IEEE P802.11
Wireless LANs

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| LB187-PR-AMPDU-LENGTH-PAD |
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Abstract

Proposed resolutions to LB187 CIDs 4389, 4392, 4660 and 4524

# Revision notes:

**REV4:**

CID 4660 – modified the way that the proposed text changes account for TXOP sharing and other changes

CID 4254 – changed the proposed change – still a revise, but now with more agreement with the commenter – instead of using the D2.1 change, proposing a new change that changes the name of the 11n-defined term non-AMPDU to Single MPDU

**REV3:**

CID 4660 – modified the way that the proposed text changes account for TXOP sharing

**REV2:**

CID 4392 – modified wording of references to EOF Pad, EOF Padding to be consistent and less ambiguous.

**REV1:**

**REV0:**

**CID 4389:**

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| 4389 | Brian Hart | 104.47 | 9.12.2 | "up to" and including? | Check, and add suggested language if needed. | Reject – Changing the language potentially causes existing devices to become non-compliant. |

**Discussion:**

The baseline has already committed us to this language.

It is unclear if receivers have been implemented to NOT include that last 1 octet or not.

It would be dangerous to change the language now and force a requirement on existing devices.

(Alternatively, the language for VHT could be changed while leaving the HT language unchanged.)

**9.12.2 A-MPDU length limit rules**

Using the Maximum A-MPDU Length fields, the STA establishes at association the maximum

length of an A-MPDU pre-EOF padding that can be sent to it. An HT STA shall be capable of

receiving A-MPDUs of length up to the value indicated by the Maximum A-MPDU Length Exponent

field in its HT Capabilities element. A VHT STA shall be capable of receiving A-MPDUs where the AMPDU

pre-EOF padding length is up to the value indicated by the Maximum A-MPDU Length Exponent

field in its VHT Capabilities element.

A STA shall not transmit an A-MPDU in an HT\_MF or HT\_GF PPDU that

is longer than the value indicated by the Maximum A-MPDU Length Exponent field in the HT Capabilities

element sent by the intended receiver. A STA shall not transmit an A-MPDU in a VHT PPDU

where the A-MPDU pre-EOF padding length is longer than the value indicated by the Maximum A-MPDU

Length Exponent field in the VHT Capabilities element sent by the intended receiver. A DBand STA shall

not transmit an A-MPDU that is longer than the value indicated by the Maximum A-MPDU Length Exponent

field in the DBand Capabilities element.

**CID 4392, 4660:**

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| 4392 | Brian Hart | 106.43 | 9.12.6 | "The procedure in the subclause is applied for each user ..." was never good enough as shown by P106L58 or P106L65 | Delete this sentence and apply an iteration (or "each-ification") over users as required. E.g. P107L15-23: append each para with ", for each user"; and at P106L47: "an A-MPDU ... pad the ampdu" -> "one or more A-MDPUs ... pad each ampdu" | Revise - Tgac editor to make changes shown under the heading CID 4389 within document 11-12-0541r4 which generally agree with the sentiment expressed by the commenter. |
| 4660 | kaiying Lv | 106.52 | 9.12.6 | "The inclusion of secondary AC traffic in an MU PPDU shall not increase the duration of the MU PPDU beyond that required to transport the primary AC traffic. "The value of the PSDU\_LENGTH parameter for user u returned in the PLME-TXTIME.confirm primitive and in the RXVECTOR for an MU PPDU is calculated based on the largest number of data symbols in the data field of multiple users. However PHY cannot guarantee the largest number of data symbols comes from the APEP\_LENGTH of user u of primary AC, but MAC layer should make sure that the largest data symbols come from the A\_MPDU from the primary AC. | Clarify in the section 9.12.6 A-MPDU padding for VHT PPDU that "An A-MPDU pre-EOF padding for MU PPDU shall also follow the rule that the inclusion of secondary AC traffic in an MU PPDU shall not increase the duration of the MU PPDU beyond that required to transport the primary AC traffic (see 9.19.2.2a Sharing an EDCA TXOP constraints. | Revise - Tgac editor to make changes shown under the heading CID 4660 within document 11-12-0541r4 which generally agree with the sentiment expressed by the commenter. |

**Discussion:**

Proposed resolution is revise, with the following proposed draft changes:

***TGac editor, please make changes to subclause “9.12.6 A-MPDU padding for VHT PPDU*” *of 802.11 TGac draft 2.1 as shown:***

* A-MPDU padding for VHT PPDU

A VHT STA that delivers a one or more A-MPDUs to the PHY (using PHY-DATA.request primitives) as one or more PSDUs for a VHT PPDU shall pad the A-MPDU(s) as described in this subclause.

An A-MPDU pre-EOF padding (see 9.12.2 (A-MPDU length limit rules)) is constructed for each user from the MPDUs available for transmission that have a TID value that matches the primary AC and from A-MPDU subframes with 0 in the MPDU Length field, provided that each added sub-frame and the complete A-MPDU meet the A-MPDU content (see 8.6.3 (A-MPDU contents)), length limit (see 8.6.1 (A-MPDU format)) and MPDU start spacing (see 9.12.3 (Minimum MPDU Start Spacing field)) constraints for the intended recipient and provided that after adding each sub-frame, the expected duration of the A-MPDU does not exceed the remaining TXOP duration for the primary AC. The A-MPDU\_Length[n] for user *n* is initialized as the length of the resulting A-MPDU pre-EOF padding.

