IEEE P802.11
Wireless LANs

|  |
| --- |
| 11bn PDT PHY Timing-Related Parameters |
| Date: January, 2025 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Mengshi Hu | Huawei |  |  | humengshi@huawei.com |
| Ross Jian Yu | Huawei |  |  | ross.yujian@huawei.com |
| Juan Fang | Intel |  |  | juan.fang@intel.com |
| Youhan Kim | Qualcomm  |  |  | youhank@qti.qualcomm.com |
| Kanke Wu | Qualcomm  |  |  | kankew@qti.qualcomm.com |
| Eugene Baik | Eugene Baik |  |  | eugeneb@qca.qualcomm.com |
| Shengquan Hu | MediaTek |  |  | shengquan.hu@mediatek.com |
| Jianhan Liu | MediaTek |  |  | jianhan.liu@mediatek.com |
| Bo Sun | Sanechips |  |  | sun.bo1@sanechips.com.cn |
| Rui Cao | NXP |  |  | rui.cao\_2@nxp.com |
| Lin Yang | Qualcomm |  |  | linyang@qti.qualcomm.com |

Abstract

This document contains Proposed Draft Text (PDT) for the Timing-Related Parameters of the TGbn (UHR, Ultra High Reliability) amendment to the 802.11 standard.

# Revision information

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | Initial revision |
| 1 |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Introduction

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbn Draft. The abstract, revision information, introduction, explanation of the proposed changes, and references sections are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbn Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

## Explanation of the proposed changes:

The proposed changes to the 802.11 TGbn draft within this document are based on the following motions adopted by the TGbn task group.

### Relevant passing motions:

Aligned with 24/1981r3 and 24/1985r3.

# Text to be adopted begins here:

***TGbn editor: Please add the following new subclauses for Timing-Related Parameters to the 802.11bn draft D0.1 (NOTE: The following subclauses are based on 11-24-1993r2):***

# 38. Ultra High Reliability (UHR) PHY specification

## 38.3 UHR PHY

### 38.3.12 Timing-related parameters

Table 38-x1 (Timing related constants) defines the timing-related parameters for UHR PPDU format.

**Table 38-x1—Timing-related constants**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Description** |
| *F* Pre-UHR | 312.5 kHz | Subcarrier frequency spacing for the pre-UHR modulated fields |
| *F* UHR | 78.125 kHz | Subcarrier frequency spacing for the UHR modulated fields |
| *TDFT* Pre-UHR | 3.2 µs | IDFT/DFT period for the pre-UHR modulated fields |
| *TDFT* UHR | 12.8 µs | IDFT/DFT period for the UHR modulated fields |
| *TGI* ELR-MARK | 0.8 µs | Guard interval duration for the ELR-MARK field |
| *TGI* UHR-LTF, ELR | 1.6 µs | Guard interval duration for the UHR-LTF field in UHR ELR PPDU |
| *TGI* ELR-SIG | 1.6 µs | Guard interval duration for the ELR-SIG field |
| *TGI* Data, ELR | 1.6 µs | Guard interval duration for the Data field in UHR ELR PPDU |
| *T*UHR-LTF, ELR | 6.4 µs | Duration of each UHR-LTF OFDM symbol without GI in UHR ELR PPDU |
| *TSYM,* ELR-MARK | 4 µs = *TDFT* Pre-UHR *+ TGI* ELR-MARK | OFDM symbol duration for ELR-MARK field |
| *TSYM* UHR-LTF, ELR | 8 µs = *T*UHR-LTF, ELR *+* *TGI*, UHR-LTF,ELR  | OFDM symbol duration for UHR-LTF field including GI in UHR ELR PPDU |
| *TSYM* ELR-SIG | 14.4 µs = *TDFT*,UHR *+* *TGI*, ELR-SIG *=*1.125  *TDFT* UHR | OFDM symbol duration for ELR-SIG field including GI |
| *TSYM* Data, ELR | 14.4 µs = *TDFT*,UHR *+* *TGI*, Data, ELR *=*1.125  *TDFT* UHR | OFDM symbol duration for ELR-Data field including GI in UHR ELR PPDU |
| *T*ELR-MARK | 8 µs = *TSYM,* ELR-MARK2 | ELR-MARK field duration |
| *T*UHR-STF, ELR | 4 µs = 5   µs | UHR-STF field duration in UHR ELR PPDU |
| *T*UHR-LTF, ELR | 16 µs = *TSYM* UHR-LTF, ELR 2 | ELR-LTF field duration in UHR ELR PPDU |
| *T*ELR-SIG | 28.8µs*TSYM* ELR-SIG2 | ELR-SIG field duration |

Table 38-x2 (Subcarrier allocation related constants for the UHR ELR PPDU) defines tone allocation related parameters for an ELR PPDU.

