**3GPP TSG-RAN WG4 Meeting # 99-e R4-2109016**

**Electronic Meeting, May. 19-27, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** | 16.2.0 |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | Draft CR for TS 38.174: IAB-MT EVM measurement | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB-Core | | | | |  | ***Date:*** | | | 2021-03-26 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. The EVM measurement processes for FR1 and FR2 are not defined. 2. Some editorial mistakes in Annex B and C. | | | | | | | | |
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| ***Summary of change:*** | | 1. Add the EVM measurement processes for FR1 and FR2. 2. Correct the editorial mistakes. | | | | | | | | |
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| ***Consequences if not approved:*** | | EVM meausurement doesn’t have guidelines. | | | | | | | | |
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| ***Clauses affected:*** | | Clause 1, Annex B, Annex C, Annex D, Annex E | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Add D.0 and E.0 according to the comments and corrected some mistakes. | | | | | | | | |

## < Start of the changes >

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.104: “NR; Base Station (BS) radio transmission and reception”

[3] 3GPP TS 38.101-1: “NR User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone”

[4] 3GPP TS 38.101-2: “NR User Equipment (UE) radio transmission and reception: Part 2: Range 2 Standalone”

[5] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios "

[6] 3GPP TS 38.133: “NR: Requirements for support of radio resource management”

[7] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[8] 3GPP TS 38.211: "NR; Physical channels and modulation”.

[9] 3GPP TS 38.212 "NR; Multiplexing and channel coding".

[10] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[11] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[12] 3GPP TS 38.215: "NR; Physical layer measurements".

[13] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".

[14] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[15] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[16] ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain".

[17] ERC Recommendation 74-01, "Unwanted emissions in the spurious domain".

[18] ITU-R Recommendation M.1545: “Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications – 2000”

[19] Recommendation ITU-R SM.328: "Spectra and bandwidth of emissions".

[20] "Title 47 of the Code of Federal Regulations (CFR)", Federal Communications Commission.

[21] 3GPP TS 38.141-2: "NR; Base Station (BS) conformance testing; Part 2: Radiated conformance testing".

[22] 3GPP TS 38.141-1: "NR; Base Station (BS) conformance testing; Part 1: Conducted conformance testing".

[23] 3GPP TS 38.521-1: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone”.

[24] 3GPP TS 38.521-2: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone”.

## < Next change >

Annex B (normative):

IAB-DU Error Vector Magnitude (FR1)

The Annex B in TS 38.104 [2] applies to FR1 IAB-DU.

Annex C (normative):   
IAB-DU Error Vector Magnitude (FR2)

The Annex C in TS 38.104 [2] applies to FR2 IAB-DU.

Annex D (normative):

IAB-MT Error Vector Magnitude (FR1)

# D.0 General

FR1 IAB-MT EVM can be determined by the process according to

1) Annex E in TS 38.521-1 [23]. Only CP-OFDM waveform of PUSCH is measured for IAB-MT.

Or

2) Annex D.1 to Annex D.7.

# D.1 Reference point for measurement

The Annex B.1 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.2 Basic unit of measurement

The Annex B.2 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.3 Modified signal under test

The Annex B.3 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.4 Estimation of frequency offset

The Annex B.4 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.5 Estimation of time offset

The Annex B.5 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.6 Estimation of TX chain amplitude and frequency response parameters

The Annex B.6 in TS 38.104 [2] applies to FR1 IAB-MT.

# D.7 Averaged EVM

EVM is averaged over all allocated uplink resource blocks with the considered modulation scheme in the frequency domain, and a minimum of slots where is the number of slots in a 10 ms measurement interval.

For TDD, let be the number of slots with uplink symbols within a 10 ms measurement interval, the averaging in the time domain can be calculated from slots of different 10 ms measurement intervals and should have a minimum of slots averaging length where is the number of slots in a 10 ms measurement interval.

- is derived by: Square the EVM results in each 10 ms measurement interval. Sum the squares, divide the sum by the number of EVM relevant locations, square-root the quotient (RMS).

- Where is the number of resource blocks with the considered modulation scheme in slot *i*.

- The is calculated, using the maximum of at the window *W* extremities. Thus is calculated using and is calculated using (*l* and *h*, low and high; where low is the timing and and high is the timing ).

- In order to unite at least slots, consider the minimum integer number of 10 ms measurement intervals, where is determined by.

and for 15 kHz SCS, for 30 kHz SCS and for 60 kHz SCS normal CP.

- Unite by RMS.

Annex E (normative):   
IAB-MT Error Vector Magnitude (FR2)

# E.0 General

FR2 IAB-MT EVM can be determined by the process according to

1) Annex E in TS 38.521-2 [24]. Only CP-OFDM waveform of PUSCH is measured for IAB-MT.

Or

2) Annex E.1 to Annex E.7.

# E.1 Reference point for measurement

The Annex C.1 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.2 Basic unit of measurement

The Annex C.2 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.3 Modified signal under test

The Annex C.3 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.4 Estimation of frequency offset

The Annex C.4 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.5 Estimation of time offset

The Annex C.5 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.6 Estimation of TX chain amplitude and frequency response parameters

The Annex C.6 in TS 38.104 [2] applies to FR2 IAB-MT.

# E.7 Averaged EVM

EVM is averaged over all allocated uplink resource blocks with the considered modulation scheme in the frequency domain, and a minimum of slots where is the number of slots in a 10 ms measurement interval.

For TDD, let be the number of slots with uplink symbols within a 10 ms measurement interval, the averaging in the time domain can be calculated from slots of different 10 ms measurement intervals and should have a minimum of slots averaging length where is the number of slots in a 10 ms measurement interval.

- is derived by: Square the EVM results in each 10 ms measurement interval. Sum the squares, divide the sum by the number of EVM relevant locations, square-root the quotient (RMS).

- Where is the number of resource blocks with the considered modulation scheme in slot *i*.

- The is calculated, using the maximum of at the window *W* extremities. Thus is calculated using and is calculated using (*l* and *h*, low and high; where low is the timing and and high is the timing ).

- In order to unite at least slots, consider the minimum integer number of 10 ms measurement intervals, where is determined by.

and for 60 kHz SCS and for 120 kHz SCS.

- Unite by RMS.

## < End of the changes >