**3GPP TSG- Meeting # *~~R4-2319458~~***

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *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 | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Current description on the RMS average of the EVM measurement with transient period is misleading in sub-clause 6.4.2.1a.Location where the short transient occurs is limited to symbols at a part of a slot (sub-frame). Thus in this EVM measurement, all the symbols in the associated slots (sub-frames) are NOT used during the RMS average, and there is a need to calculate it by only the symbols where transient occurs. |
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| ***Summary of change:*** | - 6.4.2.1aCorrected the expression of the RMS average period of EVM measurement to clarify that only symbols where the transient occur shall be used.- F.6For Error Vector Magnitude including symbols with transient periods, defined the average count. |
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| ***Consequences if not approved:*** | There is a concern that the EVM RMS average period is mistakenly interpreted otherwise. |
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| ***Clauses affected:*** | 6.4.2.1a and F.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS 38.521-1 |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<<Unchanged sections skipped>>

<<Start of change>>

#### 6.4.2.1a Error Vector Magnitude including symbols with transient period

In 6.4.2.1, EVM has been defined by excluding the symbols which have a transient period. In this section, measurement interval is defined for the symbols with a transient period to include these symbols in the RMS average EVM computation when the UE reports a transient period capability other than the default. Before calculating the EVM, the measured waveform is corrected for sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM. The symbols with transient period should not be used for equalization. Only CP-OFDM waveform is used for conformance testing.

In the case of PUSCH or PUCCH transmissions when the mean power, modulation or RB allocation across slot or subslot boundaries is expected to change the EVM result over the symbols where the transient occurs is calculated according to Table 6.4.2.1a-1.

Table 6.4.2.1a-1: EVM definition for reported transient period

| Reported transient capability (us) | EVM definition | *tpstart* (µs) | SCS4 |
| --- | --- | --- | --- |
| 2 | $$EVM\_{after}=max⁡(\overbar{EVM\_{l\\_tp},}\overbar{EVM\_{h})}$$$$EVM\_{before}=max⁡(\overbar{EVM\_{l},}\overbar{EVM\_{h\\_tp})}$$ | -0.5 | 15kHz or 30kHz5 |
| 4 | $$EVM\_{after}=max⁡(\overbar{EVM\_{l\\_tp},}\overbar{EVM\_{h})}$$$$EVM\_{before}=max⁡(\overbar{EVM\_{l},}\overbar{EVM\_{h\\_tp})}$$ | -1 | 15kHz |
| 7 | $$EVM\_{after}=min⁡(\overbar{EVM\_{l\\_tp},}\overbar{EVM\_{h})}$$$$EVM\_{before}=max⁡(\overbar{EVM\_{l},}\overbar{EVM\_{h\\_tp})}$$ | -2.7 | 15kHz |
| NOTE 1:   $\overbar{EVM\_{l}}$ ,$ \overbar{EVM\_{h}}$,$ \overbar{EVM\_{l\\_tp}},$and $\overbar{EVM\_{h\\_tp}}$ are defined in Annex FNOTE 2:   $EVM\_{after}$ is the EVM for a symbol right after a transition; $EVM\_{before}$ is the EVM for a symbol right before a transitionNOTE 3: *tpstart* denotes the start position of the EVM exclusion window as shown in Annex F.4NOTE 4: SCS denotes the SCS that can be used in the conformance testNOTE 5: 30kHz shall be used in the conformance test unless the UE signals in *supportedSubCarrierSpacingUL* in *FeatureSetPerCC* that it only supports 15kHz in the corresponding band |

The RMS average of the EVM measurements over 108 transients for the different modulation schemes shall not exceed the values specified in Table 6.4.2.1a-2 for the parameters defined in Table 6.4.2.1a-3. This requirement can be verified with 64 QAM and 256 QAM modulation.

Table 6.4.2.1a-2: Requirements for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Average EVM Level |
| 64 QAM  | % | 10 |
| 256 QAM | % | 8 |

Table 6.4.2.1a-3: Parameters for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Level |
| UE Output Power | dBm | ≥ Table 6.3.1-1  |
| UE Output Power for 256 QAM | dBm | ≥ Table 6.3.1-1 + 10 dB |
| Operating conditions |  | Normal conditions |

#### 6.4.2.2 Carrier leakage

Carrier leakage is an additive sinusoid waveform whose frequency is the same as the modulated waveform carrier frequency. The measurement interval is one slot in the time domain.

In the case that uplink sharing, the carrier leakage may have 7.5 kHz shift with the carrier frequency.

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.4.2.2-1.

Table 6.4.2.2-1: Requirements for Carrier Leakage

|  |  |
| --- | --- |
| **Parameter** | **Relative Limit (dBc)** |
| Output power > 10 dBm  | -28 |
| 0 dBm ≤ Output power ≤ 10 dBm | -25 |
| -30 dBm ≤ Output power < 0 dBm | -20 |
| -40 dBm ≤ Output power < -30 dBm | -10 |

<<Unchanged sections skipped>>

# F.6 Averaged EVM

The general EVM is averaged over basic EVM measurements for n slots in the time domain.

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where n is

$$n=\left\{\begin{array}{c}10, for 15 kHz SCS\\20, for 30 kHz SCS\\40, for 60 kHz SCS\end{array}\right.$$

for PUCCH, PUSCH.

For Error Vector Magnitude including symbols with transient periods test case, the number n of uplink slots is 108 for FDD and 216 for TDD.

<<End of change>>