**Table 38-x2—Subcarrier allocation related constants for the UHR ELR PPDU**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **ELR PPDU** | **Description** |
| *NSD,total* | 192 | Total number of data subcarriers |
| *NSP* | 16 | Number of pilot subcarriers |
| *NST* | 208 | Total number of subcarriers |
| *NSR* | 121 | Highest data subcarrier index |
| *NDC* | 7 | Number of null subcarriers at DC |
| *NGuard,Left* | 6 | Number of low frequency guard subcarriers |
| *NGuard,Right* | 5 | Number of high frequency guard subcarriers |

Table 38-x3 (Frequently used parameters) defines parameters used frequently in Clause 38 (Ultra high reliability (UHR) PHY specification).

#### **Table 38-x3—Frequently used parameters**

|  |  |
| --- | --- |
| **Symbol** | **Explanation** |
| *NRU* | For pre-UHR modulated fields, *NRU* = 1*.*For UHR modulated fields, *NRU* represents the number of occupied RU(s) or MRU(s) in the transmission. |
| *Nuser* *r* | For pre-UHR modulated fields, *Nuser* *r* = 1 .For UHR modulated fields, *Nuser* *r* represents the total number of users in the *r*-th occupied RU or MRU of the transmission. |
| *Nuser* *total* | Total number of users in all occupied RU(s) or MRU(s) of an UHR transmission, i.e.,*NRU* – 1*Nuser* *total* =  *Nuser* *r* .*r* = 0 |
| *NCBPS* *u* | Number of coded bits per OFDM symbol for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NCBPS* *m,u* | Number of coded bits per OFDM symbol over the *m*-th spatial stream for user *u*, *m* = 1,2, …, *NSS* *u* innon-OFDMA transmission and *m* = 1,2, …,  *NSS* *r* *u* in OFDMA transmission*, u* = 0 1  *Nuser* *total* – 1 . |
| *NSD* | Effective number of data tones carrying unique data.NOTE—The *NSD* value with DCM (when applicable) is half of the *NSD* value without DCM, for each RU or MRU size. |
| *NSD* *u* | Effective number of data tones carrying unique data for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NCBPSS* *u* | Number of coded bits per OFDM symbol per spatial stream for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NCBPSS* *l* *u* | Number of coded bits per OFDM symbol per spatial stream for user *u* in the *l*-th 80 MHz frequency subblock, *u* = 0 1  *Nuser* *total* – 1, and *l* = 0 1  *L* – 1 . *L* is the number of 80 MHz frequency subblocks. |
| *NDBPS* *u* | Number of data bits per OFDM symbol for user *u*, *u* = 0 1  *Nuser* *total* – 1 .NOTE—For LDPC, *NDBPS* *u* is derived from *NCBPS* *u* using *Ru* , rather than the effective LDPC code rate, which may vary depending on shortening/puncturing/ repetition performed during LDPC encoding. |
| *NBPSCS* *u* | Number of coded bits per subcarrier per spatial stream for user *u*, *u* = 0 1  *Nuser* *total* – 1 . |
| *NBPSCS* *m,u* | Number of coded bits per subcarrier over the *m*-th spatial stream for user *u*, *m* =1, 2, …, *NSS* *u* innon-OFDMA transmission and *m* = 1,2, …,  *NSS* *r* *u* in OFDMA transmission, *u* = 0 1  *Nuser* *total* – 1 . |
| *NBPSCS* *l* *u* | Number of coded bits per subcarrier per spatial stream for user *u* in the *l*-th 80 MHz frequency block, *u* = 0 1  *Nuser* *total* – 1,and *l* = 0 1  *L* – 1 . *L* is the number of 80 MHz frequency subblocks. |
| *NRX* | Number of receive chains. |
| *NSS* *r* *u* , *NSS* *u* ,*NSS* | Number of spatial streams. For the Data field, *NSS* *r* *u* is the number of spatial streams at *r*-th RU or MRU for user *u*, *u* = 0 1  *Nuser* *r* – 1 , and *NSS* *u* is the number of spatial streams for user *u*, *u* = 0 1  *Nuser* *total* – 1 .For the Data field of a UHR PPDU, . |

# Text to be adopted ends here.

# References:

1. 11-24-0171r26: 11-24-0171-26-00bn-tgbn-motions-list-part-1, Alfred Asterjadhi (Qualcomm Inc.)
2. 11-24-1993r3: 11-24-1993-03-00bn-tgbn-d0-1-spec-skeleton, Ross Jian Yu (Huawei)
3. 11-24-1981r3: 11-24-1981-03-00bn-pdt-elr, Lin Yang (Qualcomm Inc.)
4. 11-24-1985r3: 11-24-1985-03-00bn-pdt-phy-unequal-modulation-ueqm-and-new-mcs, Rui Cao (NXP)