IEEE P802.11
Wireless LANs

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| 30.12.3 TXTIME Calculation |
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Abstract

This document proposes specification text for subclause 30.12.3 (TXTIME calculation), [1].

*Editor: propose to include the text for subclause 30.12.3 as below*

**30.12.3 TXTIME calculation**

**30.12.3.1 General**

This clause defines the TXTIME parameter calculation for Control, SC, and OFDM mode of EDMG STA PHY entity. The TXTIME parameter is returned from the PHY to MAC entity using the PLME-TXTIME.confirm primitive issued in response to a PLME-TXTIME.request(TXVECTOR) primitive. The TXTIME represents the time, in microseconds, required to transmit PPDU configured using TXVECTOR parameters.

**30.12.3.2 TXTIME calculation for EDMG Control mode**

If the FORMAT parameter of TXVECTOR is EDMG, then the modulation is defined by the EDMG\_MODULATION parameter. If the EDMG\_MODULATION parameter is set to EDMG\_C\_MODE, the TXTIME parameter shall be defined in (µs) as follows:



where:







where:

* 
*  = 5 octets
*  = 9 octets
*  = 3 octets

The parameter *Length* (EDMG\_LENGTH in TXVECTOR) indicates the number of data octets in the PSDU in the rage 14 – 1023.

If the CH\_BANDWIDTH parameter indicating bandwidth configuration is set to CBW216, the number of space-time streams NUM\_STS is set to 1, and DMG-TRN parameter is set to 1, then the TRN field duration is defined as follows:



The EDMG\_TRN\_LEN parameter indicates the length of the training field in the rage 0 – 31.

Otherwise, the TRN field duration is defined as follows:



where:

* 
* If EDMG\_TRN\_LEN > 0, EDMG-TRN-T-PACKET or EDMG-TRN-R/T-PACKET:
	+ 
	+ 
	+ 
* If EDMG\_TRN\_LEN > 0, EDMG-TRN-R-PACKET:
	+ 
	+ 
	+ 
* If EDMG\_TRN\_LEN = 0:
	+ 
	+ 
	+ 

If the TRN\_SEQ\_LENGTH is set to NORMAL, then the TRN\_BL is set to 128. If the TRN\_SEQ\_LENGTH is set to LONG, then the TRN\_BL is set to 256. If the TRN\_SEQ\_LENGTH is set to SHORT, then the TRN\_BL is set to 64.

If the CH\_BANDWIDTH parameter is set to CBW216+216 or CBW432+432 and the NUM\_TX\_CHAINS parameter is set to 2 or 4, then the  is set to 1. If the CH\_BANDWIDTH parameter is set to CBW216+216 or CBW432+432 and the NUM\_TX\_CHAINS parameter is set to 6 or 8, then the  is set to 2.

If the CH\_BANDWIDTH parameter is set to CBW216, CBW432, CBW648, or CBW864 and the NUM\_TX\_CHAINS parameter is set to 1 or 2, then the  is set to 1. If the CH\_BANDWIDTH parameter is set to CBW216, CBW432, CBW648, or CBW864 and the NUM\_TX\_CHAINS parameter is set to 3 or 4, then the  is set to 2. If the CH\_BANDWIDTH parameter is set to CBW216, CBW432, CBW648, or CBW864 and the NUM\_TX\_CHAINS parameter is set to 5, 6, 7, or 8, then the  is set to 4.

If the EDMG\_TRN\_LEN is greater than 0 and the EDMG\_PACKET\_TYPE is set to EDMG-TRN-T-PACKET or EDMG-TRN-R/T-PACKET, then the , , and .

If the EDMG\_TRN\_LEN is greater than 0 and the EDMG\_PACKET\_TYPE is set to EDMG-TRN-R-PACKET, then the , , and .

If the EDMG\_TRN\_LEN is set to 0, then the , , and .

The EDMG\_TRN\_LEN parameter indicates the length of the training field in the rage 0 – 255.

**30.12.3.3 TXTIME calculation for EDMG SC mode**

If the EDMG\_MODULATION parameter is set to EDMG\_SC\_MODE, the TXTIME parameter shall be defined in (µs) as follows:



where:







* If NUM\_USERS = 1, CH\_BANDWIDTH = CBW216, and NUM\_STS = 1:
	+ 
* If NUM\_USERS ≥ 1, CH\_BANDWIDTH ≠ CBW216 and/or NUM\_STS ≠ 1:
	+ 
* If NUM\_USERS = 1, CH\_BANDWIDTH = CBW216, and NUM\_STS = 1:
	+ 
	+ 
* If NUM\_USERS ≥ 1, CH\_BANDWIDTH ≠ CBW216 and/or NUM\_STS ≠ 1:
	+ 
	+ 
* If NUM\_USERS = 1:
	+ 
* If NUM\_USERS > 1:
	+ 



If the NUM\_USERS parameter is set to 1, CH\_BANDWIDTH parameter is set to CBW216, and NUM\_STS is set to 1, then the EDMG-STF and EDMG-CEF fields are not transmitted and *TEDMG-STF* = 0 and *TEDMG-CEF* = 0.