The A-MPDU\_Length[n] for user *n* is used as the APEP\_LENGTH[n] parameter value for the PLME-TXTIME.request (see 6.5.7 (PLME-TXTIME.request)) primitive which is then invoked once for the VHT PPDU (i.e. not invoked once per user). The PLME-TXTIME.confirm (see 6.5.8 (PLME-TXTIME.confirm)) primitive provides the TXTIME parameter and PSDU\_LENGTH[] parameters for each user for the transmission.

Subsequently, for each user *n,* as permitted by the rules for EDCA TXOP Sharing (see 9.19.2.2a Sharing an EDCA TXOP), a VHT STA may add to the A-MPDU for that user, A-MPDU subframes that have a TID that matches the secondary AC and A-MPDU subframes with 0 in the MPDU Length field, provided that each added sub-frame and the complete A-MPDU meet the A-MPDU content (see 8.6.3 (A-MPDU contents)), length limit (see 8.6.1 (A-MPDU format)) and MPDU start spacing (see 9.12.3 (Minimum MPDU Start Spacing field)) constraints for the intended recipient, and provided that after adding each sub-frame, the expected duration of the A-MPDU does not exceed the remaining TXOP duration for the primary AC and provided that after incrementing the A-MPDU\_Length[n] with the length of each such added A-MPDU subframe that the relationship A-MDU\_Length[n] <= PSDU\_LENGTH[n] is true.

Padding is then added to the A-MPDU for each user *n*, such that the resulting A-MPDU for that user contains exactly PSDU\_LENGTH[n] octets, as follows:

* First, while A-MPDU\_Length[n] < PSDU\_LENGTH[n] and A-MPDU\_Length[n] mod 4 != 0, add a subframe padding octet and increment A-MPDU\_Length[n] by 1
* Then, while A-MPDU\_Length[n] + 4 <= PSDU\_LENGTH[n], add an A-MPDU[n] subframe with 0 in the MPDU Length field and 1 in the EOF field and increment A-MPDU\_Length[n] by 4
* Finally, while A-MPDU\_Length[n] < PSDU\_LENGTH[n], add an EOF pad octet and increment A-MPDU\_Length[n] by 1

An A-MPDU subframe with EOF set to 1 and with MPDU Length field set to 0 shall not be added before any A-MPDU subframe with EOF set to 0.

An A-MPDU subframe with EOF set to 1 and with MPDU Length field set to 0 shall not be added before an A-MPDU subframe that contains a VHT single MPDU (see 9.12.7 (Setting the EOF field of the MPDU delimiter(#4969))).

An EOF pad octet shall not be added before any A-MPDU subframe.

**CID 4524:**

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| 4524 | David Hunter | 28.33 | 8.2.4.5.4 | Since a VHT single MPDU is by definition inside an A-MPDU frame, the 11mb version of this text already covers the VHT single MPDU case. | Remove this change to the 11mb text. | Revise – Commenter is correct that the technical definition of non-A-MPDU includes VHT Single MPDU, but the term is so confusing in name that it is suggested that the term be renamed to Single MPDU to avoid future confusion of the type that caused the task group to add VHT single MPDU in the cited instance. TGac editor to change the term “non-A-MPDU” to “single MPDU” throughout the TGac draft and baseline as per the instructions provided in 11-12-0541r4 under the heading CID 4524. |

**Discussion:**

Note that the commenter suggests that the 11mb language already covers the VHT single case, and he is technically correct, because the phrase “non-A-MPDU frame” is a defined term with the meaning a frame not carried in an A-MPDU or a VHT single MPDU.

However, the meaning of the phrase, non-A-MPDU frame, while explicitly clear when it was created by 11n, has been muddied by the TGac inclusion of the VHT single MPDU, which in construct, is very much exactly identical to that of an A-MPDU, but differs from a normal A-MPDU only in the required response on the part of the recipient. Only the most observant followers of the voluminous writings of the 802.11 sages are likely to be able to maintain in the forefront of their studious minds, a recollection of this subtle distinction when encountering the term “non-A-MPDU” while performing their daily readings. Therefore, to assist the overwhelmed, less diligent, but no less penitent followers of 802.11 in maintaining as complete a sense of closeness with the perfection embodied in the standard, it is suggested that the original term be renamed to avoid the potential wailing and gnashing of teeth that might otherwise result.

A convening of the best minds of 802.11 has produced the alternative term that will assist those of lesser qualification to remain faithful: Single MPDU.

Note that the 11mb language was:

*In a frame that is a non-A-MPDU frame*

Note also that the draft 2.0 language was admittedly confusing in its wording because it cannot be definitively established whether the modifier “not” applies to only the phrase preceding the conjunction “or”, or to the pair of conjoined phrases. CID 4817 suggested a change to clarify exactly this point, and this change, which has been effected in draft 2.1 should also satisfy CID 4524.

Draft 2.0 language:

*~~In a frame that is a non-A-MPDU frame~~When not carried in an A-MPDU*

*subframe or carried in a VHT single MPDU:*

Draft 2.1 language:

*In a frame that is either a VHT single MPDU or not carried in an A-MPDU~~a~~*

*~~non-A-MPDU frame~~(#4817):*

***TGac editor, please change the phrase “non-A-MPDU” wherever it occurs in the TGac draft to be “Single MPDU” and find all occurrences of “non-A-MPDU” in the baseline that are not already present in the TGac draft and include new headings, editing instructions and text changes to effect the change from “non-A-MPDU” to “Single MPDU” for each of those discovered occurrences in the baseline.***

See also CID 4817, 2873, 3363, 3546, 3568, 4780.

**References:**