**3GPP TSG-RAN WG4 Meeting #95-e DRAFT R4-2008859**

Online, 25 May - 05 Jun 2020

**Source:** Huawei

**Title:** TX directional FR2 MU budget spreadsheet

**Agenda Item:** 6.19.5

**Document for:** Approval

# Introduction

This is resubmission of the TX FR2 MU calculation tables R4-2004529, the tables were submitted to RAN4#94bis-e but were not approved the TE companies wished to confirm the TE MU values used.

In particular the value for the CATR EIRP in the frequency range 37<f<40GHz is 0.07 dB larger than the previously agreed MU value. It was requested to have another meeting cycle to try to resolve this minor issue (it is not intended to change any agreed MU or TT values only resolve the MU calculation table).

# Background

## 2.1 Spreadsheet construction

The MU calculation tables have been taken from each of the donor TR’s (TR 37.842, TR 37.843 and TR 37.817-02) and consolidated in a spreadsheet.

This spreadsheet deals with the TX requirements for FR2.

 R4-2001700 - OTA BS testing Tx FR2 MU calculation tables.xls

The spreadsheets correct all the errors and inconsistencies identified in the existing donor TR tables, the intention of the spreadsheet is to ensure that all calculations and used values are correct and consistent and once the spreadsheet is approved/agreed all the budgets can be copied into the new TR.

The spreadsheet is arranged as follows:

**Summary sheet**

A **summary** sheet with the final MU values for each of the requirements for each of the OTA chambers.

|  |  |  |
| --- | --- | --- |
| 　 | Expanded uncertainty [dB] | A method exceeds agreed value |
| IAC | CATR | Reverb | Agreed value |
| 24.25<f≤29.5GHz | 37<f≤40GHz |  | 24.25<f≤29.5GHz | 37<f≤40GHz |  | 24.25<f≤29.5GHz | 37<f≤40GHz |  | 24.25<f≤29.5GHz | 37<f≤40GHz |  | 24.25<f≤29.5GHz | 37<f≤40GHz |  |
| EIRP | 　 | 　 | 　 | 1.74 | 2.07 | 　 | 　 | 　 |  | 1.70 | 2.00 | 　 | 　 | x | 　 |
| EIRP extreme | 　 | 　 | 　 | 3.05 | 3.25 | 　 | 　 | 　 | 　 | 3.10 | 3.30 | 　 | 　 | 　 | 　 |
| Power dynamics | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 0.40 | 0.40 | 　 | 　 | 　 | 　 |
| EVM (%) | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 1.00 | 1.00 | 　 | 　 | 　 | 　 |
| In-band TRP | 　 | 　 | 　 | 2.11 | 2.39 | 　 | 1.85 | 2.08 | 　 | 2.10 | 2.40 | 　 | 　 | 　 | 　 |
| ACLR- abs | 　 | 　 | 　 | 2.69 | 2.71 | 　 | 2.36 | 2.36 | 　 | 2.70 | 2.70 | 　 | 　 | 　 | 　 |
| ACLR-rel | 　 | 　 | 　 | 2.28 | 2.54 | 　 | 2.15 | 2.36 | 　 | 2.30 | 2.60 | 　 | 　 | 　 | 　 |
| OBUE | 　 | 　 | 　 | 2.70 | 2.72 | 　 | 2.36 | 2.36 | 　 | 2.70 | 2.70 | 　 | 　 | 　 | 　 |
| COEX EM | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| COLO EM | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| TX IMD | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 　 | 　 | 　 |
| 　 | IAC | CATR | Reverb | **Agreed value** | 　 | 　 | 　 |
| 　 | 18GHz<f≤26.5 GHz | 26.5GHz<f ≤40GHz | 40GHz<f ≤60GHz | 18GHz<f≤26.5 GHz | 26.5GHz<f ≤40GHz | 40GHz<f ≤60GHz | 18GHz<f≤26.5 GHz | 26.5GHz<f ≤40GHz | 40GHz<f ≤60GHz | **18GHz<f≤26.5 GHz** | **26.5GHz<f ≤40GHz** | **40GHz<f ≤60GHz** | 　 | 　 | 　 |
| OOB EM | x | x | 4.94 | x | x | 4.96 | x | x | 3.53 | **x** | **x** | **5.00** | 　 | 　 | 　 |
| RX EM | x | x | 4.94 | x | x | 4.96 | x | x | 3.53 | **x** | **x** | **5.00** | 　 | 　 | 　 |

The final 3 column indicate if one or more of the chamber MU values exceed the agreed common maximum accepted test system uncertainty.

**TE sheet**

This sheet contains the MU values for the test equipment and the conducted MU values (minus mismatch) which are used in all the chamber calculations.

The all use of these numbers is referenced to this sheet.

**Chamber Error sheets**

The following 6 sheets:

CATR-Er

Reverb-Er

IA-Er

Contain the errors and MU values for the different chamber types (as indicted), these errors are referenced throughout the different requirements to ensure that for the same error the same value is used in each of the MU budgets.

**Requirement MU calculation sheets**

These sheets calculate the MU for each of the chamber types (as contributed in donor TR’s) and calculate the chamber final MU value.

All the MU values in these sheets are referenced to the TE and the chamber error sheets, as such these sheets should not be edited directly.

At the top of each sheet there is a summary of the results of each chamber type for example for EIRP:

|  |  |
| --- | --- |
| 　 | Expanded uncertainty [dB] |
| 24.25<f<29.5GHz | 37<f<40GHz |
| Indoor Anechoic Chamber | 　 | 　 |
| Compact Antenna Test Range | 1.74 | 2.07 |
| One Dimensional Compact Range Chamber | 　 | 　 |
| Near Field Test Range | 　 | 　 |
| PWS | 　 | 　 |
| **Agreed value** | **1.70** | **2.00** |

The requirement sheets are as follows:

EIRP EIRP accuracy measurement

EIRP – Ex EIRP accuracy measurement in extreme condition

TX OFF FR2 TX OFF EIRP measurement

In-band TRP Wanted signal TRP measurement

ACLR- abs ALCR absolute power measurement

ACLR-rel ACLR relative measurement

OBUE Out of band unwanted emissions (absolute power measurement)

OOB EM Tx mandatory Out of band spurious emissions

RX EM Rx out of band spurious emissions

# Updates after RAN4#94-e, 1st round

Ericsson: The distribution is different in each table. i.e. Rectangular vs. Rect. Can this be aligned for consistency?

**Action:** Done, also rounds all numbers to 2 dp as per previous document, replace Normal with Gaussian as mixture was used.

|  |  |  |
| --- | --- | --- |
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