If the NUM\_USERS parameter is greater or equal to 1 and the CH\_BANDWIDTH parameter is not equal to CBW216 and/or the NUM\_STS parameter is not equal to 1, then EDMG-STF and EDMG-CEF fields are transmitted with time duration specified above.

If the NUM\_USERS parameter is set to 1, then the EDMG-Header-B is not transmitted and *TEDMG-Header-B* = 0. If the NUM\_USERS is set to value greater than 1, then the EDMG-Header-B is transmitted with time duration specified above.

If the NUM\_STS parameter is set to 1 or 2, then the  parameter is set to 1. If the NUM\_STS parameter is set to 3 or 4, then the  parameter is set to 2. If the NUM\_STS parameter is set to 5, 6, 7, or 8, then the  parameter is set to 4.

The number of SC symbol blocks  depends on the EDMG\_LENGTH, MCS and other parameters in TXVECTOR and shall be as defined in 30.5.9.4.

If the NUM\_USERS parameter is set to 1, the CH\_BANDWIDTH parameter is set to CBW216, and NUM\_STS is set to 1, then if the GI\_TYPE parameter is set to SHORT, *NGI* = 64, if the GI\_TYPE is set to NORMAL, *NGI* = 64, and if the GI\_TYPE is set to LONG, *NGI* = 128.

If the NUM\_USERS parameter is set to 1 and the CH\_BANDWIDTH parameter is not equal to CBW216 and/or the NUM\_STS parameter is not equal to 1, then if the GI\_TYPE parameter is set to SHORT, *NGI* = 32, if the GI\_TYPE is set to NORMAL, *NGI* = 64, and if the GI\_TYPE is set to LONG, *NGI* = 128.

If the NUM\_USERS parameter is greater than 1, then if the GI\_TYPE parameter is set to SHORT, *NGI* = 64, if the GI\_TYPE is set to NORMAL, *NGI* = 64, and if the GI\_TYPE is set to LONG, *NGI* = 128.

The TRN field duration shall be as defined in 30.12.3.2.

If the L\_BEAM\_TRACKING\_REQUEST is set to Beam\_Tracking\_Not\_Requested, L\_PACKET\_TYPE is set to TRN-R-PACKET, the EDMG\_BEAM\_TRACKING\_REQUEST is set to Beam\_Tracking\_Requested, EDMG\_PACKET\_TYPE is set to EDMG-TRN-R-PACKET, and the EDMG\_TRN\_LEN is greater than 0, then the , , and .

If the EDMG\_ADD\_PPDU parameter is set to ADD-PPDU, then the TXTIME parameter shall be updated every time when receiving the PLME-TXTIME.request(TXVECTOR) for each consecutive PPDU. The TXTIME shall be increased by the duration of (*TEDMG-Header-A*+*TData*) every time the PHY entity receives a new PPDU transmitted as a part of A-PPDU.

The TRN field can be appended only once at the very end of the A-PPDU transmission.

**30.12.3.4 TXTIME calculation for EDMG OFDM mode**

If the EDMG\_MODULATION parameter is set to EDMG\_OFDM\_MODE, the TXTIME parameter shall be defined in (µs) as follows:



where:













* If NUM\_USERS = 1:
	+ 
* If NUM\_USERS > 1:
	+ 



The TRN field duration is defined as follows:



where:

* 
* If EDMG\_TRN\_LEN > 0, EDMG-TRN-T-PACKET or EDMG-TRN-R/T-PACKET:
	+ 
	+ 
	+ 
* If EDMG\_TRN\_LEN > 0, EDMG-TRN-R-PACKET:
	+ 
	+ 
	+ 
* If EDMG\_TRN\_LEN = 0:
	+ 
	+ 
	+ 

If the NUM\_STS parameter is set to 1 or 2, then the  parameter is set to 2. If the NUM\_STS parameter is set to 3, then the  parameter is set to 3. If the NUM\_STS parameter is set to 4, then the  parameter is set to 4. If the NUM\_STS parameter is set to 5 or 6, then the  parameter is set to 6. If the NUM\_STS parameter is set to 7 or 8, then the  parameter is set to 8.

If the NUM\_USERS parameter is set to 1, then the EDMG-Header-B is not transmitted and *TEDMG-Header-B* = 0. If the NUM\_USERS is set to value greater than 1, then the EDMG-Header-B is transmitted with time duration specified above.

If the GI\_TYPE parameter is set to SHORT, *NGI* = 48, if the GI\_TYPE is set to NORMAL, *NGI* = 96, and if the GI\_TYPE is set to LONG, *NGI* = 192.

