3GPP TSG-RAN WG4 Meeting # 98-e R4-21xxxx

Electronic Meeting, 25 January - 5 February 2021

**Agenda item:** 12.1.8.1

**Source:** Keysight Technologies

**Title:** On Testability for band n262

**Document for:** Approval

# Introduction

This contribution is addressing MU aspects of the new n262 band.

# Discussion

In the RAN4#97-e WF on n262 [1], it was decided to use 49 GHz as upper frequency for testability discussions

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| WF1: Agreements on testability parameters* Upper frequency limit includes the OOB region (i.e. 48.2 + 0.8 = 49 GHz)
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While RAN5 will continue to be responsible with the final MU/MTSU definitions, RAN4 has been tasked to determine whether any additional MU elements need to be defined and to prepare a preliminary MU assessment (where applicable).

The MU elements based on the existing antenna pattern assumptions, i.e., Positioning misalignment, Influence of beam peak search grid, DUT repositioning, Influence of spherical coverage grid, will remain the same since they are frequency independent.

On the other hand, the MU elements based on the test equipment and external components, i.e., mismatch, Uncertainty of the RF power measurement equipment, gNB emulator uncertainty, Amplifier uncertainties, Influence of the XPD, Uncertainty of the absolute gain of the calibration antenna, Influence of Noise, etc. need to be further analysed.

Since the n262 band is near the upper limit of the FR2 limit of 52.6GHz, there were concerns/comments raised whether this frequency range can be supported with a single probe antenna or whether (offset) antennas must be leveraged to support some of the newer frequency bands, e.g., n259 and n262.

In case multiple measurement antennas are used to cover bands of interest within FR2, the existing MU element ‘Multiple measurement antenna uncertainty’ could be leveraged which covers multiple measurement antennas switched into operation mechanically or electrically [2].

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| B.2.1.25 Multiple measurement antenna uncertainty This contributor describes the uncertainty caused by switching multiple measurement antennas either by mechanically or electrically to measure TRx spurious emission. A frequency range of spurious tests (e.g. general spurious emission) is defined from 6 GHz to second harmonic of FR2 bands such as 80 GHz. Since that frequency range is quite wide, it is impossible to cover the whole range only by one measurement antenna. Therefore to provide a feature of the spurious emission measurement by FR2 test system, the system has to equip a capability to switch corresponding measurement antennas in an anechoic chamber. One of the mechanical antenna switching methods can be a structure of a slider. Then a repeatability of a bending loss of a feeder cable which is connected to the measurement antennas shall be taken into account. On the other hand for electrical antenna switching, since multiple antennas need to be aligned in a chamber with a different position, the quiet zone characteristics might receive an influence by a displacement from the ideal focal point. In a case of electrical switching system, if the measurement antenna configuration is the same for the quality of the quiet zone measurement and the DUT measurement, then this uncertainty term is encompassed in the quality of the quiet zone results. |

While this MU element is currently applicable to spurious emissions, it could be augmented/adjusted for offset antennas to split FR2 testing among multiple probe antennas. The value and applicability of this MU element is FFS.

Proposal 1: No additional MU elements are needed for n262 but several MU elements need to be further analysed.

We believe that all of FR2 could be covered with a single probe antenna. This contribution presents preliminary Quality of QZ (QoQZ) results for all test frequencies (defined so far +49 GHz which has not been addressed in in RAN5): 23.45 (n257, n258, n261), 32.125 (n257, n258, n261, n260), 40.80 (n260, n259), 44.30 (n259, low end QoQZ test frequency range of n262?), and 49.00 GHz (n262).

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This contribution is based on a EIRP&TRP QoQZ MU campaign with 238 measurement points. The quiet zone size evaluated in this contribution is a 30cm sphere and the procedure is following the procedure and requirements outlined in [3].

The EIRP/TRP QoQZ standard deviations/MUs from this QoQZ campaign are tabulated in Table 2.

Table 2: EIRP and TRP std. deviations from the full QoQZ scan

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| Frequency [GHz] | Standard Deviation [dB] |
| **EIRP (P1 only)** | **EIRP** **(P1-P7)** | **TRP****(P1 only)** | **TRP****(P1-P7)** |
| 23.45 | 0.36 | 0.46 | 0.24 | 0.34 |
| 32.125 | 0.23 | 0.47 | 0.15 | 0.39 |
| 40.8 | 0.32 | 0.34 | 0.22 | 0.27 |
| 44.3 | 0.25 | 0.44 | 0.18 | 0.35 |
| 49.0 | 0.29 | 0.46 | 0.13 | 0.34 |

Clearly, the EIRP MUs are a generally a bit higher than the TRP MUs but these values are all within the 0.6dB example value defined in RAN5 for QZ up to 30 cm for Stage 2 (P1-P7) and within the 0.4dB example value for Stage 1 (P1 only). As such, no increase in QoQZ MU is necessary for 49 GHz.

Observation 1: The QoQZ MUs at 49 GHz are within the example MUs value defined in RAN5.

Observation 2: No increase in QoQZ MU is necessary for 49 GHz.

# Conclusion

The following observations and proposals were made in this contribution

**Observation 1: The QoQZ MUs at 49 GHz are within the example MUs value defined in RAN5.**

**Observation 2: No increase in QoQZ MU is necessary for 49 GHz.**

**Proposal 1: No additional MU elements are needed for n262 but several MU elements need to be further analysed.**

# References

1. R4-2017599, WF on testability aspects for the introduction of the new band n262, Apple, 3GPP TSG-RAN WG4 Meeting #97-e, November 2020
2. TR 38.903, Derivation of test tolerances and measurement uncertainty for User Equipment (UE) conformance test cases, V16.6.0 (2020-12)
3. TS 38.521-2, User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone, V16.40 (2020-06)
4. R5-190386, On Quality of Quiet Zone Evaluation for Spurious Emissions Test Cases, Keysight Technologies, 3GPP TSG-RAN WG5 5G NR AH #4, January 2019
5. R5-185956, Quality of Quiet Zone Results for IFF and 30cm Quiet Zone, Keysight Technologies, 3GPPRAN5#3-5G-NR Adhoc, October 2018