to follow at a later stage) of all Rel-17 CA combinations that fall into the category defined by the WI title.

Note：the uplink band combination includes at least one TDD band. And, the uplink FDD+TDD band combinations could support NR 23dBm + NR 26dBm, NR 26dBm + NR 26dBm, and NR 23dBm + NR 29dBm.

The configurations of power class 1.5 UE for NR CA band combinations are defined in the table 1 below:

Table 1: Power class 1.5 NR CA band combinations within FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CA****configuration** | **CA****configuration** | **contact****name, company** | **Contact email** | **other supporting companies****(min. 3)** | **status****(new, ongoing, completed, stopped)** |
| CA\_n2A-n77A | CA\_n2A-n77A | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n5A-n77A | CA\_n5A-n77A | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n13A-n77A | CA\_n13A-n77A | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n48A-n77A | CA\_n48A-n77A | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n66A-n77A | CA\_n66A-n77A | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n12A-n77A | CA\_n12A-n77A | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n14A-n77A | CA\_n14A-n77A | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n30A-n77A | CA\_n30A-n77A | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n2A-n77A | n77A PC1.5 | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com | AT&T | Completed for PC3, Completed for PC2 |
| CA\_n5A-n77A | n77A PC1.5 | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com | AT&T | Completed for PC3, Completed for PC2 |
| CA\_n13A-n77A | n77A PC1.5 | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n48A-n77A | n77A PC1.5 | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com |  | Completed for PC3, Completed for PC2 |
| CA\_n66A-n77A | n77A PC1.5 | Zheng Zhao, Verizon | zheng.zhao@verizonwireless.com | AT&T | Completed for PC3, Completed for PC2 |
| CA\_n12A-n77A | n77A PC1.5 | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n14A-n77A | n77A PC1.5 | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n30A-n77A | n77A PC1.5 | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |
| CA\_n29A-n77A | n77A PC1.5 | Ron Borsato, AT&T | ronald.borsato@att.com | Ericsson, Nokia, Qualcomm | Completed for PC3, Completed for PC2 |

### 4.2 Objective of Performance part WI

Specify the necessary performance requirements such as release independence in TS 38.307.

### 4.3 RAN time budget request (not applicable to RAN5 WIs/SIs)

NOTE: For all RAN related WIs/SIs which are not led by RAN WG5 the WI/SI rapporteur has to fill out the attached Excel table to request time budgets for corresponding RAN WG meetings.
The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI.
One time unit (TU) corresponds to ~ 2 hours in the meeting.
If no TU is needed leave the field empty otherwise enter a number >0 in the field.

 For revisions of already approved WI/SI descriptions: Please remove the Excel table from the WID/SID's zip file. The time budgets are already recorded. If you want to modify them, then this has to be done via the status report and not via a revised WID/SID.

 If this WID is covering Core and Performance part, then please fill out one line for each part in the attached Excel table.

**additional comments to the time budget request in the attached Excel table:**

## 5 Expected Output and Time scale

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Remarks |
| *Internal TR* | *TR 37.xxx* | PC1.5 Rel-17 NR inter-band CA of xDL and 2UL (1FDD+1TDD) bands (x= 2, 3, 4) |  | *TSG#95e* | Core part |

|  |
| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 38.101-3 | Add PC1-5 CA to User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios | RAN#95 | Core part |
| 38.307 | Add PC2 CA Requirements on User Equipment (UEs) supporting a release-independent frequency band | RAN#95 | Perf. part |

## 6 Work item Rapporteur(s)

*Per Lindell, Ericsson,* *per.lindell@ericsson.com*

## 7 Work item leadership

*RAN WG4*

## 8 Aspects that involve other WGs

*{Specify all the other WG(s) to be involved and, if specific, their task. E.g.: "SA2, SA3, SA5. CT6 for storage, and potentially SA4". If not applicable, indicate "None" or "None identified yet".}*

## 9 Supporting Individual Members

*{At least 4 supporting Individual Members are needed. There is an expectation that these companies will provide resources to progress the work. Note that having 4 supporting companies is a necessary but not sufficient condition: the usual TSG approval process by consensus is needed for the WID approval.}*

|  |
| --- |
| Supporting IM name |
| Verizon |
| Qualcomm |
| Samsung |
| Nokia |
| AT&T |
|  |
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