

**[92-e-20-TRP-TRS-WI] - Version 0.0.3**  
**RAN**

3GPP TSG-RAN Meeting #92-e

RP-211556

Electronic Meeting, June 14-18, 2021

Agenda Item: 9.7.4.2

Source: Moderator (vivo)

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## 1 Introduction

The approved WID from March RAN-P meeting is in [1], which is also listed in the Annex of this file for information. The SR for the WI on FR1 TRP TRS can be found in [2].

Contribution [3] is submitted to RAN#92e for discussion. In addition, LSs from GSMA and RAN4's reply LS have been received in [4] and [5], respectively. Finally, another LS from RAN4 to CTIA [6] has been received on OTA head&hand phantoms.

The open issue should be discussed in this RAN plenary meeting is:

-Clarification of the EN-DC OTA testing scope. i.e., whether LTE measurement procedure is included in EN-DC OTA test?

-Any other issues?

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## 2 Initial Round Discussion

In this initial phase of discussions, the goal is collecting company views on the topics identified in section 1 aiming at RAN Plenary guidance.

### 2.1 EN-DC OTA test method working scope

Background:

In the LS from GSMA [4], the following test configuration is suggested by GSMA:

***It would be appreciated if the following items could be included in the 3GPP work:***

- *Measure TRP for both LTE and NR with a 50%-50% equal power sharing between LTE and NR (simultaneous or one by one)*

In the approved WID [1], for EN-DC, the objective for requirement has been restricted to NR only:

***Specify the FR1 EN-DC TRP and TRS requirements and tolerance:***

- For EN-DC, only NR requirements will be specified and no additional LTE requirements will be introduced.

In the WID, there is no clear statement whether LTE should be measured under EN-DC mode.

Therefore, the following answer should be provided by RAN plenary:

**Question 1: is LTE measurement included in FR1 EN-DC OTA test method?**

**YES:**

-The LTE path should be measured under EN-DC mode. The LTE antenna performance test procedure should be included in FR1 EN-DC OTA testing.

**NO:**

-For FR1 EN-DC OTA testing, LTE path should not be measured. Only NR antenna performance test procedure should be included in FR1 EN-DC OTA testing.

**Feedback Form 1: Is LTE measurement included in FR1 EN-DC OTA test method? (locked)**

**1 – MediaTek Inc.**

The answer to the question is obvious. Current WID does not include LTE measurement in the scope. We are wondering whether the discussion is to confirm the WID or to potentially revise the WID? Of course, plenary consensus is needed first before revising it.

In case there is a consensus to revise it to include the LTE part, we suggest to add some conditions: 1) The WI completion should not be impacted by adding additional scope. If eventually RAN4 can not meet the finalization deadline, the NR part should be prioritized. 2) UE testing time should be properly controlled with additional LTE measurement. The detail can be left to RAN4.

**2 – Apple Italia S.R.L.**

In our understanding, the WID currently precludes OTA measurements of the LTE carrier. This follows the existing RAN4 and RAN5 principles of not introducing additional RF requirements on the LTE carrier when configured for EN-DC operation. Our general concern here is also related to the breadth of scope of the FR1 EN-DC OTA test method: as the WID is currently drafted, the scope is manageable within Rel-17. If we introduce more complexity to the EN-DC configuration, then the methodology work is less likely to converge in time.

**3 – Huawei Technologies France**

Current WID does not include the LTE measurement. It is clearly stated that “for EN-DC, only NR requirements will be specified and no additional LTE requirements will be introduced”.

**4 – Qualcomm Incorporated**

The current WID is explicitly stating only NR requirements will be specified and no additional LTE requirements will be introduced for EN-DC. We prefer to focus on the NR requirements and would not extend

the work for LTE requirements considering the tight timeline to complete the work within Rel-17.

#### **5 – ROHDE & SCHWARZ**

We agree that the objective for this WI is to define requirements only for NR and, given the background discussed already during the past year and half, we understand the reasons for it. Even though, this does not prevent the methodology to enable measurements for both LTE and NR when testing EN-DC. This will actually be very useful to the ecosystem by enabling a comprehensive test methodology at the same time that fulfilling the objective in the WID.

It has to be noted that EN-DC TRP/TRS methods defined already in other SDOs (e.g. CTIA or CCSA) include the measurements for both carriers (LTE and NR), and thus the harmonization among them is highly recommended.

From workload point of view, there will not be any impact since the methodology definition for EN-DC is already a separate objective to SA.

#### **6 – Guangdong OPPO Mobile Telecom.**

In our view, only NR needs to be tested in EN-DC.

#### **7 – VODAFONE Group Plc**

Agree that only NR requirements need to be specified in accordance with the existing WI description quote by Huawei. We would prefer to ensure the methodology work can converge in time and not introduce additional complexity to the scope.

