IEEE P802.11
Wireless LANs

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| CRs on symbol design in Section 32 |
| Date: 2019-01-14 |
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Abstract

This contribution poposes comment resolutions for the CIDs: 185, 255, 303, 306, 440, 441, 442, 443, 767, 1045, 1046, 1047, 1049, 1153, 1199.

Rev1: Updated with comments from Yunsong Yang (Huawei)

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 185 | 69.36 | 32.2.3 | Line 36 to Line 46 needs to be polished. Should start with WUR-PPDU includes legacy portion and WUR-portion. The generation of legacy portion described in 21.3.3. The genreatin of the WUR portion is ...... The text "The generation of each field in a WUR-PPDU uses the following blocks:" is wrong since the the WUR SYNC doesn't need to use the Manchest encorder. Also need to add per antenna CSD handling in both texts and block diagram 32-4 and 32-5 |  | Revised.The Manchester-based encoder is removed and the text updated. The per antenna CSD is not needed in Figures 32-4 and 32-5 since this is part of the symbol randomizer shown in Figure 32-6 and 32-7.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 185. |

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| 255 | 73.32 | 32.2.3.3 | 11ac already supports 160 MHz transmission, and thus, WUR can also consider supporting it. | Change the sentence as follows:"The 40 MHz, 80 MHz or 160 MHz FDMA WUR PPDU can be generated by ..." | Accepted.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 255. |

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| 303 | 74.17 | 32.2.3.1 | In figure 32-6, "First half of IDFT output" is ambiguous and depends on which particular DFT specification is used. | Use unambiguous language, or refer to the mathematical description of the signal. | Rejected.There is a DFT definition in the specification. Besides, the figure 32-6 is merely an example. Using that definition the first half is identical to the second half, so there should be no unambiguity. |

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| 306 | 74.00 | 32.2.3.1 | It is not clear from the text if the modulation of On symbols can vary from PPDU to PPDU, between the sync field and the payload field, or even from bit to bit. Requiring a constant modulation throughout the packet allows for coherent receiver architectures which potentially perform better than power based receivers. | Specify that On symbol waveform (before symbol randomization) is constant throughput the PPDU. | Revised.In the mathematical description of the signal, we have added that the signal is the same throughout both WUR-Sync and WUR-Data for the HDR, and that it is different between WUR-Sync and WUR-Data, but the same within the fields for the LDR.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 306. |

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| 440 | 70.01 | 32.2.3 | remove the examples of a WUR signal generator. The generation of WUR signal is up to each vendor's impplementation. With WUR signal format is clearly defined. Examples are redundant. All have been well described in 32.2.4. | delete the the examples of a WUR signal generator. | Rejected.Examples are illustrative and equivalent examples are available in the spec. |

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| 441 | 71.01 | 32.2.3.2 | remove the Figure 32-6--An Example of an On-WG for the Sync and high rate Data fields. No need for such an example. The immplementation is straightforward and can be different from the figure. All have been well described in 32.2.4. | as in comment | Rejected.Examples are illustrative and equivalent examples are available in the spec. |

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| 442 | 72.01 | 32.2.3.2 | remove Figure 32-7--An Example of an On-WG for the low rate Data fields. No need for such an example. The immplementation is straightforward and can be different from the figure. All have been well described in 32.2.4. | as in comment | Rejected.Examples are illustrative and equivalent examples are available in the spec. |

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| 443 | 73.01 | 32.2.3.3 | remove Figure 32-8--An Example of a WUR Data field signal generator for the FDMA transmission. This figure just gives one example of many possible immplementations. Given the clear definition of the formates, this is redundant and causes confusion. All have been well described in 32.2.4. | as in comment | Rejected.Examples are illustrative and equivalent examples are available in the spec. |

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| 767 | 70.00 | 32.2.3 | "On waveform" and "Off waveform" should be defined. | Define these terms or refer to the other part(s) of the document | Revised.Added a better description when WG-On and WG-Off are introduced solving this problem.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 767. |

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| 1045 | 70.15 | 32.2.3 | In the Fig. 32-4, it is not clear if the On-WG corresponds to LDR On-WG or HDR On-WG.Since the Sync bit duration is 2 us, it can be explicitly mentioned here that the On-WG corresponds to HDR On-WG. | Replace the On-WG in Fig. 32-4 with On-WG\_{HDR} | Revised.Added a better description when WG-On and WG-Off are introduced solving this problem.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1045. |

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| 1046 | 70.23 | 32.2.3 | In the following sentence, it is not clear if the On-WG corresponds to LDR On-WG or HDR On-WG: "The Sync bit sequence is then used to switch between the On waveform generator (On-WG) and the Off waveform generator (Off-WG)."Since the Sync bit duration is 2 us, it can be explicitly mentioned here that the On-WG corresponds to HDR. Replace the On waveform generator (On-WG) in the sentence with HDR On waveform generator (On-WG\_{HDR}). | As shown in the comment. | Revised.Added a better description when WG-On and WG-Off are introduced solving this problem.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1046. |

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| 1047 | 70.36 | 32.2.3 | In the Fig. 32-5, it is not clear if the On-WG corresponds to LDR On-WG or HDR On-WG and how this is determined.Replace the On-WG in Fig. 32-5 with a block comprising of On-WG\_{LDR} and On-WG\_{HDR} and a switch between these two based on WUR\_DATARATE input, as it was done in Fig. 32-8. | As shown in the comment. | Revised.Added a better description when WG-On and WG-Off are introduced solving this problem.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1047. |

