**3GPP TSG-RAN4 Meeting #102-e *R4-2206125***

**Online, , 21st Feb 2022 - 3rd Mar 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-1** | **CR** | **1029** | **rev** | **-** | **Current version:** | **16.10.0** |  |
|  |
| *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:***  | CR to R16 TS38.101-1 on transient period capability |
|  |  |
| ***Source to WG:*** | Skyworks Solutions Inc. |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_RF\_FR1-Core |  | ***Date:*** | 2022-03-01 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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)* |
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| ***Reason for change:*** | In case the UE only supports the default transient period capability of 10μs, the definition of “*tpstart*” is vague (the conditional tense is used in parentheses). “*tpstart*” only applies to UE signaling the support of the transient period capability, it does not apply otherwise. Also, the term “transition period” is only used once throughout while the rest of this sub-clause refers to transient periods. This CR removes these ambiguities. Following round 2 agreement, brackets on rmsEVM requirements and removed on tpstart.  |
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| ***Summary of change:*** | 1. Replace “transition period” with “transient period”
2. Clarify that for the case the UE supports only the default transient period of 10μs, the transient period is shared symmetrically in time masks where “*tpstart*” is specified.
3. Clarify that for the case the UE signals a transient period capability (tp) of 2,4, or 7μs, the transient period is not shared symmetrically, and the transient period start position is given by “*tpstart*”; Replace “usec” with “μs”.
4. Table 6.4.2.1a-2 brackets on average EVM level are removed.
5. Brackets on tpstart values are removed in Table 6.3.3.1-1 and Table 6.4.2.1a-1.
6. tpstart is changed from -2.0μs to -2.7μs for 7µs transient period capability.
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| ***Consequences if not approved:*** | Specifications for transient period capability are incomplete. and not correctly specified UEs that do not signal any transient period capability. |
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| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS38.521-1 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## << Start of change >>

### 6.3.3 Transmit ON/OFF time mask

#### 6.3.3.1 General

The transmit power time mask defines the transient period(s) allowed

- between transmit OFF power as defined in clause 6.3.2 and transmit ON power symbols (transmit ON/OFF)

- between continuous ON-power transmissions with power change or RB hopping is applied. When a UE signals the transient period capability, the transient period value (*tp)* can be 2, 4, or 7μs. If no capability is signalled, the default transient period value of 10μs applies.

 In case of RB hopping, and in following figures where *tpstart* is specified, the transient period is shared symmetrically when the transient period is 10usec. If the UE signals a transient period (*tp*) of 2, 4 or 7μs, the transient period start position is given by *tpstart* in Table 6.3.3.1-1.

Table 6.3.3.1-1 tpstart  values

| tp (μs) | tpstart (μs) |
| --- | --- |
| 2 | -0.5 |
| 4 | -1 |
| 7 | -2.7 |
| NOTE 1: Negative values mean that the transient period starts before the symbol boundary |

Unless otherwise stated the requirements in clause 6.5 apply also in transient periods.

In the following clauses, following definitions apply:

- A slot or long subslot transmission is a transmission with more than 2 symbols.

- A short subslot transmission is a transmission with 1 or 2 symbols.

## << next 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 basic EVM measurements over [108] subframes for the symbols where the transient occurs 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 |

## << End change >>