IEEE P802.11
Wireless LANs

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| Proposed Draft Text: Packet Extension |
| Date: 2020-09-04 |
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Abstract

This submission shows

* Packet Extension

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Fixed typos in Equations

**34.3.12 Packet extension**

A PE field of duration 4 µs, 8 µs, 12 µs, or 16 µs is present in an EHT PPDU. The PE field provides additional receive processing time at the end of the EHT PPDU. The PE field, if present, shall be transmitted with the same average power as the Data field and shall not cause significant power leakage outside of the spectrum used by the Data field. Other than that, its content is arbitrary. In an OFDMA EHT PPDU or punctured non-OFDMA EHT PPDU, the spectrum used by PE field is commensurate with the locations and sizes of the occupied RUs or MRUs in the Data field. For example, for an 20MHz OFDMA EHT PPDU, if the occupied RU in the Data field is 106-tone RU, the PE would have a spectrum that is approximately 10 MHz wide.

The duration of the PE field for an EHT MU PPDU is determined by both the pre-FEC padding factor value in the last OFDM symbol of the Data field, and the TXVECTOR parameter NOMINAL\_PACKET\_PADDING.

For an EHT MU PPDU, the nominal $T\_{PE}$ value ($T\_{PE,nominal}$) is given by Equation (34-3.12-1).

 $T\_{PE,nominal}=max\_{u}T\_{PE,nominal,u}$ (34-3.12-1)

where

 $T\_{PE,nominal,u}$ is the nominal $T\_{PE}$ value for user *u* and is also given by Table 34-3.12-1 (Nominal $T\_{PE}$ values).

 $max\_{u}f(u)$ is the maximum value of $f(u)$ over all values of *u*.

In this case, *a* in Table 34-3.12-1 (Nominal $T\_{PE}$ values) is given by either Equation (34-3.12.1-13) or Equation (34-3.12.1-14).

**Table 34-3.12-1 ⎯Nominal** $T\_{PE}$ **values**

|  |  |
| --- | --- |
| **a** | **TXVECTOR parameter NOMINAL\_PACKET\_PADDING[*u*] (EHT MU PPDU)** |
| **0 µs** | **8 µs** | **16 µs** |
| 1 | 0 µs | 0 µs | 4 µs |
| 2 | 0 µs | 0 µs | 8 µs |
| 3 | 0 µs | 4 µs | 12 µs |
| 4 | 0 µs | 8 µs | 16 µs |

The duration of the PE field, $T\_{PE}$, may take values of 0 µs, 4 µs, 8 µs, 12 µs, or 16 µs. $T\_{PE}$ for an EHT MU PPDU shall not be less than $T\_{PE,nominal}$. $T\_{PE}$ for an EHT MU PPDU should be equal to $T\_{PE,nominal}$ to minimize the packet extension overhead. Figure 34-3.12-1 (PE field duration of an EHT MU PPDU without midambles if maximum value of TXVECTOR parameters NOMINAL\_PACKET\_PADDING[*u*] is 8 µs and $T\_{PE}=T\_{PE,nominal}$), and Figure 34-3.12-2 (PE field duration of an EHT MU PPDU without midambles if the maximum value of TXVECTOR parameters NOMINAL\_PACKET\_PADDING[*u*] is 16 µs and $T\_{PE}=T\_{PE,nominal}$), show examples of the PE field duration in an EHT MU PPDU without midambles if the maximum value of TXVECTOR parameters NOMINAL\_PACKET\_PADDING[*u*] is 8 µs, and 16 µs, respectively, and $T\_{PE}=T\_{PE,nominal}$.

$T\_{PE}$for an EHT sounding NDP is 4 µs.



**Figure 34-3.12-1 ⎯ PE field duration of an EHT MU PPDU without midambles if the maximum value of TXVECTOR parameters NOMINAL\_PACKET\_PADDING[*u*] is 8 µs and** $T\_{PE}=T\_{PE,nominal}$



**Figure 34-3.12-2 ⎯ PE field duration of an EHT MU PPDU without midambles if the maximum value of TXVECTOR parameters NOMINAL\_PACKET\_PADDING[*u*] is 16 µs and** $T\_{PE}=T\_{PE,nominal}$

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME (TBD), each transmitter of an EHT TB PPDU shall append a PE field with a duration *TPE* calculated using Equation (34-3.12-2) except for an EHT TB feedback NDP, which has *TPE* = 0(TBD).

$T\_{PE}=\left⌊\frac{\left(\frac{LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}\right)-N\_{SYM}T\_{SYM}-N\_{MA}N\_{EHT-LTF}T\_{EHT-LTF-SYM}}{4}\right⌋×4$ (34-3.12-2)

where

LENGTH is the value indicated by UL Length subfield of the Common Info field(TBD) in the Trigger frame

*T*EHT-PREAMBLE is the value for an EHT TB PPDU in Equation (34-3.12-9)

*T*EHT-LTF-SYM is defined in Table 34-3.9-x (Timing-related constants)

*NMA* is the number of midamble periods in the current PPDU

$N\_{SYM}=\left⌊\left(\frac{LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}-N\_{MA}N\_{EHT-LTF}T\_{EHT-LTF-SYM}\right)/T\_{SYM}\right⌋-b\_{PE-Disambiguity}$ (34-3.12-3)

*b*PE-Disambiguityis the value of the TXVECTOR parameter EHT\_TB\_PE\_DISAMBIGUITY(TBD)

There are multiple methods for computing *NMA* for an EHT TB PPDU that get the same result, one example is as follows. The duration of one midamble period is defined in Equation (34-3.12-4).