#### **8 – vivo Communication Technology**

LTE antenna performance has been verified by LTE only test methodology. We also prefer only measure NR carrier for EN-DC combinations, given only NR OTA requirements will be specified.

#### **9 – Nokia France**

It is difficult to see how LTE measurement can be included without significantly extending the timeframe of the WI, especially considering that most bands have no OTA requirements for LTE.

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### **3 Any other issues**

Companies are invited to share their views on any other issues regarding RAN Plenary guidance for the project on FR1 TRP TRS WI.

**no comments received for this part.**

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### **4 Intermediate round discussion**

9 Companies share views on this open issue, 8 of them support only NR should be measured for EN-DC combinations, 1 company thinks alignment with other SDOs is useful.

Therefore, the proposed conclusion is that:

**Only NR should be measured under EN-DC mode, LTE carrier measurement is not within the EN-DC OTA measurement scope.**

So companies can share preference on the actions for next step in this meeting:

**Option A:** update the WID objective to state clearly the above clarification for EN-DC test method.

**Option B:** capture the above RAN-P conclusions in a WF to provide guidance for RAN4 discussions.

**Feedback Form 2: How to reflect the conclusions of RAN-P  
EN-DC testing scope (updated WID or WF) (locked)**

**1 – Orange**

Sorry for missing the first round of comments. Orange believe it is important to test both LTE and NR in EN-DC as per the request from GSMA. OTA test methodologies should be able to demonstrate the behaviour of devices when using full power in EN-DC mode.

Orange also thinks a proper test methodology should not be restricted to testing equal power sharing between LTE and NR, but also the case with: "Max power on NR, lower power in LTE", which reflects the UE behaviour at cell edge of NR in n78 in EN-DC mode with sub-1 GHz LTE bands.

**2 – Apple Italia S.R.L.**

We support the Moderator's recommendation that "**Only NR should be measured under EN-DC mode, LTE carrier measurement is not within the EN-DC OTA measurement scope.**" We don't think a revision of the WID is necessary (Option A), and we don't have a strong view on whether RAN guidance is necessary (Option B).

**3 – CAICT**

Sorry for missing the 1st round of comments. We believe that a harmonized configuration with other SDOs will be helpful for the industry, which is also expected by GSMA in their LS to 3GPP. In CCSA, a rough 50%-50% power splitting is used for TRP and TRS. In CTIA, a exact 50%-50% power splitting is used for TRS.

We understand that only NR requirements will be defined in this WI and we do not intend to change this consensus, but at least a harmonized test method or power splitting configuration should not be precluded.

**4 – Nokia France**

The moderator's proposed conclusion is consistent with the status quo, so there is no need for any WID update nor WF. The minutes will capture the conclusion of the discussion.

**5 – Huawei Technologies France**

We think it is not necessary to update the WID objective. It is clear as it is. Option B may be helpful, but no strong view as the WID is clear already.

**6 – Qualcomm Incorporated**

We agree with Moderator's proposed conclusion and it is in line with the current WID. Therefore, we don't think there is a need to revise the WID. We don't have strong view on option B. The details on the test method e.g., 50%-50% or high power in NR/low power in LTE should be discussed in RAN4.

## 7 – Orange

In the sake of a consensus, we agree with CAICT approach that LTE requirement targets may not be specified in EN-DC mode, but that test methods considering simultaneous transmission of both LTE + NR may not be precluded.

## 8 – vivo Communication Technology

Thanks for the compromise. The fixed-power-splitting approach has been agreed in RAN4, that means the NR and LTE will transmit simultaneous with proper Max power setting under EN-DC mode. Therefore, I think the concern for this point can be removed. We also think aligned power splitting between LTE and NR with other SDO is helpful.

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## 5 Final conclusion

After Intermediate round, majority view agrees the proposal from Moderator. Further clarification on “NR and LTE will transmit simultaneous under EN-DC mode” is confirmed. The power splitting between LTE and NR to align with other SDO would be helpful, and this will be discussed in RAN4.

Therefore, the final agreements after two-rounds of discussion should be:

- 1. Only NR should be measured under EN-DC mode, LTE carrier measurement is not within the EN-DC OTA measurement scope.**
- 2. The power-split assumed between LTE and NR will be discussed in RAN4.**

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## 6 References

### WID:

[1] RP-210807 New WID: Introduction of UE TRP (Total Radiated Power) and TRS (Total Radiated Sensitivity) requirements and test methodologies for FR1 (NR SA and EN-DC), vivo

### SR:

[2] RP-211160 Status report for WI NR FR1 TRP TRS; rapporteur: vivo, RAN4

### RAN contributions:

[3] RP-211159 Discussion on working scope for EN-DC TRP TRS measurement, vivo

### WG LSs:

[4] RP-210958 LS on Definition of an OTA Testing Method for 5G FR1 (GSMA\_LS210423; to: RAN, RAN4, RAN5; cc: -; contact: Vodafone)

[5] RP-210967 Reply LS to GSMA\_LS210423 = RP-210958 on 5G FR1 OTA Testing Method (R4-2108623; to: GSMA TSG-AP; cc: RAN5, RAN; contact: Vivo)

## 7 Annex (WID in RP-210807 for information)

### 7 Objective

#### 7 Objective of Core part WI

The objective of this Work Item is to extend SISO OTA methodology defined in TR37.902 to NR FR1 (NR SA and EN-DC) and to specify FR1 TRP and TRS performance requirements for both SA and EN-DC UEs.

