TSG-RAN Working Group 4 (Radio) meeting #96-E *R4-20xxx*

**Electronic Meeting, xx- August, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.941** | **CR** |  | **rev** |  | **Current version:** | **15.** |  |
|  | | | | | | | | |
| *For* [*HE**LP*](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | CR to TR 37.941: Clause 6.3.3 Angular alignment in TRP measurements | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | OTA\_BS\_testing | | | | |  | ***Date:*** | | | 2020-08-17 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Release 15 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Current text is unclear. Proposed changes:   1. Table 6.3.3-1 caption and headings improvements are proposed to clairfy text to indicate errors due to off beam peak measurements for TRP measurement. 2. Paragraph directly following Table 6.3.3-1 has been improved to clarify the potential impact of TRP values if beam peak is not captured in the measurement grid point pertaining to test methods which could benefit from capturing peak EIRP | | | | | | | | |
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| ***Summary of change:*** | | Improved wording in Section 6.3.3 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Text is unclear and misleading | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

TEXT PROPOSAL:

### 6.3.3 Angular alignment in TRP measurements

For the TRP test methods relying on finding EIRP peak measurements, guidance on how to find the peak with acceptable accuracy is required.

The following test methods relies on finding peak EIRP:

1. Beam-based direction (clause 6.3.2.2.4)

2. Orthogonal cut grid (clause 6.3.4.5)

3. Peak method (clause 6.3.2.5.3)

4. Equal sector with peak average method (clause 6.3.2.5.4)

For the above procedures, measuring maximum EIRP accurately is critical to the accuracy of TRP estimates. If the maximum value is not accurately sampled, this will result in measurement errors. In the worst case, the measurement error is larger than the MU, which is not acceptable. The measurement error is caused by angular misalignment which is the difference (in degrees) between the actual and the measured angular positions of the intended maximum EIRP. Figure 6.3.3-1 shows an example of angular misalignment, where the measured EIRP is at an angle equal to -2° while the actual angular position of the maximum EIRP is at 0° in the radiation pattern. This results in an absolute measurement error = = 1 dB.



Figure 6.3.3-1: Angular misalignment

If the actual angular position of maximum EIRP is known (e.g., declared by manufacturers), measurement errors due to angular misalignment can be alleviated. However, if the actual angular position of maximum EIRP is not known, then the angular interval used in searching for the maximum EIRP employing the peak search method can contribute to the measurement errors due to angular misalignment. The search is performed in the proximity of the expected angular position of maximum EIRP (e.g., a broadside radiation pattern). To determine the magnitude of the measurement error caused by angular misalignment, the angular step size can be expressed in terms of half-power beam width (HPBW) of test beams. If the angular step size is set to HPBW, the absolute measurement error can be as large as 3 dB. Table 6.3.3-1 summarizes the maximum absolute measurement error versus different angular step sizes. The absolute measurement errors were derived assuming a linear approximation between the maximum EIRP and the 2 HPBW points as illustrated in figure 6.3.3-2. The linear approximation gives us the worst-case scenario as can be observed in figure 6.3.3-2.



Figure 6.3.3-2: Linear approximation of measurement errors

Table 6.3.3-1: Sampling beam peak error due to misalignment error

|  |  |
| --- | --- |
| Angular misalignment | Beam peak misalignment error (dB) |
| HPBW | 3 |
|  | 1.5 |
|  | 1 |
|  | 0.75 |

The above table illustrates the relationship between beam peak search and largest possible error in terms of maximum EIRP level due to mistaken measurement point for beam peak. Note, there is a trade-off between search time and angular misalignment (that is, the difference in actual and measured angular positions of intended peak EIRP). For FR2 measurements, it can be expected that larger values of the measurement error may apply, due to the fact typically narrower beams are expected at higher frequencies due to larger number of antenna elements in FR2 compared to FR1.

As shown in the above figures angular step size smaller than the calculated angular step size may be desired if the measured TRP does not provide an accurate enough measurement. For measurements were peak EIRP is not captured as a point in the measurement grid the associated errors should be taken into account.