$T\_{MA}= M\_{MA}T\_{SYM}+N\_{EHT-LTF}T\_{EHT-LTF-SYM}$  (34-3.12-4)

where *MMA* is the midamble periodicity indicated by the Number of EHT-LTF Symbols And Midamble Periodicity subfield of the Common Info field (TBD) in the Trigger frame. Equation (34-3.12-5) for computing *NMA* can be used.

$$N\_{MA}=\left\{\begin{matrix}0, if Dopper=0 \\max\left(0,\left⌊\left(\frac{LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}-\left(b\_{PE-Disambiguity}+2\right)∙T\_{SYM}\right)/T\_{MA}\right⌋\right), if Doppler=1 \end{matrix}\right.$$

(34-3.12-5)

where Doppler is indicated by the Doppler subfield of the Common Info field (TBD) of the Trigger frame.

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRS(TBD), each transmitter of the EHT TB PPDU shall append a PE field with the duration *TPE* equal to the value specified in the TXVECTOR parameter DEFAULT\_PE\_DURATION(TBD).

The PE Disambiguity field of the TBD field for an EHT MU PPDU (see 34.3.11.x) shall be set to 1 if the condition in Equation (34-3.12-6) is met, otherwise it shall be set to 0.

The PE Disambiguity subfield in the Common Info field(TBD) of the Trigger frame shall be set to 1 if the condition in Equation (34-3.12-6) is met for the EHT TB PPDU solicited by the Trigger frame. Otherwise, it shall be set to 0.

$T\_{PE}+4×\left(\left⌈\frac{TXTIME-SignalExtension-20}{4}\right⌉-\left(\frac{TXTIME-SignalExtension-20}{4}\right)\right)\geq T\_{SYM}$ (34-3.12-6)

where

*TPE* is the PE field duration

*TSYM* is the symbol duration of the Data field as defined in 34-3.9-x (Timing-related constants)

TXTIME (in µs) is defined in 34.X1.3 (TXTIME and PSDU\_LENGTH calculation)

*SignalExtension* is 0 µs if TXVECTOR parameter NO\_SIG\_EXTN is true and is aSignalExtension as defined in Table 34-X2 (34.X1.4 EHT PHY) if TXVECTOR parameter NO\_SIG\_EXTN is false

The receiver computes *NSYM*, *TPE* and *NMA* using Equation (34-3.12-7), Equation (34-3.12-8) and (34-3.12-10), respectively.

$N\_{SYM}=\left⌊\left(\frac{L\\_LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}-N\_{MA}N\_{EHT-LTF}T\_{EHT-LTF-SYM}\right)/T\_{SYM}\right⌋-b\_{PE-Disambiguity}$  (34-3.12-7)

$T\_{PE}=\left⌊\frac{\left(\frac{L\\_LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}\right)-N\_{SYM}T\_{SYM}-N\_{MA}N\_{EHT-LTF}T\_{EHT-LTF-SYM}}{4}\right⌋×4$ (34-3.12-8)

where

L\_LENGTH is the value indicated by the LENGTH field of the L-SIG field

$$T\_{EHT-PREAMBLE}= \left\{\begin{matrix}T\_{RL-SIG}+T\_{U-SIG}+T\_{EHT-STF-T}+N\_{EHT-LTF}T\_{EHT-LTF-SYM}, for an EHT TB PPDU \\T\_{RL-SIG}+T\_{U-SIG}+N\_{EHT-SIG}T\_{EHT-SIG}+T\_{EHT-STF-NT}+N\_{EHT-LTF}T\_{EHT-LTF-SYM}, for an EHT MU PPDU\end{matrix}\right. $$

(34-3.12-9)

*T*RL-SIG, *T*EHT-STF-T, *T*EHT-STF-NT, *T*EHT-LTF-SYM, *T*U-SIG, *T*EHT-SIG are defined in Table 34-3.9-x (Timing-related constants)

*N*EHT-SIG, *N*EHT-LTF are defined in Table 34-3.9-x (Frequently used parameters)

*b*PE-Disambiguity is the value indicated by the PE Disambiguity subfield of the TBD field for an EHT MU PPDU, or the value indicated by the PE Disambiguity subfield in the Common Info field(TBD) in the Trigger frame for an EHT TB PPDU.

*NMA* may be computed by multiple methods that get the same result, one example of which is given in Equation (34-3.12-10).

$$N\_{MA}=\left\{\begin{matrix}0, if Dopper=0 \\max\left(0,\left⌊\left(\frac{L\\_LENGTH+3}{3}×4-T\_{EHT-PREAMBLE}-\left(b\_{PE-Disambiguity}+2\right)∙T\_{SYM}\right)/T\_{MA}\right⌋\right), if Doppler=1\end{matrix}\right.$$

(34-3.12-10)

where

*TMA* is defined in Equation (34-3.12-4) except that *MMA* is the midamble periodicity indicated by the TBD field in an EHT MU PPDU.

Doppler is indicated by the Doppler field of TBD field.