IEEE P802.11
Wireless LANs

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| Discussion of CID 5940 |
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Abstract

This contribution provides further background and discussion of CID 5940.

CID 166

# Introduction

This submission discusses CID 5940 and CID 5866, which depends on the resolution of CID 5940.

# CID 5940

CID 5940 is shown below:

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| **CID** | **Draft** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** |
| 5940 | 4 | 22.4.4 | 2568 | 54 | The NOTE in Table 22-29 for aPSDUMaxLength is not correct. For an SU PPDU, the max APEP\_LENGTH is 1 048 575, according to Table 22-1. This could never result in a PSDU\_LENGTH of 4 692 480. (see (22-112) and (22-113)). For SU, the difference between APEP\_LENGTH and PSDU\_LENGTH is at most N\_DBPS/8). For MU transmissions, PSDU\_LENGTH could be longer, but it would not be possible to use 8 streams to a single user. | I believe the maximum PSDU\_LENGTH would be 1506\*12480/8 = 2 349 360, corresponding to 4 streams MCS9 in an MU PPDU with N\_STS,total=5 that is 1506 symbols long. |

The CID refers to the following Table:



## Discussion

Table 22-29 shows a maximum PSDU\_LENGTH of 4,692,480 octets. According to the note, this number supposedly corresponds to an 8-stream 160 MHz frame of maximum length (5.484 msec) using MCS9 and short GI.

For such a frame we have:

* NVHT-LTF = 8
* #symbols =FLOOR[ (5484 – 20 (legacy preamble) – 8 (VHT-SIG-A) – 4 (VHT-STF) – NVHT-LTF \*4 (VHT-LTF) – 4 (VHT-SIG-B))/3.6] = 1504
* N\_DBPS = 24960

As such, the number of bytes carried in this frame is: N\_DBPS\*1504/8 = 4,692,480.

However, for SU the maximum of allowed value of APEP\_LENGTH is 1,048,575 bytes (See Table 22-1)



For SU, the definition of PSDU\_LENGTH is:



With:



Based on these definitions, one can show that:

PSDU\_LENGTH – APEP\_LENGTH < NDBPS/8 (for the case without STBC)

PSDU\_LENGTH – APEP\_LENGTH < NDBPS/4 (for the case with STBC)

As such, the maximum PSDU\_LENGTH for SU should always be less than 1,048,575 + 3120 = 1,051,695 if STBC is not used and less than 1,048,575 + 6240 = 1,054,815 if STBC is used. This shows that the value in Table 22-29 can not be correct. The exact upper bound would have to be found by exhaustive search.

The correct value appears to be **1,054,549** (STBC, SU, 8SS, max APEP\_LENGTH, short GI).

For MU, the difference between APEP\_LENGTH and PSDU\_LENGTH can be much larger, since the number of symbols is essentially determined by the user which has the longest TXTIME. All other users have to be padded to the same length. In order to maximize the PSDU\_LENGTH for a given user, we make the following assumptions:

* The user has four streams (the maximum allowed for a user in an MU transmission) using MCS 9 (N\_DBPS = 12480)
* The transmissions uses short GI
* The training sequence (VHT-LTF) is as short as possible for an MU frame containing at least one user with 4 streams. In practice, this means N\_STS,total = 5 or 6, for which N\_VHT-LTF would be 6.

With these values, the number of symbols is:

* #symbols =FLOOR[ (5484 – 20 (legacy preamble) – 8 (VHT-SIG-A) – 4 (VHT-STF) – 6\*4 (VHT-LTF) – 4 (VHT-SIG-B))/3.6] = 1506

The maximum PSDU\_LENGTH is then:

1506\*12480/8 = 2,349,360

In conclusion:

* For SU, PSDU\_LENGTH <= 1,054,549
* For MU, PSDU\_LENGTH <= 2,349,360

## Proposed resolution

Proposed resolution: Revised

Modify the NOTE in Table 22-29 as follows:

NOTE—this is the maximum length in octets for a VHT SU PPDU with a bandwidth of 160 MHz or 80+80 MHz, VHT-MCS 9, and 8 spatial streams, and limited by 1504 possible Short GI data symbols in aPPDUMaxTime. Note that this is the maximum PSDU length a VHT PHY could support assuming no restrictions in MAC.  See 9.13.2 for additional restrictions on the maximum number of octets the MAC could support.

# CID 5866

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| **CID** | **Draft** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** |
| 5866 | 4 | 8.2.4.7.1 | 587 | 37 | The max PSDU size for VHT PPDU (fourth column) may be wrong. There is a separate comment on Table 22-29. Outcome of that comment resolution should be reflected in this Table 8-19. | See comment |



Discussion:

The value for VHT is copied from Table 22-29. This value is questioned by CID 5940. Depending on the resolution of comment 5940, the value in this table needs to be updated as well.

## Proposed Resolution

Proposed resolution: revised

This comment is implicitly resolved by resolution of CID 5940

# Conclusion

This contribution provides further background and discussion on CID 5940.

Note that CID 5932 and 5953 will benefit from this discussion as well.