Investigate and specify the following aspects:

#### **General aspects**

- Considering the following device types:
- Smartphone

Considering UEs with antenna configurations of 1Tx, 2Tx, 2 Rx and 4 Rx

- Tablet
- Laptop embedded equipment (LEE)
- Laptop mounted equipment (LME)
- Test scenarios:
  - For smartphone, head/hand phantoms testing configuration is the first priority
  - For other device types,
    - Free space (FS) testing configuration is the first priority
    - OTA performance requirements with head/hand/Laptop ground plane phantoms are second priority
  - Environmental conditions:
    - Normal temperature and voltage test conditions

#### **SISO OTA Test methodology enhancement**

- Specify necessary enhancements of the SISO OTA test methodology for NR FR1 TRP and TRS, e.g.
- Using the test methodology defined in TR37.902 as well as the associated aspects related to measurement uncertainty in TR25.914 and section 4.2 of TS 37.144 as the basis for NR FR1

- Support UE operating frequency in the range of 410 MHz – 7125 MHz (i.e., test methods will cover all the NR FR1 bands)
- Support up to 100 MHz CBW
- Define the configured power settings for EN-DC (1 CC LTE with 1 CC NR)
- Develop the Measurement Uncertainty (MU) assessment [RAN5]

Measurement Uncertainty (MU) aspects will be handled by RAN5 and the conclusions can be captured in a separate section of TR

- Consider UE with multi-antenna under SISO OTA Test Methodology, e.g.
- Study whether a test procedure for UL Transmit Diversity of SA, if this feature is supported by UE, is needed

This task shall not start until RAN4 concludes on all of the corresponding requirements related to UL Transmit Diversity of SA

- Consider how to treat the UE with Tx switching and ensure predictable verification of TRP results
- Consider how to treat the UE with multiple antenna receivers and ensure predictable verification of TRS results
- Consider whether exceptional requirements to be tested for EN-DC TRS is needed, this will be treated as second priority
- Example: NSA TRS requirements for potential UE self-interference due to IMD3 in EN-DC
- Consider the testing time reduction for TRP and TRS among the bands and EN-DC band combinations that UE support
- Example: Alternative Single Point Offset TRP/TIS Test is not precluded

During the course of this work item, ongoing communication with 3GPP RAN WG5, CTIA OTA Working Group, CCSA TC9 WG1, GCF, ETSI MSG TFES and PTCRB shall be maintained to ensure industry coordination on this topic.

## 7 Objective of Performance part WI

### **Performance part framework**

Define a framework on how to handle requirements task for SA and EN-DC TRP and TRS before collecting trustable UE measurement results, the requirements task will follow the framework strictly, e.g.

- Main actions in the framework in sequence:

Requirements task should be a step-by-step approach, bands selected as first priority in the WID will be defined for the first step

Decide the minimum number of devices (e.g., at least [20 or 25]) for defining requirements

Start lab alignment activity among volunteered certified labs before collecting measurement results

Select sufficient devices those are commercially available in the market, and the measurement results of these devices from the aligned labs should be submitted for data processing

Specify the requirements based on the measurement results with a per-band approach

- Start with one type of device requirement which is most efficient to collect enough results
- Only specify 4Rx requirement for n41, n78, n79
- Specifying requirements of SA with 1 CC is the first priority
- Define clear process of submitting and processing the measurement results (e.g. example decide which entity collects and manages the data)

### **Specify final requirements**

Specify the NR FR1 SISO SA TRP and TRS requirements and tolerance:

- Band n41, n28, n78, and n79 for PC3 *and* PC2 UEs are the first priority
- Define the detailed requirements of the selected bands based on the conclusion of above requirement definition framework

Specify the FR1 EN-DC TRP and TRS requirements and tolerance:

- For EN-DC, only NR requirements will be specified and no additional LTE requirements will be introduced.
- Only consider EN-DC combinations of 1 CC LTE with 1 CC NR
- Band n41, n28, n78, and n79 related EN-DC band combinations for PC3 UEs are the first priority
- Further limiting the number of EN-DC band combinations
- Define the detailed requirements of the selected bands based on the conclusion of above requirement definition framework