The number of OFDM symbols  depends on the EDMG\_LENGTH, MCS and other parameters in TXVECTOR and shall be as defined in 30.6.6.2.

If the TRN\_SEQ\_LENGTH is set to NORMAL, then the TRN\_BL is set to 2×704. If the TRN\_SEQ\_LENGTH is set to LONG, then the TRN\_BL is set to 4×704. If the TRN\_SEQ\_LENGTH is set to SHORT, then the TRN\_BL is set to 704.

If the NUM\_TX\_CHAINS parameter is set to 1 or 2, then the  is set to 2. If the NUM\_TX\_CHAINS parameter is set to 3, then the  is set to 3. If the NUM\_TX\_CHAINS parameter is set to 4, then the  is set to 4. If the NUM\_TX\_CHAINS parameter is set to 5 or 6, then the  is set to 6. If the NUM\_TX\_CHAINS parameter is set to 7 or 8, then the  is set to 8.

If the EDMG\_TRN\_LEN is greater than 0 and the EDMG\_PACKET\_TYPE is set to EDMG-TRN-T-PACKET or EDMG-TRN-R/T-PACKET, then the , , and .

If the EDMG\_TRN\_LEN is greater than 0 and the EDMG\_PACKET\_TYPE is set to EDMG-TRN-R-PACKET, then the , , and .

If the EDMG\_TRN\_LEN is set to 0, then the , , and .

If the L\_BEAM\_TRACKING\_REQUEST is set to Beam\_Tracking\_Not\_Requested, L\_PACKET\_TYPE is set to TRN-R-PACKET, the EDMG\_BEAM\_TRACKING\_REQUEST is set to Beam\_Tracking\_Requested, EDMG\_PACKET\_TYPE is set to EDMG-TRN-R-PACKET, and the EDMG\_TRN\_LEN is greater than 0, then the , , and .

If the EDMG\_ADD\_PPDU parameter is set to ADD-PPDU, then the TXTIME parameter shall be updated every time when receiving the PLME-TXTIME.request(TXVECTOR) for each consecutive PPDU. The TXTIME shall be increased by the duration of (*TEDMG-Header-A*+*TData*) every time the PHY entity receives a new PPDU to be transmitted as a part of A-PPDU.

The duration of the EDMG-Header-A starting from the second PPDU aggregated in A-PPDU is defined as follows:



The *NGI* parameter depends on the GI\_TYPE parameter as defined above.

The TRN field can be appended only once at the very end of the A-PPDU transmission.

**30.12.3.5 TXTIME calculation for non-EDMG Control mode**

If the FORMAT parameter of TXVECTOR is NON\_EDMG, then the modulation is defined by the NON\_EDMG\_MODULATION parameter. If the NON\_EDMG\_MODULATION parameter is set to C\_MODE or NON\_EDMG\_DUP\_C\_MODE, the TXTIME parameter shall be defined in (µs) as follows:



where:







where:

* 
*  = 5 octets



The parameter *Length* (LENGTH in TXVECTOR) indicates the number of data octets in the PSDU in the rage 14 – 1023. The TRN\_LEN parameter indicates the length of the training field in the rage 0 – 16.

**30.12.3.6 TXTIME calculation for non-EDMG SC mode**

If the NON\_EDMG\_MODULATION parameter is set to SC\_MODE or NON\_EDMG\_DUP\_SC\_MODE, the TXTIME parameter shall be defined in (µs) as follows:



where:











The number of SC symbol blocks  depends on the LENGTH and MCS parameters in TXVECTOR and shall be as defined in 20.6.3.2.3.3.

The parameter LENGTH indicates the number of data octets in the PSDU in the rage 1 – 262143.

The MCS parameter indicates the modulation type and coding scheme used in the transmission of the PPDU. For SC mode transmission, the MCS parameter is in the range 1 – 12, with possible extension to 9.1, 12.1, 12.2, 12.3, 12.4, 12.5, and 12.6 MCS subset.

The TRN\_LEN parameter indicates the length of the training field in the rage 0 – 16.

If the L\_BEAM\_TRACKING\_REQUEST is set to Beam\_Tracking\_Requested, L\_PACKET\_TYPE is set to TRN-R-PACKET, and the L\_TRN\_LEN is greater than 0, then the *TTRN* = 0.

If the ADD\_PPDU parameter is set to ADD-PPDU, then the TXTIME parameter shall be updated every time when receiving the PLME-TXTIME.request(TXVECTOR) for each consecutive PPDU. The TXTIME shall be increased by the duration of (*TL-Header*+*TData*) every time the PHY entity receives a new PPDU to be transmitted as a part of A-PPDU.

The TRN field can be appended only once at the very end of the A-PPDU transmission.

**SP:**

Do you agree to include the spec text for subclause 30.12.3 (TXTIME calculation) proposed in (11-17-1806-03-00ay 30 12 3 TXTIME Calculation) into the spec draft?

**References:**

1. Draft P802.11ay\_D0.8