IEEE P802.11
Wireless LANs

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| Channel estimation normalization and other fixes |
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Abstract

This document provide corrections to channel estimation normalization, QoS Null frames density spacing, and other bug fixes (CID 9001).

**Comment #1**

Subclause 8.4.2.138, page 196, line 12 (Draft 8.0)

*Comment:*

The -8 to 55 dB range and .5 dB step size conflict with the 6 bits width for the SNR values in the Channel Measurement Feedback element. Make the step 1 dB.

*Recommended change:*

The SNR subfield levels are unsigned integers referenced to a level of -8 dB. Each step is ~~0.5~~ 1 dB. SNR values less than or equal to -8 dB are represented as 0. SNR values greater than or equal to 55 dB are represented as 0x3F.

**Comment #2**

Subclause 8.4.2.138, page 197, line 6 (Draft 8.0)

*Comment:*

The normalizing rule for channel measurements in the Channel Measurement Feedback element is extremely complicated; it involves a complex division of all channel measurements (N*taps* × N*meas*, with a maximum of 63 × 64, or about 4000 (I, Q) components) by the complex value of the strongest tap among all paths. Channel measurements are required to be returned in BRPIFS. The strongest/maximum reading can be the very last one in the worst case, so no pipelining can be applied. On the other hand, the beamforming initiator can process the channel measurements (including normalization) on a non-realtime basis. Therefore, the only practical requirement is to make good use of the 7 bits for each (signed) I and Q reading.

Recommendation is to eliminate any normalizing requirement. Instead, make a recommendation of having the two MSB bits to 01 or 10 for at least one of the I and Q readings, i.e., scale such that at least one of the components gets into the range 32 to 63 (positive) or -33 to -64 (negative).

*Recommended change:*

Replace

"Each channel tap is reported as in-phase and quadrature component pairs, relative to the amplitude of the strongest path detected among all TRN-T fields. The values are represented as twos’ complement numbers with values between -64 to 63. Each pair of in-phase and quadrature numbers correspond to the value of the specific tap, divided by the complex value of the strongest tap in all measurements, multiplied by 64. The strongest tap in all measurements of all TRN-T fields is represented by the in-phase and quadrature pair (63,0). "

with:

"Each channel tap is reported as an in-phase and quadrature component pair, with each component value represented as a two’s complement number between -64 and 63. Unless all in-phase and quadrature component values are reported as zero, they should be scaled such that the two most significant bits for at least one of the component values equal 01 or 10 (binary)."

**Comment #3**

Subclause 9.12.3, page 278, line 7 (Draft 8.0)

*Comment:*

QoS Null frames are exempt from MPDU density spacing; we wanted this to have an efficient solution (i.e., no byte overhead) for carrying a QoS header together with control frames, e.g., to be able to send an Ack or Block Ack frame and carry RD-related information at the same time.

There are a few problems with the language:

1. "Shall" is unnecessary, and in fact, restricting; what we want is every receiver to be able to process MPDU + ... + MPDU + QoS NULL + ... with no density spacing right before the QoS Null. But transmitter can avoid spacing if efficiency is important (e.g., in the case of ACK/B-ACK + QoS-NULL), or can insert any other spacing otherwise, even bigger than MMSS, if it wants, and depending on the application. All the language needs to specify is no extra spacing needed before the QoS Null frame. This change has no effect on any compliant implementation.
2. The terms "extra octets" and "before" are vague terms causing confusion, and need to be clarified.

*Recommended change:*

QoS Null frames transmitted by DMG STAs are not subject to this spacing, i.e., no ~~extra octets shall~~ MPDU delimiters with zero length need to be inserted ~~before~~after the MPDU immediately preceding the QoS Null frame~~s~~ in an A-MPDU.

**Comment #4**

Subclause 21.2.2, page 510, no line (third row of the table from the bottom) (Draft 8.0)

*Comment:*

RCPI measurement has been clarified to take place over preamble and not the data portion. See the RCPI definition (21.3.10).

*Recommended change:*

Is a measure of the received RF power measured over the preamble of a received frame. Refer to 21.3.10 for the definition of RCPI.