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| 1049 | 70.46 | 32.2.3 | In the following sentence, it is not clear if the On-WG corresponds to LDR On-WG or HDR On-WG, and how this will be determined: "Each coded bit is then used to switch between the On waveform generator (On-WG) and the Off waveform generator (Off-WG)."Rephrase the sentence as follows: "Each coded bit is then used to switch between the HDR On waveform generator (On-WG\_{HDR}), LDR On waveform generator (On-WG\_{LDR}) and the Off waveform generator (Off-WG), depending on the WUR\_DATARATE" | As shown in the comment. | Revised.Added a better description when WG-On and WG-Off are introduced solving this problem.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1049. |

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| 1153 | 69.43 | 32.2.3 | In addition to the Figure 32-4 and Figure 32-5, sub-clause 32.2.3.1 to 32.2.3.4 are all examples. | As in comment. | Revised.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1153. |

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| 1199 | 71.31 | 32.2.3.1 | use subcarrier "indices" with math symbol by using k instead of (-5, ... 5). | as in comment | Revised.Accepted the proposed change on P71. And made equivalent change on P72, to be consistent.TGba editor to make the changes shown in doc.: IEEE 802.11-19/0068r1 under all headings that include CID 1199. |

***TGba Editor: Change the following sentences in P73L41-50 in TGba Draft 1.1 as follows (#185, #1153):***

* Transmitter block diagram
* The generation of each field in a WUR PPDU can be described with the help of awaveform signal generator. (#185)

Figure 32-4 (An Example of a WUR signal generator for the WUR-Sync field), Figure 32-5 (An Example of a WUR signal generator for the WUR-Data field), and Sections 32.2.3.1 through 32.2.3.4 (#1153) show examples of transmitter block diagrams. The actual structure of the waveform generator is implementation dependent. The transmitter block diagrams for L-STF, L-LTF, and L-SIG are described in 21.3.3 (Transmitter block diagram).

***TGba Editor: Add the following sentences in P74L24 in TGba Draft 1.1 as follows (#767, #1045, #1046, #1047, #1049):***

An example of a WUR signal generator for the WUR-Sync field is shown in 32-4 (An Example of a WUR signal generator for the WUR-Sync field). The Sync bit sequence is then used to switch between the On waveform generator (On-WG) and the Off waveform generator (Off-WG). An example of an On-WG and an Off-WG for the WUR-Sync field is given in Section 32.2.3.1. The mathematical description of the On-WG for the WUR-Sync is found in Section 32.2.7, there referred to as SymHDROn. (#767, #1045, #1046, #1047, #1049)

***TGba Editor: Add the following sentences in P74L49 in TGba Draft 1.1 as follows (#767, #1045, #1046, #1047, #1049):***

An example of a WUR signal generator for the WUR-Data field is shown in Figure 32-5 (An Example of a WUR signal generator for the WUR-Data field). The information bits are mapped by a Manchester-based encoder. Each coded bit is then used to switch between the On waveform generator (On-WG) and the Off waveform generator (Off-WG). An example of an On/Off-WG for the high rate WUR-Data field and low rate WUR-Data field are given in Section 32.2.3.1 and Section 32.2.3.2, respectively. The mathematical descriptions of the On-WG for the high rate WUR-Data field and low rate WUR-Data field are found in Section 32.2.7 there referred to as SymHDROn and SymLDROn, respectively. Note that the generators are different depending on the data rate. (#767, #1045, #1046, #1047, #1049)

***TGba Editor: Change the following sentences in P77L32 in TGba Draft 1.1 as follows (#255):***

MC-OOK ‘On’ symbol for 20 MHz WUR waveform can be generated according to 32.2.3.1 (WUR PPDU waveform generation for WUR-Sync field and high rate WUR-Data field) or 32.2.3.2 (WUR PPDU waveform generation for low rate WUR-Data field) depending on WUR\_DATARATE. The 40 MHz, 80 MHz, or 160 MHz (#255) FDMA WUR PPDU can be generated by multiplexing multiple 20 MHz WUR waveforms in the corresponding channel as shown in Figure 32-8 (An Example of a WUR-Data field signal generator for the FDMA transmission).

***TGba Editor: Change the following sentences in P83L47 in TGba Draft 1.1 as follows (306):***

, are the subcarrier coefficients, and  equals S-6,6(*k*) if  and 0 otherwise. S-6,6 is an implementation dependent sequence. For HDR, is the same within both the WUR-Sync and WUR-Data fields. For LDR,  is different for the WUR-Sync and WUR-Data fields, but the same within the fields (#306). Example sequences are described in Table AB-1 (Example Values for the Sequence S-6,6 used for the Construction of the 2 µs MC-OOK On symbol) and Table AB-2 (Example Values for the Sequence S-6,6 used for the Construction of the 4 µs MC-OOK On symbol).(#317, #163, #227, #261, #666, #1059)

***TGba Editor: Change the following sentences in P75L32-33 in TGba Draft 1.1 as follows (#1199):***

For a single 20 MHz WUR channel, the 2 µs MC-OOK On symbol can be constructed by the On-Waveform Generator (On-WG) using a 64-point IDFT, sampling at 20 MHz as follows:

* Thirteen subcarriers are used, with subcarrier indices .
* The following subcarriers are null: .

***TGba Editor: Change the following sentences in P76L28 in TGba Draft 1.1 as follows (#1199):***

For a single 20 MHz WUR channel the 4 µs MC-OOK On symbol can be constructed by the On-Waveform Generator (On-WG) using a 64-point IDFT, sampling at 20 MHz as follows:

* Thirteen subcarriers are used, with subcarrier indices (#1199).