IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | TX EVM Beamforming | | | | | | Date: 2019-02-04 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Matthew Fischer | Broadcom |  |  | [Matthew.fischer@broadcom.com](mailto:Matthew.fischer@broadcom.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This document includes proposed language to modify the TX EVM language of various subclauses in order to address the question of the relationship between TX EVM and TX Beamforming.

Changes are referenced to TGmd D2.1.

**REVISION NOTES:**

**R0**:

Initial

**END OF REVISION NOTES**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

**CIDs**

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| 2655 | Matthew Fischer | 19.3.18.7.3 | 3026.57 | Tests for TX EVM limits have been specified for each PHY type. Several conditions are indicated for each test. The test procedure needs to state that beamforming is disabled during the test. | Add the sentence: "No beamforming steering matrix shall be used." after "with EQM MCSs shall be used."  Also make a similar change at 21.3.17.4.3 Transmitter constellation error, Page 3201, change:  NSS = NSTS (no STBC) shall be used  to become:  NSS = NSTS (no STBC) and no beamforming steering matrix shall be used | Revise - TGmd editor to make changes as shown in 11-19/0265r0 that are marked with CID 2655 which modify the TX EVM specification to account for beamforming, i.e. indicating that the specified TX EVM values are specific to the case when TX beamforming is disabled. |

**Discussion:**

TX EVM values are specified for various PHYs in their respective clauses. For those PHYs which support TX Beamforming, there is an inconsistency in the specification of the TX EVM. More recent PHY specifications have noted that the TX EVM is practically determined only when TX Beamforming is disabled. Older PHY specifications should be updated to similarly account for the presence or absence of TX Beamforming.

**Proposed Changes to TGmd D2.0:**

***TGm editor: within TGmd D2.0, modify the text of subclause 19.3.18.7.3 Transmitter constellation error, as shown:***

**19.3.18.7.3 Transmitter constellation error**

The relative constellation frame-averaged RMS error, calculated first by averaging over subcarriers, OFDM frames, and spatial streams, shall not exceed a data-rate-dependent value according to Table 19-22 (Allowed relative constellation error versus constellation size and coding rate). The number of spatial streams under test shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized testing instrumentation input ports. In the test, NSS = NSTS with EQM MCSs shall be used and no beamforming steering matrix shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The same requirement applies both to 20 MHz channels and 40 MHz channels. **(#2655)**

**21.3.17.4.3 Transmitter constellation error**

The relative constellation RMS error, calculated by first averaging over subcarriers, frequency segments, VHT PPDUs, and spatial streams (see Equation (19-89)) shall not exceed a data-rate dependent value according to Table 21-24 (Allowed relative constellation error versus constellation size and coding rate). The number of spatial streams under test shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized testing instrumentation input ports. In the test, *NSS = NSTS* (no STBC) shall be used and no beamforming steering matrix shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements apply to 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous transmissions as well as 80+80 MHz noncontiguous transmissions. **(#2655)**

**End of proposed changes.**