**3GPP TSG-RAN5 Meeting #96-e R5-224146r2**

**Electronic Meeting, 15th Aug– 26th Aug 2022**

**3GPP TSG RAN Meeting #97-e RP-22zzzz**

**12 Sep – 16 Sep 2022**

**Source: Nokia, Apple**

**Title: New WID on UE Conformance – Further enhancements of NR RF requirements for frequency range 2 (FR2)**

**Document for: Endorsement**

**Agenda Item: 4.1**

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: **UE Conformance – Further enhancements of NR RF requirements for frequency range 2 (FR2)**

## Acronym: [NR\_RF\_FR2\_req\_enh2](https://www.3gpp.org/DynaReport/WiSpec--890059.htm)-UEConTest

## Unique identifier:

|  |  |  |
| --- | --- | --- |
| **This WID includes a Testing part** | | **X** |
| **and it addresses the following 3GPP work area:** | **Radio Access** | **X** |
| **Core Network** |  |
| **Services** |  |

Potential target Release: Rel-17

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  |  |  |  |  |
| **No** | X | 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

|  |  |
| --- | --- |
|  | Feature |
| X | 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) |
| NR\_RF\_FR2\_req\_enh2-Core | RAN4 | 890159 | Further enhancements of NR RF requirements for frequency range 2 (FR2) – Core Part |
| NR\_RF\_FR2\_req\_enh2-Perf | RAN4 | 890259 | Further enhancements of NR RF requirements for frequency range 2 (FR2) – Perf Part |

### 2.3 Other related Work Items and dependencies

|  |  |  |
| --- | --- | --- |
| Other related Work Items (if any) | | |
| Unique ID | Title | Nature of relationship |
|  |  |  |
|  |  |  |
|  |  |  |

## 3 Justification

RAN5 has completed definition of several FR2 enhancement-based test requirements in Release 16. It is now critical to continue the work on further FR2 RF enhancements in RAN5 as part of Rel-17 scope.

Until RAN#96e, the core part of Rel-17 WI ‘Further enhancements of NR RF requirements for frequency range 2’ is 100% completed, and the performance part is 80% completed. It is justified to now start the work on the corresponding UE conformance test specifications in 3GPP RAN WG5 to meet the market requirements in time.

## 4 Objective

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

The purpose of this work item is to specify conformance test cases for the following FR2 UE features and associated requirements:

* Inter-band DL CA enhancements [RAN4 RF/RRM]
  + Agree a method how applicable IBM information is captured into specification for a particular CA configuration. Agree how it is decided whether a certain CA configuration is assuming IBM based requirements (for-example is applicability based on operator request or some general rule or are all CA configurations applicable for IBM).
  + Define test requirements for CA\_n258A-n260A and CA\_n257A-n259A based on IBM
  + Define UE RF test requirements for CA\_n258-n261 inter-band CA within the same freq. group (e.g. 28GHz + 28GHz) for (IBM)
  + Both RF and RRM requirement aspects are in scope for DL inter-band CA.
* Inter-band UL CA [RAN4 RF/RRM]
  + Specify requirements for inter-band UL CA for two bands between different frequency groups based on IBM.
  + Define test requirements for CA\_n257A-n259A and CA\_n260-n261 based on IBM
  + Both RF and RRM requirement aspects are in scope for UL inter-band CA.
* Test cases to measure performance gain due to UL gaps. Align with RAN4 defined UE specific and NW configured gap for UE Tx power management
* Define RAN5 test procedures that evaluate the RAN4 defined performance gain over the current baseline (Rel.16 requirements). Include any RAN4-provided definitions related to UE self-calibration and monitoring, impact of UE emissions during UL gap, if any.
* Align with RAN4 defined UL gap configuration(s), related UE capability and interruptions, Included definition of release independence aspects.
  + - Note: The work of FR2 UL gaps includes (NG) EN-DC, NE-DC, NR-DC and SA with leverage across the options suitably defined in the test specifications.
* Introduce new FR2 CA BW classes and related Rx requirements to support of contiguous downlink aggregated channel BW up to 1600 MHz [RAN4 RF]
* Specify DC location reporting scheme to cover intra-band UL CA with 2 CCs and more for FR1 and FR2, and intra-band DL CA for FR2. (RAN4, RAN2)
  + NOTE: No impact on Rel-16 method (uplinkTxDC-TwoCarrierReport-r16)

## 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 |
|  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| TS 38.508-1 | Definition of common environment for FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TS 38.508-2 | Introduction of physical implementation capabilities for FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TS 38.521-2 | Introduction of RF requirements for FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TS 38.521-3 | Introduction of RF requirements for EN-DC FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TS 38.522 | Introduction of test applicability for FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TR 38.903 | Derivation of test tolerances and measurement uncertainty for UE conformance test cases for FR2 enhancements. | TSG RAN#102  (Dec-23) |  |
| TR 38.905 | Derivation of test points for FR2 enhancements in radio transmission and reception UE conformance test cases. | TSG RAN#102  (Dec-23) |  |
|  |  |  |  |

## 6 Work item Rapporteur(s)

Säynäjäkangas, Tuomo (Nokia)

[tuomo.saynajakangas@nokia.com](mailto:tuomo.saynajakangas@nokia.com)

Ashwin Mohan (Apple)

[ashwin\_mohan@apple.com](mailto:ashwin_mohan@apple.com)

## 7 Work item leadership

RAN5

## 8 Aspects that involve other WGs

None

## 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Apple |
| AT&T |
| HiSilicon |
| Huawei |
| Keysight Technologies |
| Nokia |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |